Export cartels

and economic development

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This dissertation is submitted for the degree of

Doctor of Philosophy

Wolfson College
March 2018

I would like to dedicate this thesis to my loving family . . .

Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text. It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. This dissertation contains fewer than 80,000 words including appendices, bibliography, footnotes, tables and equations and has fewer than 150 figures.

Peerapat Chokesuwattanaskul

March 2018

Acknowledgements

I truly believe that, without a great amount of helps provided by a number of people throughout my journey, I, myself, alone can never come this far. I am thankful for what I become and would not have it changed even a tiny bit. Please note that the following topics are by no means ordered by their importance.

People in my life

To those people whom I met, in whichever context or circumstance, during an invaluable time in Cambridge, each of you is at the heart of this transformative period of mine. I believe that a man is merely a unique composition of people around him. So whatever is good about thesis, I owe it to all of you. I thank you indeed for being in my life.

The same fully applies to those who came into my life before I left for Cambridge. From the kindergarten level to my first doctoral degree, I have been fortunate enough to get to know over hundreds of you whose names could never be put in an exhaustive list. But if you see this message and we know each other, you are already in that list. I wholeheartedly thank you as well.

Our lives will keep moving forward and there will be times at which our paths may cross and I hope I will be able to return them a favour, should my services ever be needed at all.

Dr. Ha-Joon Chang

These four years (five years, if master's degree is included) have been a transformative period of my life and my supervisor, Dr Ha-Joon Chang, is at the heart of it. It was clear to me since I was applying to pursue my further studies in Economics that University of Cambridge is at the top of my wish list and it was mainly because Cambridge has a faculty member called Ha-Joon Chang. Therefore, having an opportunity to study under his supervision is nothing short of a dream come true. I made one of the best decisions in my life when I asked to meet him at the beginning of my MPhil year in order to state my intention to work under his supervision in the PhD level. I personally believe that my strong intention was one of the main reasons why he later on took me on as his PhD student. Being his advisee, I have learnt how one professor can inspire and change a life of his student completely. Hands down, he is one of the kindest and most influential persons I have ever been fortunate to meet. His influences on how I look at the world and, particularly, the field of Economics are unmeasurable and will last indefinitely.

I would like to use this space to take a note about how working with Dr. Chang is like. Dr. Chang is famous among his students for his 'red-ink' comments, which could be found everywhere on almost every single page of his students' works. My experience is not an exception. I remember that the amount of comments literally threw me into a panic at first. I could barely sleep properly for a day or two after getting his comments for the first time, worrying if I had some serious flaws in my writing skill. It took me quite a while to start to realise how lucky I am for what he has done for me. I am so lucky to be trained by the world-class economist with a world-class standard. Gemstone cutting and polishing are difficult and time-consuming but tremendously necessary. Without them, a gemstone is crude and worthless. I clearly remember talking to him one day during the early stage of my PhD asking if my work disappointed him, as I still got so many red-ink comments after several revisions. He told me that he tried to be as critical as possible so that, after I have revised

my work in accordance with his comments, it will be tremendously difficult for anyone in the world to easily turn down my ideas. A few years after I started my PhD saw myself enthusiastically taking his feedback off the folder and looking at these red-ink comments with a wide smile on my face. My attitude towards his comments has been entirely changed. Going through his comments one by one, I can barely hide my gratitude towards the amount of efforts he put on examining my work. Eventually, the outcome speaks for itself. This thesis would have been far worse or even unfinished without those countless lessons and thoughts he has given me in the past four years. I will humbly take him as a role model when I become a lecturer in the future. The word 'thank you' can never be enough to return how much I owe to him.

My life without Dr Chang's teachings would have been completely different. Quite certainly, it would have been a much worse one indeed. I owe him greatly for the rest of my life.

My family

I would have achieved virtually nothing without a never-ending support from my family. It was during these five years away from home that I truly realised the value of being together as a family. A month or two at home per year could never been enough. Through countless ups and downs, they have always been there for me. To me, there is nothing in the universe (or multiverse) that can substitute my Dae and Ma (Dad and Mom), not even close.

I still remember well what Ma told me at the airport when I left for Cambridge for the first time in 2012. She said 'Do not be worried about me. Please do whatever benefits your future the most. Only a short call to let me know that you are fine is enough.' That short sentence from her has taught me what an unconditional love is. Her love has provided me the strength and courage to face any constraints or difficulties. Dae also gave me an incredible amount of support. It is him who always has faith in my potentials when no one including

myself does not. Without those little pushes from him, I would never have made it thus far. Whenever I told him and Ma about my achievement, their voices would be excitingly shaking. Such a moment always put a wide smile on my face. It is one of the most important purposes of my life. I remember that, even though I gave them a call everyday in the past five years, they usually asked to hang up after just a minute or less because they were afraid that they would disturb my study time. Dae and Ma have been tremendously understanding. They respected all the choices no matter right or wrong I have made in my life. They always let me know that, if I ever make a mistake, they will always be there for me. I hope this little step of my life will make them proud. I love you Dae and Ma, and I will always do. As the youngest boy, my elder brother and sister, Dr. Ronpichai (Yang) and Dr. Susama (Yin) Chokesuwattanaskul, have been someone to whom I always look up. Both of them are also at the heart of all the achievements I have acquired and will acquire in my life. I hope our family will keep being a great support to each other into the future.

My wife

One of the biggest days in my life happened shortly after the viva examination date. I got married to the most beautiful, the most charming, and the smartest girl with whom I fell in love during the final year of my PhD. Her name is Pim (Dr Anthipa Chokesuwattanaskul, previously Busagornruangrat). Our wedding was on March 3, 2018. I dedicate all my efforts put in this thesis to her and let this thesis be a witness of our everlasting love.

Examiners

I would like to explicitly express my gratitude to Professor Robert (Bob) Rowthorn and Dr Antonio Andreoni for their time and effort in reading and examining this thesis.

Proofreaders

I would like to explicitly show my gratitude to Dr. Julian Lewis and Mr. Tony Dye for proofreading this thesis at different stages.

The losses

Along my journey, sadly, I lost two PhD mates who passed away much too soon. My thoughts will always be with their families and friends. Even though I did not get a chance to know them well, I believe that we were entering the centre with the same goal in mind: We would like to make this world a better place for everyone, especially the poor. I hope I will be able to fulfil this goal in the future. To me, it is probably the best way I can do to pay tribute to them.

Abstract

This research aims to dispel the myth that export cartels should be prohibited because they restrain competition and, thus, holds back economic development. It also proposes the conditions under which export cartels promote economic development.

In contrast to the myth, this research argues that, when it comes to economic development, competition is not always desirable and, therefore, that export cartels should be formed under certain conditions. In other words, the doctrine that maximum competition is optimal competition is not applicable when the objective is economic development. Moreover, as export cartels from developing countries do not possess market power in the global market, if they facilitate their firms, which are mainly SMEs, to be able to export, competition in the global market is increased, rather than decreased.

We then propose the concept of competition relocation, which argues that cartelisation does not eliminate competition but relocate competition from the activity being cartelised into other activities. The concept rejects the conventional interpretation of competition as a unidimensional action, in which cartels always decrease competition. On the contrary, competition is multidimensional, i.e., firms compete across different activities. Therefore, cartelisation may not eliminate or decrease competition but simply relocates it across different activities and the overall degree of competition might even increase. Export cartels is simply a tool to relocate competition.

Based on the concept of competition relocation, we argue further that, in order to promote economic development, we must make sure that whenever cartelisation promotes the long-

term productive capabilities more than competition does, cartelisation should be promoted. To derive the conditions under which export cartels should be promoted, we used both history and game theory. We study the historical lessons of now-developed countries, including Germany, the US, and Japan and draw a game-theoretical model to derive the conditions under which export cartels promote economic development.

In terms of game theory, we propose that the situation in which export cartels should be promoted resembles the stag-hunt game, where both cartelisation and competition are Nash equilibria. Even though it is more productive to hunt a stag together, each hunter has an incentive to deviate and catch a hare. The model shows that, whenever the benefit of sharing resources between firms is sufficiently large (in comparison with other parameters), export cartels are more productive than competition. Therefore, most export cartels have been promoted among SMEs. Moreover, it also shows that, even though each firm may be able to export (due to abundant exclusive resources), the environment, which supports the use of resources across firms, could still make export cartels more productive.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 The motivation of the research

Adam Smith, right after his renowned invisible-hand argument, wrote in the Wealth of Nations, that

"People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices."

He continued his argument by admitting that the law is unable to "prevent such meetings." Even so, Smith argued further, the law should not "facilitate such assemblies; much less to render them necessary." Quite the contrary, the following century after Smith saw a number of rich countries facilitated or rendered such assemblies. This dissertation looks at those evidences and aims to dismiss what Adam Smith claimed above. The argument of this dissertation is that, under certain conditions, the government needs to facilitate or even render some types of assemblies to promote the public interests. The type of assembly and the

aspect of public interests on which this dissertation focuses are export cartels and economic development respectively.

1.1.1   An overview: Three stylised facts about export cartels

The motivation of this dissertation is best captured by three stylised facts from empirical evidence and the literature on export cartels, which will be discussed as follows.

Firstly, the dominant view shared among academics and policymakers nowadays is against export cartels, claiming that they are detrimental to the economy. Generally, they condemn export cartels as an obstruction to achieving an optimal level of efficiency and as merely a beggar-thy-neighbour policy and, therefore, recommend that export cartels should be abolished (Becker, 2007; Gonta, 2010; Martyniszyn, 2012; Sokol, 2008; Sweeney, 2007).

Secondly, despite the fact that most recent academic studies have advocated support for the policies against export cartels, in reality, export cartels are usually not illegal in most countries (see Martyniszyn (2012) further for the legal aspect of export cartels and why they do not usually fall under the legal constraints). Most countries worldwide either explicitly exempt export cartels by enacting special laws to legalise export cartels or implicitly exempt export cartels from competition law by stating that competition law covers only the practices that have impacts on a domestic market. For example, the 1918 Webb-Pomerene Act of the United States exempted export cartels from the provisions of the Sherman Act (Gonta, 2010; Schultz, 2002; Victor, 1991).

So far, the first two facts could simply imply that export cartels are like *cancer*, which survives through loopholes in regulations and the failure to notice by regulators. If it is so, advocation of policies against export cartels by academics and policymakers should be supported[1].

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[1]A point to notice is that, even if this is the case, medical treatments of cancers usually kill malignant and healthy cells as well and, thus, sometimes the medical advise for treating a cancer is not to treat it at all. Likewise, demolition of cartels may harm beneficial cooperation between firms and creates a net negative outcome. However, this point is beyond the scope of this study and should be left for future study.

However, **lastly**, historical evidence suggests that it is hard to say that export cartels are purely evil and should be strictly prohibited. When we look into historical evidence, export cartels have always been an integral part of the global economy. They were ubiquitous in now-developed countries during their catch-up periods. Too few have realised the fact that export cartels once, before the Second World War to be precise, governed almost forty per cent of world trade (League of Nations. et al., 1947) and all developed countries have used export cartels to a certain degree. Essentially, it is hard to imagine how the global economy would be if export cartels were absent from the picture.

The last fact gives weight to calls from developing countries to re-examine the impact export cartels have on economic development. On the contrary, it by no means implies that export cartels are always good for economic development. The bottomline is that export cartels could be either beneficial or detrimental in terms of economic development and our task is to identify when and why it is so. Most importantly, these calls challenge the current views held by academics and policymakers on export cartels that maximum competition is optimal competition (Amsden and Singh, 1994).

In subsequent sections, we first discuss, in section 1.1.2, how several attempts have been made on the international stages to call for a revision on the policy towards export cartels, especially from developing countries. Then, in section 1.1.3, we introduce the fundamental reason behind the repeated failures of such attempts: the dominant doctrine that competition is always desirable. We point out that competition may be not desirable in certain situations, one of which is when economic development is an objective; this point will also be further elaborated later in Chapter 4. The goal of this research is to describe when export cartels should be formed and when they should not.

1.1.2   Recent calls for the use of export cartels

Within the past few decades, several attempts have been made by developing countries and development scholars to call for special treatment in the case of developing countries to promote their economic development.

After the wave of post-Second World War liberalisation, the international community started to realise the fact that developing countries need differential treatment to be competitive in the global economy. In the 1960s, the *New International Economic Order* (NIEO) was proposed by economists such as Raul Prebisch. The NIEO demanded that developing countries should have special treatment relative to developed countries. In 1964, the Geneva Conference on World Trade and Development led to the establishment of the United Nations Conference on Trade and Development (UNCTAD), which became the first international organisation specifically founded to facilitate developing countries (Cox, 1979). Raul Prebisch also served as the first secretary general of UNCTAD between 1964 and 1969. At the core of the NIEO, the idea of stabilising and raising the prices of commodity exports of developing countries through different measures, such as trade policies, was proposed based on the case of Latin America and the industrialisation of Germany (Johnson, 1976). In other words, in order to promote the trading capability of developing countries, developing countries should be allowed to restrain their export activities (i.e., using trade policies) without any countermeasures from developed countries. Later on, the idea was explicitly incorporated as a part of the Declaration of the Establishment of a New International Economic Order by the General Assembly of the United Nations in May 1974. Certainly, export cartels could be seen as a trade policy, which developing countries may use in order to promote their trading capability (Immenga, 1995).

It was not until the 2000s that export cartels were explicitly discussed in the Doha Round of trade negotiations started at the WTO Fourth Ministerial Conference in Doha, Qatar, in November 2001. The fundamental objective of the negotiation was the Doha Development

Agenda, in which ministers explicitly stated that "developing countries' needs and interests" are at the heart of the Work Programme adopted in the Doha Round. Regarding export cartels from developing countries, a group of developing countries proposed that export cartels should be allowed to be formed in developing countries and in a non-reciprocal manner (without countermeasures from developed countries).

According to the Working Group on the interaction between Trade and Competition Policies (WGTCP), the special entity which was founded as a result of the 1996 Ministerial Conference in Singapore, report coded WT/WGTCP/6 in 2002, a group of developing countries such as Thailand, India, China, and Indonesia requested that export cartels from developing countries should be exempted on a non-reciprocal basis (under the principle of special and differential treatment)[2]. They argued that export cartels should enhance economic development prospect of developing countries by allowing these countries to export more and facilitate their firms' capabilities. For example, Thailand proposed the followings:

"...we believe that developing countries should be allowed to: (1) exempt national and international export cartels. This is because most developing countries' exporters or importers are mainly small scale and may need to bind together to counter the bargaining power of larger buyers or sellers from industrialized countries... (Communication from Thailand, 26 September 2002, p. 3)"

Under the special and differential treatment provisions in various agreements, including the introductory clause (the chapeau) of the Agreement Establishing the World Trade Organisation (the WTO Agreement), Article XXXVII of the General Agreement on Tariffs and Trade (GATT), Article 66 of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) and Article IV of the General Agreement on Trade in Services (GATS), the concept

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[2]See the WGTCP reports indexed WT/WGTCP/W/213/Rev.1 (Communication from Thailand, 26 September 2002); WT/WGTCP/W/216 (Communication from India, 26 September 2002); China: WT/WGTCP/M/19 (Minutes of the meeting of 26-27 September 2002), paragraph 78; Indonesia: id., paragraph 53.

of non-reciprocal preferential treatment for developing countries states that developed countries, by granting trade concessions to developing countries, should not expect the developing countries to make matching offers in return. Moreover, the 1979 Decision on Differential and More Favourable Treatment, Reciprocity and Fuller Participation of Developing Countries (the Enabling Clause) which was also adopted under GATT in 1979 also allows developed countries to provide more favourable treatment to developing countries. The Enabling Clause provided a legal basis for the Generalised System of Preferences (GSP), according to which developed countries offer non-reciprocal preferential treatment to developing countries. Furthermore, Article XVIII:C of GATT also allows developing countries to take any measure not consistent with other provisions of GATT 1994 in order to promote the establishment of a particular industry. However, the deviation requires consultations with affected members (developed countries in our case). All in all, this highlights that most of these cases provide a discretion to developed countries to make a decision whether to provide preferential treatment to developing countries or not. Therefore, it depends on the judgment of developed countries whether the treatment should benefit developing countries and be provided or not. In other words, there is no obligation for developed countries to provide special or different treatment to developing countries.

However, an agreement regarding the preferential treatment to allow export cartels to be formed in developing countries has never been reached. In 2004, the agendas of the subsequent WTO meetings (the *July package*) left out export cartels (Gonta, 2010). After that, the issue of competition policy including export cartels was left out of the negotiation during the Doha Round and the WGTCP became inactive[3] (Martyniszyn, 2012). The reason why the proposition from a group of developing countries fell through was because of the disagreement from developed countries such as Japan, who argued that export cartels will not only harm the economy of the importing countries but also the economy of the exporting countries.

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[3]Doha Work Programme, WTO Doc WT/L/579 (2004) [1(9)].

1.1.3   The doctrine that maximum competition is optimal competition

In recent decades, the vast majority of scholars have believed that cartels should not be allowed to exist (Bridgman et al., 2015; Sweeney, 2007). The reasons given were mainly that competition should yield lower costs and prices for goods and services, better quality, more choice, more innovation, greater efficiency and productivity, greater wealth equality, stronger democracy by dispersing economic power, greater wellbeing by promoting individual, liberty, free association, and economic development and growth (Gerber, 1998; Stucke, 2013); this research primarily focuses on economic development.

When it comes to economic development, the doctrine implies that one of the key factors hindering economic development is anti-competitive practices, including cartels. Anti-competitive practices have been accused of preventing the economy from achieving its optimal level of efficiency. Therefore, academics and policymakers have tried to advocate a simple rule: competition should be promoted by all means, hence the doctrine that *maximum competition is optimal competition* ("the doctrine"). The doctrine concluded in the report for the Inter-American Development Bank written (Crampton, 2004) that, "within OECD countries, competition is now broadly accepted as the best available mechanism for maximising the things that one can demand from an economic system in most circumstances" (Crampton, 2004). It is unsurprising that the past few centuries witnessed enactments of Antitrust or competition laws worldwide (Wells, 2012). Over a hundred of countries have become member countries of the International Competition Network (ICN), which is the network of countries that have enacted competition law (Stucke, 2013). Moreover, a number of studies also claimed that competition was a fundamental force behind economic development in now-developed countries. Sakakibara and Porter (2001) claimed that domestic competition was the reason why Japanese firms were able to compete in the international market. Kolasky (2002); Weingast (1995) and Fox and Pitofsky (1997) similarly argued that the Sherman Act has been a crucial contributing factor to the US economic growth in the past century.

When competition is considered desirable, cartels, including export cartels, are seen as something that should be prohibited. Unsurprisingly, cartels were named as the most *egregious* anti-competition practice by the Organisation for Economic Cooperation and Development (OECD). Cartels are egregious because they are equivalent to monopolies, yet more difficult to detect as they are usually disguised (OECD Development Competition Committee, OECD, 2002). However, when it comes to economic development, competition is not necessarily desirable and cartels could be beneficial. The subsequent section elaborates this point further.

1.1.4   Competition is not always good and export cartels are not always bad

One of the situations in which maximum competition is not optimal competition is when the objective is economic development (Amsden and Singh, 1994). Economic development is "a process of economic growth that is based on the increase in an economy's productive capabilities: its capabilities to organise and, more importantly, transform its production activities" (Chang, 2014). In terms of economic development, competition serves as a means not an end. Under certain circumstances, competition may hinder economic development. Sometimes, this type of competition is called ruinous or excessive competition. The reason is that, despite the fact that competition enhances an incentive to invest on productive capabilities, competition also reduces a capacity to do so because competition generally wipes out resources to make such an investment. Therefore, competition should be promoted only if it enhances economic development (Posner, 2009). In other words, competition should be controlled to strike a balance between incentive and capability, by which economic development could be optimised. Amsden and Singh (1994) also argued that most recent *economic miracles*, including Japan and Korea in the late twentieth century, have developed mainly by restraining

competition to reach the optimal level of competition, instead of maximising competition. In other words, the optimal competition is not maximum competition.

As maximum competition is unlikely to be optimal competition when it comes to economic development, export cartels are no longer the most egregious practice anymore. On the contrary, export cartels, when used appropriately, could also promote economic development, even more than competition in some circumstances. Therefore, the question becomes under which conditions export cartels should be formed to promote economic development vis-a-vis competition. To make the impacts on economic development of competition and export cartels comparable, subsequent chapters aim to find the common *denominators* or the *underlying factors* of the effects of both competition and cartels on economic development and consider how competition and cartels differently affect these factors and, hence, economic development (see Figure 1.1). The way to derive these common denominators is essentially by considering how (export) cartels were used in reality from historical evidence and literature. As a consequence, we review how cartels, especially export cartels, were used by developed countries during their development process (see Chapter 3). Eventually, after a set of factors has been derived, we consider the conditions under which export cartels enhance economic development more than competition does and vice versa (see Chapter 5).
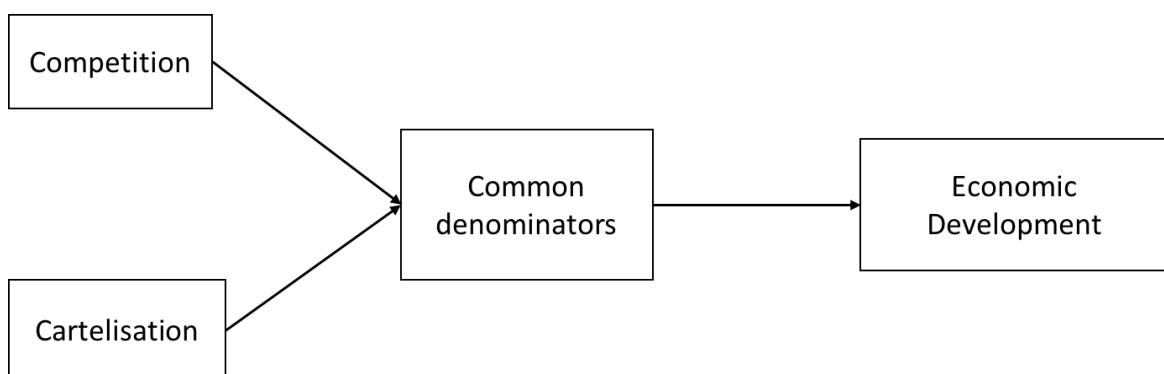
Figure 1.1 The common denominators through which competition and cartelisation affect economic development.

In the next section, we discuss the structure of the dissertation by briefly introducing the remaining chapters of this research.

1.2   The structure of the dissertation

In Chapter 2, the definition and the significance of export cartels, we define an export cartel in order to provide a common understanding of the types of organisation that fall under the scope of this research. An export cartel is defined as "an arrangement of more than one exporting firm in the domestic oligopolistic market in which they explicitly agree to cooperate in order to regulate one or more certain aspects of their horizontal export market interaction." We then discuss various elements of the definition and eventually discuss how our definition of an export cartel differ from other definitions in the literature in sections 2.2 and 2.3.

After the definition of an export cartel has been clearly stated and discussed, we subsequently point out why export cartels are worthy of being studied at all. In section 2.4, the significance of export cartels is discussed. In this section, we show that export cartels could be seen everywhere due to the fact that they could be formed in most countries worldwide almost without any legal constraints. This is of considerable concern, as export cartels, despite being useful in certain situations, could be detrimental in some situations. It will be also be shown later in Chapter 5 that leaving firms to arbitrarily make a decision does not always lead to an optimal outcome. Therefore, it is not recommended that export cartels will be *put under the blind eye* as they have been so far in reality. In conclusion, the current situation of export cartels is that they are *blindly ubiquitous yet barely understood*. Therefore, a further study on export cartels is much needed in order to understand when export cartels should be and should not be formed.

In Chapter 3, titled, 'Export Cartels: The evolution of practice and the academic literature', we explore the literature and the history of export cartels. As a significant number of studies

consider export cartels as merely a type of cartel and have discussed export cartels together with cartels in general, it is hard to find the literature that exclusively discuss export cartels.

In Chapter 3, after the history of the pre-cartel period (other preceding forms of organisations) has been discussed, the history of, and the literature on, cartels are separated into two periods, namely, the pre- and post-Second World War periods. The Second World War witnessed a turning point in the attitude towards cartels among both academics and policymakers. Generally speaking, the pro-cartel or the neutral view on cartels widely seen during the pre-Second World War period had rapidly changed into a ubiquitous anti-cartel view.

Apart from the literature on cartels, which mention export cartels in passing, and the literature on the 1918 Webb-Pomerene Act of the United States, the study of export cartels appeared for the first time, very recently, in 1981 (Jacquemin et al., 1981). Despite the fact that the *tone* of the literature has been volatile periodically, it is evident that export cartels have been widely and consistently used in many now-developed countries, including the U.S., Germany, and Japan. In Chapter 3, we discuss further how export cartels were used in different industries and try to draw some lessons from the experiences of these countries. These lessons form the main arguments of this research, which will be elaborated in Chapters 4 and 5.

In Chapter 4, titled, 'The relocation of competition', we propose that the relationship between export cartels and economic development can be best understood through the concept of competition relocation. The concept of competition relocation essentially states that an export cartel, instead of eliminating competition as widely understood, relocates competition from the regulated activities into the other activities along the value chain. Therefore, as long as the relocation process is conducted such that competition is preserved or increased in the activities in which competition is more productive than cartelisation and, at the same time, competition is removed from the activities in which competition is less productive

than cartelisation, an export cartel could enhance economic development. The discussion then focuses on identifying the conditions, under which cartelisation enhances economic development more than competition. In order to do that, the common denominators or the underlying factors of the impacts of both competition and cartelisation on economic development need to be described.

In Chapter 5, titled, 'The model', we identify the factors determining productive capabilities of firms (i.e., economic development). These factors are the resources that firms possess and the environment that firms are in (see Figure 1.2). The resources are classified into two types, one is more productive when being used within a firm (exclusive resources), the other is more productive when being shared across firms (shared resources). The environment is similarly classified into two types; one which supports the use of resources within a firm (the within-firm multiplier), while the other supports the use of resources between firms (the between-firm multiplier). The way in which these factors determine productive capabilities of firms is, in turn, decided by whether firms compete with each other or to form an export cartel. These factors are used to measure the payoffs of the firms in the game in which they have to decide whether to compete or to form an export cartel.
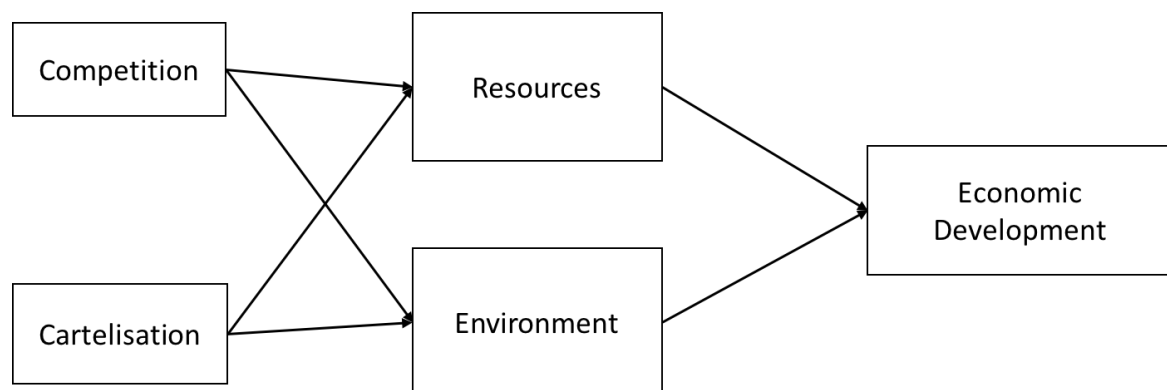
Figure 1.2 The common denominators, through which competition and cartelisation affect economic development, are resources and environment.

Whenever cartelisation is more productive than competition, it is proposed that the game becomes the so-called **stag-hunt game**, in which forming an export cartel to access

the global market is analogous to cooperation in a stag hunt. In the stag-hunt game, both competition and export cartel formation are Nash equilibria of the game and equally likely to happen. It is therefore argued that the government has to take action by guiding firms to choose the most productive equilibrium, i.e., export cartel formation. Otherwise, if firms, in such situation, choose to compete instead, competition becomes what literature describe as *wasteful* competition.

In Chapter 6, titled, 'Conclusion', the results of the research will be presented along with how they correspond to the research questions posed at the beginning of the research. The limitations of the study will be discussed and further notes provided from which the future research may be drawn.

Chapter 2

Definition and significance of export cartels

2.1 The definition of an export cartel

An export cartel[1] is **"an arrangement of more than one exporting firm in the domestic oligopolistic market in which they explicitly agree to cooperate in order to regulate one or more certain aspects of their horizontal export market interaction."** The definition could be broken down into three elements: an oligopolistic market, an explicit agreement to regulate, and the horizontal export market interaction; each point will be discussed subsequently.

2.1.1 An oligopolistic market

The first part of the definition states that: **"an arrangement of more than one exporting firm in the domestic oligopolistic market ..."**. An export cartel, like any other types of cartel, is formed in an oligopolistic market. The number or the size of firms in the

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[1]The term "cartel" was just introduced to the English-speaking world in less than a century ago in Robert Lieftmann's book first published in German in 1897 then translated into English in 1932. It was derived from the German term *Kartelle* which means *alliances of enterprises* (Liefmann, 1932)

oligopolistic market has no definite figure. The market is considered oligopolistic as long as firms could still recognise the *mutual interdependence* of their decisions (i.e., **interaction**) (Martin, 2010). As a consequence, each firm takes the decisions of the other firms that have an effect on the outcome of its respective decision into account when making *strategic* decisions, i.e., the best decision after taking the other firms' decisions into account (Schelling, 1980). A strategic decision, however, is usually made when firms do not cooperate or the cooperation is not credible or non-binding. Alternatively, firms may decide to regulate their mutual interdependence by agreeing upon a specific choice of decision for each firm, that is, forming a cartel.

In a textbook's version of a competitive market, atomistic profit-maximising firms find themselves homogenous with each other. These atomistic firms know that each of them cannot individually affect the market outcome or the other firms' decision. In that situation, it is not possible to have an arrangement **"...to regulate one or more certain aspects of their horizontal export market interaction"**. However, it does not imply that an export cartel has to be formed solely among larger firms. Moreover, an export cartel is not necessarily formed among all firms in a given industry, i.e., a full cartel. In reality, export cartels are commonly formed among small- and medium-sized enterprises (SMEs) who co-exist with larger firms in the domestic market. For example, the joint marketing board (a type of export cartel) was formed among the Danish dairy product firms during the twentieth century. Therefore, the size of firms is not an important element of an oligopolistic market as long as the decisions of firms are still interdependent, this element will be subsequently discussed.

2.1.2   An explicit agreement to regulate

The second element of the definition is that an agreement to form an export cartel has to be explicit. In other words, the agreement has to be made as a consequence of the explicit

communication between firms[2]. However, cartel formation and stability are distinctive. Whether each party will respect the agreement and act accordingly impacts the issue of stability. Cartel formation is complete, i.e., a cartel is formed, after the agreement has been made even though all members may defect afterwards, in which case, a cartel is formed but becomes unstable. The explicitness of an agreement has to be stated because the strategic decision of a firm does not necessarily lead towards an explicit[3] agreement among firms[4] An export cartel is an explicit agreement in the sense that firms explicitly communicate through negotiations, bargainings, and the like in the process of formation in order to make an agreement to further their interests (Olson, 2009; Stigler, 1964).

Apart from being explicit, an export cartel agreement must aim to regulate their mutual interdependence or interaction. An insightful way to consider an export cartel agreement is through the lens of *internalisation*[6], namely, an agreement that firms take certain aspects of their mutual interdependence into the firms' boundaries instead of the market (Coase, 1937). Therefore, in terms of internalisation, an export cartel is an agreement among firms to internalise their mutual interdependence (interaction) by coordinating their decisions instead

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[2]Posner (2009) comprehensively discussed different cases in the U.S. antitrust discussions in which actions were considered on the basis of whether they were explicit and tacit agreements between firms

[3]Some works referred to a cartel as explicit collusion and further defined collusion as a 'secret' agreement (Kaplow, 2013). Therefore, even though a cartel is formed by an explicit agreement among firms, the agreement is secretly kept away from the public including consumers and the government. In fact, a cartel has not always been secret and was actually even promoted by the government. It was not until after the World War II when the liberalisation regime dominated that cartels became increasingly illegitimate ever since (Fear, 2006; Stocking and Watkins, 1948).

[4]Sometimes, an agreement to regulate firms' interaction could be made without direct or explicit communication. For example, one firm sets the price at its preferable fixed level. The other firm sees the price level in the market and decides to match the price. In this case, there is no "explicit" agreement between firms but the agreement to regulate their pricing activity has been "tacitly" made, hence, the so-called *tacit collusion*[5] (Carlton and Perloff, 2005; Ivaldi et al., 2003; Posner, 2009). Posner (2009) argued that it is difficult to find a sharp separation between tacit and explicit collusion in practice. However, the discussion is out of the scope of this study. Tacit collusion, obviously, is not considered a cartel.

[6]The criteria under which the internalisation decision (whether to form an export cartel or not) is determined can be either the minimisation of transaction costs and the maximisation of value creation. The former has been the main subject in the field of Transaction cost economics (Coase, 1937; Hennart, 1991; Peng and York, 2001; Williamson, 1979, 1981). On the other hand, the latter has been studied in the Resource-based view of firms (RBV) (Barney, 1991; Das and Teng, 2000; Peteraf, 1993; Wernerfelt, 1984). Neither of these two perspectives is unanimously more useful than the other. In the section 4 on page 119, the facts that economic development serves as an objective of export cartels gives more weight to the value creation, and hence naturally leads to the use of RBV.

of treating the decisions of each other exogenously. Consequently, an export cartel can be considered as "the intermediate form" between a spot market, on the one hand, and mergers and acquisitions (M&A), on the other hand (Fear, 2008). A spot market represents a zero degree of internalisation under which firms unilaterally decide all aspects of interaction (e.g. price, quantity, quality, and so on). On the other hand, mergers and acquisitions represent a full degree of internalisation under which firms explicitly regulate all aspects of their mutual interdependence (by becoming the same firm). An export cartel is a case where firms explicitly regulate certain aspects of interaction and let the other activities remain untouched. In practice, the intermediate form normally implies internalisation of just one or two activities in order to partly "limit or eliminate competition among them" and "free producers (firms) from the influence of market forces" (Stocking and Watkins, 1948).

Firms do not necessarily further their mutual benefits: The collective action problem

On the surface, firms should make an agreement whenever it promotes their common goal. However, an agreement could not be as easily made as it may seem. There is a situation in which an individual will be better off at the expense of the other by defecting from the agreement. This is sometimes described as the individual having a *free-riding* incentive, i.e., the task being agreed could be done by each individual while the other individuals get the benefits of the task without any contribution as if they are taking a free ride. This is the so-called *collective action problem* (Olson, 2009).

Being the intermediate form between the market and a single firm implies that each firm in an export cartel preserves its autonomy while deciding to give up its freedom of decision in certain aspects. The fact that each firm still preserve some of its autonomy creates the collective action problem. The collective action problem is a situation in which, despite the fact that cooperation makes everyone better off, each firm gains a unilaterally greater benefit from defection while the others pay the cost. As each firm is uncertain of the other firms

propensity to defect when it cooperates, it chooses not to cooperate as well. This fear of defect makes cooperation difficult or even impossible from the beginning. In the context of cartels, the most obvious example is a price-fixing cartel, whereby the member firms agree to fix prices at a certain level. Any individual firm may, however, get a unilaterally greater benefit if it decides to break the agreement, or defect, by undercutting the agreed prices in order to attract more customers.

In addition, the collective action problem could be seen as a situation in which a cartel agreement could benefit outsiders and, therefore, the outsiders have no incentive to take part in a cartel. In the same example above, a firm, knowing the price level fixed by a price-fixing cartel, could charge the same price level without being a member of the cartel. These outsiders need not pay the costs of bargaining, negotiation or the legal exposition afterwards and, thereby, prefer to not get involved. Therefore, firms prefer to remain as outsiders and it is more difficult to cooperate and form a cartel (Bowman, 1989; Olson, 2009). This type of free-rider, however, is rather mild when a cartel agreement could exclude outsiders. The exclusion could be governed by either an internal mechanism or an external intervention such as selective incentives or benefit for the members and the legal enforceability of a cartel agreement. For example, a Joint Sales Agency (JSA) may provide its exclusive services only to its members.

Realising that the collective action problem significantly affects how cartels could be formed, the literature on cartels in the past few decades have put an emphasis on the factors determining formation and sustainability of cartels[7]. There are different situations under which cartels, including export cartels, are more prone to the collective action problems than the others. In other words, there are different types of collective action problems, which should be elaborated subsequently. In this section, we consider two of the major types: heterogeneity of firms and frequency of contact.

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[7]Another motivation, which will be discussed in Chapter 3, is that cartels have been 'stigmatised' as an egregious action. Therefore, the relevant policies should aim at destabilising cartels by all means

One caveat on the issues of formation and sustainability of cartels is that they are not always necessarily crucial in terms of economic development because of two main reasons. Firstly, the promotional effects of export cartels on economic development rely on the fact that firms, knowing that a cartel will be dissolved in the foreseeable future, will have an incentive to 'relocate' competition to the non-cartelised activities (see further discussion in Chapter 4). Therefore, if export cartels are 'too sustainable'[8], they may have an adverse consequence on economic development instead. Secondly, most of the studies on export cartels are based on the 'non-cooperative' nature of cartels, which includes the situation in which the agreements are made but non-binding (when they are illegal). However, in the light of this study's propositions, when export cartels are more productive than competition, the government should be proactive and encourage firms to form export cartels (see further discussion in chapter 5).

Heterogeneity of firms

At a glance, it seems to be a common sense to make an assumption that heterogeneity of firms should make it more difficult for firms to make an agreement to form an export cartel. However, there are different kinds of heterogeneity of firms and they are supposed to affect a collective action differently.

Heterogeneity[9] in terms of market shares, number of varieties in the product portfolio, costs and technological knowledge, and capacities tend to destabilise cartels (Motta, 2004). In a nutshell, a homogeneity of firms sets firms at a level playing field when they negotiate their stakes in a cartel agreement. Moreover, it is easier for firms to set a common practice in

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[8]In the context of this study, an export cartel is too sustainable when, even after competition has become more productive than cartel formation, a cartel is still operating.

[9]Häckner (2000) proposed a reverse relationship between cartels and heterogeneity of products, especially in terms of differences in tangible or subjective quality. This argument is in line with the concept of competition relocation, which will be discussed further in Chapter 4.

a certain activity (Martin, 2010). Therefore, an absence of it, i.e., heterogeneity, destabilises cartels.

In terms of size, as measured by capacity constraint, if the marginal costs are different across firms, the firms with higher marginal costs will need to reduce outputs and those with lower marginal costs will need to increase their outputs. These adjustments become harder once the difference is too substantial and, therefore, firms find it difficult to agree upon their conducts or to enforce their agreement. This fact explains why heterogeneity in size undermines cartels even in highly concentrated industries. It is because smaller firms are unable to discipline the larger firms (Compte et al., 2002). Berla (2000) studied the airline industry and found that firm-size inequality destabilises collusion. A study of domestic crude oil industry in the US in the late 20th century shows that small and low cost firms tend to be the first who violate quotas (being agreed under a cartel) (Wiggins and Libecap, 1987). On the contrary, the larger producers could alternatively act as "swing producers" who facilitate the sustainability of a cartel. For example, Saudi Arabia and Texas are the large producers of the sustainable OPEC and interstate oil cartel in the US respectively. However, this could be seen as a mechanism, by which members use to overcome the difficulty caused by heterogeneity. Often, the dominance of larger firms occurs when merger and acquisition (M&A) are prone to the legal intervention (e.g., Antitrust law), therefore, larger firms are forced to keep smaller firms alive but use its influence to control the agreement to be in its desirable direction.

The level of heterogeneity could also be enhanced by the fact that there are an increasing number of firms trying to reach a cartel agreement. The complication of any negotiation process exponentially increases with the number of involving parties. Certainly, an agreement between two heterogenous firms is (often substantially) less complicated than an agreement among a dozen of firms. In the field of Industrial Organisation, the term 'concentration' is widely used to represent the extent to which a particular market has active members.

Moreover, firms still independently make their decisions as members of a cartel and, often, just a decision to deviate by one firm is sufficient to dissolve a cartel. Therefore, the more firms involving in a cartel, the more likelihood that a decision to deviate may occur. Having said that, it is clear that entry barriers (to limit the number of firms) promote cartel formation and stability (Levenstein and Suslow, 2006). The entry barriers may be created by sunk costs of production, customer loyalty, predatory pricing[10], or direct government intervention Granitz and Klein (1996); Scherer and Ross (1990).

Focusing on the heterogeneity in terms of product, even though the products of firms are relatively homogenous (the elasticity of substitution between products is high), the *demand-side* heterogeneity may also affect the sustainability of cartels (Stigler, 1964). In other words, the commitment of buyers to purchase different homogenous products may differ across sellers due to the size and urgency of buyers. Moreover, Motta (2004) interestingly pointed out that, even though products are homogenous, the differentiation among products could be made indirectly through different marketing tools. For example, the advertisement in homogenous products such as cigarettes, beverages, and mineral waters can make the difference among the homogenous products to consumers.

Frequency of contact

In some situations, the collective action problem could be rather mild or may not even exist, and, therefore, cartels could be sustained. One situation occurs when the game is to be played repeatedly and indefinitely. In such situations, each firm has more strategies to play than just cooperation or defection. In reality, regularity and frequency of orders are

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[10]To discourage entry, the perpetrators of the US pools consciously decided to raise prices higher than monopoly level within a few months. They reasoned that potential entrants would view such unsustainable prices as evidence that the members were irrational and that the pool would quickly crash before the outsiders could start production. This information-obfuscation tactic worked because large-scale entry was thwarted for a year, which allowed that cartel to operate successfully for 19 months, about 12 months longer than if a more moderate pricing policy had been adopted (Edgerton, 1997)

believed to promote the stability of cartels because the threat is imminent and the benefit from deviation is small (Motta, 2004). In terms of game theory, there are some strategies by which the collective action problem could be mitigated or even demolished.

One example is a strategy whereby a firm remains cooperative as long as the other firm cooperates, and defects as soon as the other firm defects thereby remaining uncooperative indefinitely. A strategy is called the **grim-trigger strategy**, demonstrates how a cartel may be sustained, despite the fact that a short-term benefits of defection outweighs the short-term benefits of cooperation, as long as the long-term (present-valued) benefit of cooperation outweighs the short-term benefit of defection (Mailath and Samuelson, 2006). In reality, even though violating the agreement might put each firm in a favourable position at the expense of the other, it also significantly reduces the future possibility of cooperation because of the distrust among firms.

Another example is a strategy whereby a firm cooperates in the first move and will imitate the other firm's move from the previous period. This strategy is called the **tit-for-tat strategy**. The strategy was once empirically proven to be superior to the other strategies (always-defect, always-cooperate, and random strategies) in the renowned Axelrod's computer tournament. The experiment was conducted by letting a group of professors submit their strategies to compete in the iterative setting of a prisoner's dilemma setting. Therefore, as long as the game is started by cooperation, the tit-for-tat strategy will lead towards the long-term cooperation.

Export cartels and collective action problems: How to address the issue

We have seen how the collective action problem may destabilise cartels, including export cartels. We also have seen how different types of the collective action problems may occur and some situations will have a more severe problem than the others. Moreover, we have discussed that 'too much' sustainability of export cartels is not always a good signal, especially when it comes to economic development. As we will be seeing throughout this

study, export cartels have distinctive features, which differentiate them from other types of cartels. One of such features is the fact that export cartels are usually formed by relatively smaller players in the global scale, who themselves are unable to individually penetrate into the global market. It is primarily argued that this characteristic alleviate the degree of the collective action problem to a certain extent already, as the failure from the collective action becomes more costly. This feature of export cartels led us to question the validity of using the famous prisoner's dilemma to represent the situation of export cartel formation.

Even though the prisoner's dilemma game has been widely used to model a cartel in literature, it is not necessarily the only game whereby a cartel could be described. Scherer and Ross (1990) argued that collective action problems should be represented by Assurance or Chicken games or a mix of both instead, especially when individuals can choose from a continuous range of strategies. This dissertation proposes that a cartel, especially an export cartel from developing countries, is best described as a **stag-hunt** game (or the Assurance game). If one were to suppose that no amount of collective benefits could be provided until the total contributions exceeded a certain threshold, then there would be no strong incentive to defect or exploit. This case may lead to either cooperative or non-cooperative Nash equilibrium, i.e., there are multiple Nash equilibria, so the intervention by a third party (e.g., the government) to enforce the preferred (more productive) Nash equilibrium might be needed (Taylor, 1987). In Chapter 5, a relationship between a stag-hunt game and an export cartel will be elaborated further and it will be argued that the game perfectly portrays an export cartel from developing countries.

Although export cartel formation could be represented by the stag-hunt game, it does not mean that the collective action problem simply vanishes. It just becomes milder, to certain extent depending on the contexts (mainly, depending on how large the benefit from the collective action is, i.e., how large a stag is). Different types of the collective action problems we discussed above still exist and may as well destabilise export cartels. In order to address

the heterogeneity of firms, in Chapters 4 and 5, we will assume away the difference in terms of size of firms by setting the same amount of resources across firms. However, as we will separate firm's resources into two types, one of which is more productive to be used within an export cartel. We will elaborate further that resources of this type are not necessarily the same across firms, but their services are *complementary*. These complementary resources, despite being heterogeneous, should help facilitate export cartel formation. Therefore, once a firm is considered as a bunch of resources (see further in Chapter 4 and 5), heterogeneity in the standard sense may be insufficient to determine if it facilitates and undermines an export cartel.

Apart from the heterogeneity, in Chapter 5, other collective action problems could also be captured within the notion of the cost of cartel (γ), especially the element of the cost of cartel which is defined as *executing costs* (ε). The executing costs are the costs which a firm needs to pay to execute an export cartel only after firms decide to form it. The executing costs contain negotiation costs, which firms have to pay in both monetary and non-monetary firms so that the different types of collective action problems will be *tranquilised*. Unsurprisingly, the higher the cost of cartel is, the less likelihood that export cartels will be formed.

Therefore, an export cartel has to be an *explicit* agreement to regulate firms' *interactions*. However, not all types of interaction are meant to be regulated by an export cartel. The subsequent section discusses the last element of the definition of an export cartel: a particular type of interaction which is regulated by an export cartel, i.e., the horizontal export market interaction.

2.1.3   A horizontal export market interaction

The first two parts of the definition concern the oligopolistic market in which firms operate and the explicitness of the agreement. The last part of the definition concerns the substance

of the agreement. From the definition of an export cartel, the substance of the agreement is "...one or more aspects of their horizontal export market interaction." From the individual firm's point of view, these one or more aspects are, in turn, the activities along the value chain[11].

The value chain is "a system of interdependent activities" and it "divides a company's activities into the technologically and economically distinct activities (i.e., value activities) it performs to do business" (Porter and Millar, 1985). Moreover, the firms' interactions with each other are *horizontal* as long as the respective interdependent decisions remains at the same level along the value chain. For example, the sales and marketing activities of two exporting firms in the same industry are horizontally aligned and any agreement to regulate some or all of these activities such as sharing the export market information is an agreement to regulate the horizontal export market interaction. On the contrary, an original equipment manufacturer (OEM) may agree to share the export market information[12] with some downstream distributors (its buyers). Such agreements are not horizontal but vertical agreements and hence not an export cartel. It is more sensible to define the horizontal interaction at the level of activity, rather than at the level of the firm, because different firms interact with each other in different sets of activities[13].

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[11]In recent literature, the horizontal export market interaction is sometimes narrowly defined under the scope of a *hard-core* cartel and is therefore limited to some specific types of activities such as price setting, bidding, output quantity, and market share OECD Development Competition Committee, OECD (2002); Whinston (2003). At the extreme, some literature consider only the case of price setting, i.e., price-fixing cartels (Carlton and Perloff, 2005; Church and Ware, 2000; Connor, 2007a; Posner, 2009). These limited definitions of horizontal (export) market interaction could be found in most of mathematical and econometric studies on cartels in which the choice variables are mostly either price or quantity (Loury, 1986; Wiggins and Libecap, 1987). However, these definitions are too narrow to analyse the effects of export cartels on economic development.

[12]Even though the functions of export cartels are different in the substance of the agreement, they normally share one characteristic: *exchange of information*. Exchange of information is an interaction among competitors that exchange various types of information through different channels. There are two types of information exchange in an export cartel. Firstly, exchange of information as a facilitating factor of regulating other horizontal interactions such as price fixing or market sharing agreement. Secondly, exchange of information is a stand-alone practice in itself. The latter could both increase market transparency and stabilise an export cartel. See further discussion in Capobianco (2004).

[13]In practice, an agreement to regulate one activity, say, prices, is difficult to effectuate without regulating other *ancillary activities* such as quantities or market share. As a consequence, export cartels are inextricably mixed in type (Posner, 1970). Some Neoclassical economists claimed that hard-core (export) cartels could

The activities along the value chain

The activities along the value chain are the options which export cartels may choose to regulate (i.e., internalise). In Figure 2.1 on page 28, the activities start from the design and product development (idea and physical creation of the product) and end with the consumption and recycling process. Once the product or service is designed, the production unit transforms the idea into reality with the help of support activities by providing input and infrastructure. Afterwards, the product or service is introduced to the export market by the marketing unit. Eventually, the product or service reaches its consumer abroad and possibly goes through the recycling process afterwards (Kaplinsky and Morris, 2001).

Each of these activities along the value chain is facilitated by the factors including firm infrastructure (e.g. managerial and operational structures), human resource, technology development and procurement. These facilitating factors support all the activities along the value chain by which the knowledge and physical inputs (such as raw materials, machines, and labours) are turned into the final products. The facilitating factors and the knowledge and physical inputs are collectively called "resources", and form the underlying concept on which the model in Chapter 5 is developed.

Moreover, all activities in the value chain are interdependent, i.e., there are both material and information exchanges across activities (Rayport and Sviokla, 1995). For example, the design and product development activity provides the specifications of the products and the materials needed for the production activity, which, in turn, provides feedback regarding the productive capability and technology back to the design and product development unit. At the same time, the marketing activity needs to reflect both activities to understand the characteristics of market demand so that they could design and produce suitable products to serve

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be productive because the benefits of these ancillary agreements outweigh the costs of hard-core agreements. However, they still failed to explain why hard-core export cartels are always welfare-reducing and how the productivity gain from ancillary agreements may outweigh the efficiency loss from the hard-core agreements in the so-called non-naked cartel agreements (Bork, 1978; Bos and Pot, 2012; Sproul, 1993). This point will be elaborated further in the subsequent chapter.

Figure 2.1 A value chain (adapted from Porter and Millar (1985) and Kaplinsky and Morris (2001))
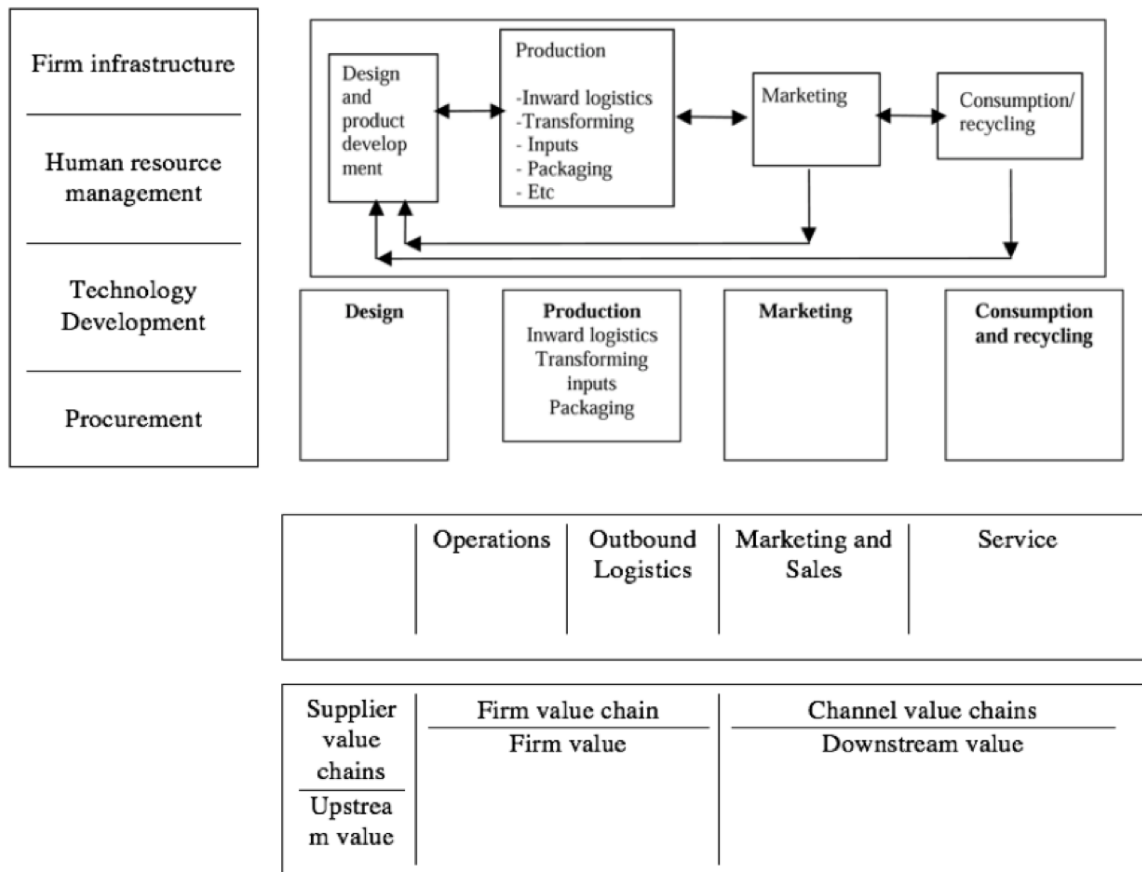
the market. The interdependence of activities also implies that resources could be relocated across activities. The relocation of resources is, in turn, essential for understanding how the formation of an export cartel in the "right" activities may induce economic development. This point is elaborated in Chapter 4.

In conclusion, different activities or different sets of activities upon which firms agree to regulate, lead to different types of export cartels. An arrangement of an export cartel could be based on any activity from simple price-and-quantity fixing to a more complex organisational function such as the joint sales agency and profit-pooling cartels (as Kaplow (2013) called the "classic cartels") as long as these activities are export-oriented.

According to section 2.1.2, an export cartel is an intermediate form between the market and the firm in terms of internalisation. Table 2.1 on page 31 shows that the markets, firms and different intermediate forms. These cartels could be conducted either privately and publicly as cartels that are led by firms and the government respectively. Hard-core cartels were formed to fix prices, make rigged bids (collusive tenders), establish output restrictions or quotas, or share or divide markets by allocating customers, suppliers, territories, or lines of commerce OECD Development Competition Committee, OECD (2002). These agreements are singled out because of the nature of those agreements whereby consumers are directly and strongly affected. Therefore, since consumerism has become a predominant view in competition-related topics which include cartels, hard-core cartels have become the focus of the recent literature on cartels, as will be discussed later in this study. It should be noted that the order of these intermediate forms in the table does not imply the degree of internalisation.

Below, the functions of different types of cartels in Table 2.1 are shown in Table 2.2 on page 32[14]. The list of cartels in Table 2.2 is not at all exhaustive as a cartel could be formed to regulate any activity along the value chain. Moreover, a cartel need not regulate just one activity at a time.

Most of the existing literature consider export cartels as a distinctive type of cartels. However, export cartels may actually regulate any activities that domestic cartels can regulate. For example, an export cartel may actually establish desirable procedures for transacting export markets (like a condition cartel), allocate customers in export markets (like a customer cartel), or share export markets (like a territorial cartel). Therefore, export cartels are not

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[14]A similar categorisation can also be seen in the empirical studies as well. For example, Posner (1970) studied the antitrust cases of the United States' Department of Justice (DOJ) between 1890 and 1969. The source of data is a series of volumes published by the commerce clearing house, which is collectively called the *blue book*. Being labelled the horizontal conspiracy, a cartel was the most frequent alleged antitrust cases and has similar "means employed" (functions) to the ones proposed in this study. These functions include exclusive sales agencies (pool), production or sales quota, trade association, division of territories, patents or copyrights, etc. Interestingly, among these functions, the most frequent one was trade association (431 out of 989 cases or 43.58 per cent). Trade associations are formed to regulate the activities of members to conform to the definitive aim (Liefmann, 1932) and are essentially export cartels by our definition. Similarly, Haucap et al. (2010) classified German cartels between 1958 and 2004 into cooperation, specialisation, rationalisation, condition, rebate, price fixing, bidding agreements, quantity fixing, and allocation of territories cartels.

merely another type of cartel. Instead, export cartels and domestic cartels are identical in terms of function but are different in terms of objective (i.e., for maximising collective profits from exports).

In conclusion, the definition of an export cartel comprises of three basic elements: an oligopolistic market, an explicit agreement to regulate, and the horizontal export market interaction. The first element, an oligopolistic market, was discussed in section 2.1.1. The members of export cartels must realise the fact that their decisions are interdependent, i.e., they are interactive. The second element, an explicit agreement to regulate, was discussed in section 2.1.2. The export cartel agreement has to be explicitly agreed among the members and it must regulate their interaction. The last element, the horizontal export market interaction, which was discussed in section the horizontal export market interaction, describes a specific type of interaction which export cartel agreement must aim to regulate. Having elaborated on the definition of export cartels, the next section discusses definitions of export cartels in the literature. The next section demonsrates why several of the existing definitions of export cartels are either too broad or too narrow to serve the purpose of this study, namely, to understand the relationship between export cartels and economic development.

2.2   Definitions of export cartels in the literature

The definitions of export cartels in literature are limited (see, for example, Dick (1990); Gonta (2010); Immenga (1995); Jacquemin et al. (1981); Schultz (2002)). The definitions of export cartels, if explicitly defined, have been generally portrayed to fit the purpose of each individual study. Economic development, however, has been largely overlooked as the purpose of study of cartels, let alone the purpose of study of export cartels (Levenstein and Suslow, 2006). Therefore, most of the definitions of export cartels in the literature do not fit the purpose of this study.

Table 2.1 Markets, firms and intermediate forms (adapted from Fear (2008))

Modes	**Type**
Competition (non-internalisation)	- Spot markets - Implicit collusion
	- Contractual or condition cartels - Type/Standard cartels (environmental safety/ product quality processes) - Patent/Patent licensing cartels - Customers cartels - Specialisation cartels - Territorial cartels - Quota cartels - Price cartels - Syndicates - Rationalisation cartels - Recession cartels - Cooperative marketing/purchasing arrangements
Strategic alliances	- Long-term contracts - Networks (Enterprise groups/Subcontractors) - Non-equity strategic alliances - Equity-based joint ventures
Hierarchies	- Firms

Table 2.2 the functions of different types of export cartels (Audretsch, 1989; Fear, 2008; Haucap et al., 2010)

Type of export cartels	Function
Contractual/Condition cartels	Establishing desirable procedures for transacting on markets by setting general terms and conditions of business, delivery and payment.
Type/Standard cartels	Setting quality standards, or codes of behaviour, or minimum environmental, labour, or sefety regulations.
Patent/Patent licensing cartels	Clarifying patent rights or restricting the use of related, unpatented articles or processes. They also include patent pooling, i.e., cross-licensing arrangements.
Customers cartels	Allocating customers or suppliers to certain producers.
Territorial cartels	Sharing geographically-defined markets.
Quota cartels	Limiting the output of members.
Specialisation cartels	Assigning distribution channels, product lines, or production techniques to firms–this is a non-price-oriented strategy, which clarified the division of labour and divided the market.
Price cartels	Fixing the price of members.
Rationalisation cartels	Rationalising economic activities, i.e., "organiz(ing) (economic activities) through a division and coordination of activities for the purpose of achieving greater efficiency and productivity." (Freund, 1968), by standardisation, agreements to reduce transport and inventory costs and to stabilise excessive demand fluctuations, and rationalisation in conjunction with price agreements or the establishment of joint purchasing or selling organisations by which leads to an increase in productive efficiency and an improvement in consumer welfare (the pre-2005 article 5 of GWB).
Syndicates	A specific type of rationalisation cartels, the I.G. (*Interessen-Gemeinschaft*) in German, through which firms need to pool their profits together and a syndicate will then allocate profits in accordance with the agreement.
Recession cartels	Coordinating reduction in productive capacity in consequence of a non-temporary reduction in demand (e.g., in shrinking industries) to eliminate excess capacity efficiently.
Cooperative marketing cartels	Acting as a collective bargaining agent in negotiations with outsiders including buyers and/or suppliers.

2.2.1   Too-narrow and too-broad definitions of export cartels

2.2.1.1   Export cartels on specific activities: Too narrow

Export cartels may be narrowly defined to regulate just certain activities. Some studies simply define export cartels as hard-core cartels in export trade (Becker, 2007; Bhattacharjea, 2004; Martyniszyn, 2012; Sokol, 2008). Export cartels in these studies are generally criticised on the same grounds as hard-core cartels. Some other studies limited export cartels to specific functions, such as joint marketing and R&D export cartels. For example, Audretsch and Yamawaki (1988) and Kamien et al. (1992) emphasised the importance of regulating R&D activity by cartels without discussing the use of cartels in other activities.

As they are poorly defined, export cartels have an increased chance of promoting allocative efficiency (Bos and Pot, 2012; High, 1985; Sweeney, 2007). An example is the R&D cartel, which regulates a relatively *upstream* activity, therefore, final consumer prices are not particularly affected either in the short term or the long term. Recent studies on export cartels restrict the definition of export cartels to certain activities where allocative efficiency could be promoted.

However, in the subsequent chapters, it will be shown that not all firms or industries will equally benefit from regulating the same activities including R&D, especially, in terms of dynamic efficiency. Therefore, narrowly defining export cartels as cartels formed to regulate certain activities does not allow the proper study of the (more general) relationship between export cartels and economic development.

2.2.1.2   Export cartels on any activity: Too broad

Some studies recognise the fact that export cartels (or export associations) are formed to regulate a variety of unspecified activities, which may change over time and contexts. As a consequence, some definitions of export cartels attempt to include as many types

of cooperation as possible. For example, Sweeney (2007) defined an export cartel as an agreement "between exporters to act collusively in respect of some aspects of their export activity." However, these studies often overly broadened the scope of export cartels such that export cartels become "any" co-operation among firms that export. Jensen-Eriksen (2013) similarly defined cartels as "alliances of producers from one country, which aim to limit competition and promote co-operation between them in foreign markets", which basically covers every type of cooperation among firms. However, some types of cooperation are certainly not export cartels. One example discussed earlier was the "vertical" cooperation between firms such as the agreement between the original equipment manufacturer (OEM) and its purchasers in the same country which is not an export cartel.

2.3   Definitions of cartels in the literature

In the literature, export cartels are mostly considered as a type of cartel. Thereby, the definitions of cartels are reviewed in this section.

Some attempts to find a common definition of cartels in the literature have been made. For example, Bruneckiene et al. (2015) pointed out that definitions of a cartel in the literature have two broad common elements. Firstly, a cartel must be *voluntarily* formed among *legally independent* firms. Secondly, firms may use a diversity of measure (e.g., often price and output fixing) to pursue a common goal. However, an agreement consisting of these two elements encompasses not only a cartel but actually all sorts of agreements between firms. Table 2.3 shows examples of definitions of cartels in the literature.

Table 2.3 Definitions of a cartel in the literature

Source	Definition of a cartel (or cartels)
Liefmann (1932)	(Cartels are) free (voluntary) associations of producers for the monopolistic control of the market.

Ripley (1916)	(A cartel is a) contractual joint-profit increasing agreement by independent sellers over prices and quantities.
Stocking and Watkins (1948)	(A cartel is) an arrangement among, or on behalf of, producers engaged in the same line of business designed to limit or eliminate competition among them.
Salin (1996)	A cartel is viewed as an agreement between different producers in order to follow common rules or behaviours, i.e., a system of mutual and freely accepted obligations. Cartels are considered to be specific productive structures which allow producers to exert a monopoly power.
Lipczynski et al. (2005)	A cartel is form of organisation adopted by firms in an oligopoly in an attempt to achieve collusive outcome.
Bouwens and Dankers (2005)	A cartel is voluntary, written or oral agreement among financially and personally independent, private, entrepreneurial sellers or buyers fixing or influencing the values of their parameters of action, or allocating territories, products or quotas, for a future period of time.
Connor and Bolotova (2006)	Hard-core cartels are those that made explicit agreements to control prices or limit quantities to be produced or sold. Price agreements may cover list prices or transaction prices the transaction prices may be floor prices, target prices, or, if a common sales agency is employed, actual transaction prices.

Veljanovski (2006)	(A cartel) is an agreement (explicit collusion) or other cooperation (tacit collusion) between firms that restricts output, overcharges customers and generates excess profits for its members.
Connor (2007b)	A cartel is an association of two or more legally independent firms that explicitly agree to coordinate their prices or output for the purpose of increasing their collective profits.
Pepall et al. (2005)	A cartel is a group of firms who have agree explicitly among themselves to coordinate their activities in order to raise market price–that is, they have entered into some form of price-fixing.
Belleflamme and Peitz (2010)	(Cartels are) collusive agreements, whereby firms in an industry avoid competing with one another.
European Commission	Cartels are agreements and/or concerted practices between two or more companies aimed at influencing the relevant parameters of competition through practices such as the fixing of purchase or selling prices or other trading conditions, the allocation of production or sales quotas, the sharing of markets including bid-rigging. The purpose of a cartel is to prevent, restrict, or distort competition.

Bruneckiene et al. (2015)	(Cartels are) agreements or concerted practices between two or more legally independent firms operating on the same market on the fixing of prices (consumer overcharging or reductions in prices for suppliers), the restriction of output or sales quotas, and the allocation of markets in order to generate higher profits, restrict competition and autonomy of decision making.

As can be seen in Table 2.3 above, there are two types of definitions of cartels in the literature; hard-core and anti-competition definitions of cartels.

2.3.1   The anti-competition definitions

The first type defines a cartel by its *anti-competition* purpose. The definitions proposed by the likes of Liefmann (1932), Stocking and Watkins (1948), and Belleflamme and Peitz (2010) in Table 2.3 serve as good examples. Liefmann (1932) stated several times that a monopolistic purpose is a necessary condition for a cartel. Otherwise, an agreement is just a concern (a merger of firms which remain legitimately independent of one another in a single unit for the purposes of production techniques, administration, trading, or finance) or similar forms of associations. However, the anti-competition definition of a cartel is not relevant in this study for two main reasons.

The first reason is that a cartel does not necessarily have a purpose to limit or eliminate competition. It is true that, once firms agree to regulate their interaction in a certain activity, a degree of competition in that activity might be decreased as an immediate consequence. However, it does not imply that the degree of competition in the longer term or in other activities will be lower as well[15]. For example, a cartel may be formed to preserve long-term

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[15]Actually, a degree of competition in other activities tends to be greater because of the fact that a cartel is temporary by nature and firms normally prepare for future competition by drawing resources into other

competition by allowing the highest-cost (often, the smallest or newly-founded) ones to still be profitable in the short term. Moreover, a cartel may actually relocate competition in one activity (e.g., price) to another (e.g., non-price), the concept of **relocation of competition** which will be discussed further in the subsequent chapters.

The second reason is that the elimination of competition itself is not necessarily detrimental to improvements in social welfare, especially in terms of economic development. Cut-throat or ruinous competition is the term which describes a situation in which excessive competition hinders the firm's productivity growth. It was a fundamental reason behind German and Japanese legalisation of cartels in the twentieth century (Haucap et al., 2010).

2.3.2 The hard-core definitions

The second type of definitions limit a cartel to the so-called a *hard-core* type of cartel. A cartel is hard-core if an agreement exists to fix prices, make rigged bids (collusive tenders), establish output restrictions or quotas, or share or divide markets by allocating customers, suppliers, territories, or lines of commerce (OECD Development Competition Committee, OECD, 2002). In extreme cases, some studies treated a cartel as a synonym of a price-fixing cartel, which is a smaller subset of hard-core cartels (Carlton and Perloff, 2005; Church and Ware, 2000; Connor, 2007a; Posner, 2009).

Nevertheless, an analysis of the relationship between an export cartel and economic development needs a broader definition than the hard-core definition. The original definition of cartels were never meant to be limited to just hard-core cartels, as in the modern Neoclassical literature. The origin of the term cartel, *Kartelle*, in German simply means an alliance of enterprises or producers (Liefmann, 1932). There is no reason to believe that other agreements apart from those defined as hard-core have trivial or irrelevant consequences on economic development. As discussed in section 2.1, the horizontal export market interaction

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activities during the time when a cartel agreement is binding. This point will be elaborated further in Chapter 4 when the relocation of competition concept is formally introduced

could involve any activities along the value chain and should not be limited to the downstream activities of firms, such as price and quantity settings as in the case of the hard-core cartel[16]. Moreover, in section 2.4 and Chapter 3 below, the history also shows that both hard-core and non-hard-core cartels were, in similar fashion, formed in order to promote economic development in different contexts and periods.

Consequently, the definition of an export cartel in this study can be either more specific or broader than the definitions in other studies. Therefore, what is called an export cartel in other studies may or may not be an export cartel in this study. In the previous section, some arrangements have been shown that are not considered export cartels under the definition of this study such as vertical agreements between firms or the agreements which do not aim to regulate the interaction between firms. There are some organisations or arrangements which are not considered export cartels in other studies but could be considered as export cartels in this study. To give an example of the latter case, the definition of export cartels in this study covers the functions of both cartels and concerns in *Cartels, Concerns and Trusts*, the classic work written by Robert Liefmann in 1932.

Liefmann (1932) defined a cartel as "*a monopolistic control of the market amongst producers*" and defined a concern as "*a merger of firms which remain juridically independent of one another into a single unit for the purposes of productive technique, administration, trading, or finance*". Table 2.4 exhibits the differences between a cartel and a concern in Liefmann (1932).

According to Liefmann (1932), a concern may take one of the following functions: an equity/non-equity participation (i.e., strategic alliance in the present terms), an interest-group by which the function resembles a profit-dividing cartel without a monopolistic purpose, an appointment of directors/supervisors on to the board of one another, an administration of a part/whole of the operation of all firms by just one or some of the firms, or a hire of units of

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[16]One of the explanations of why a hard-core definition is widely-used in the literature is that, from the static efficiency perspective, the downstream activities have more influence on the consumer surplus and therefore are closely related to consumerism.

Table 2.4 The differences between a cartel and a concern in Liefmann (1932)

A concern	A cartel
1a) Regulate internal conditions and establish relations between firms which have nothing to do with exchange but aim at unifying the management in one of the four directions described in its definition	1b) Regulate external exchange relations of the firms involved
2a) No monopolistic purpose	2b) Monopolistic purpose
3a) Based on de facto agreements or legal documents	3b) Based on obligatory or personal relationships

one company to another. Under the definition of an export cartel in this study, these functions of concerns can be seen as different activities along the value chain at which firms aim to regulate their horizontal market interaction.

Therefore, what really distinguishes a cartel from a concern in Liefmann's work, especially between 1a) and 1b) in Table 2.4, is where agreement for cooperation along the value chain has been made (i.e., relatively upstream in the case of concerns and relatively downstream in the case of cartels). As it will be clarified in the subsequent section, a monopolistic purpose is mostly irrelevant under the context of an export cartel from developing country because most export cartels from developing countries do not have a monopolistic power in the export market. Furthermore, regarding the topics 2a) and 2b), what really matters is not the purpose itself but the consequence for the market. In other words, a concern in Liefmann (1932) could create a monopoly power regardless of whether the firms intend to do so or not. The last difference (3a and 3b) also depends largely on whether an export cartel is legalised or not and whether the registration is made explicitly or implicitly. Therefore, the definition of an export cartel in this study incorporates a concern under the definition of Liefmann (1932) as well.

To sum up, the difference in the definitions of export cartels in this study and other studies is not problematic as long as the definition of an export cartel in this study is internally consistent. Having discussed the definition of an export cartel, the next section aims to answer a simple yet crucial question: "why should we study export cartels and economic

development?". The section will show that export cartels are strikingly different from other types of cartels especially when it comes to their impacts on economic development.

2.4 The significance of export cartels

In the previous section, an export cartel was defined as "an arrangement of more than one exporting firm in the domestic oligopolistic market in which they explicitly agree to cooperate in order to regulate one or more certain aspects of their horizontal export market interaction." This section explains why export cartels are worthy of study.

Export cartels possess certain useful characteristics when it comes to economic development. Yet, the conditions under which export cartels may or may not promote economic development are poorly understood. **Economic development** is defined as "*a process of economic growth that is based on the increase in an economy's productive capabilities: its capabilities to organise–and, more importantly, transform–its production activities (Chang, 2014)*". Hence, economic development is not about the short-term use of given resources but about increasing available resources in the long term (Chang, 2010). This chapter elaborates how export cartels are significant in terms of economic development.

2.4.1 Export cartels: Ubiquitous but neglected

Seemingly irrelevant on the surface

Why do we need to care about export cartels at all? Export cartels seem to be overlooked by both governments and academics. In a correspondence email with the U.S. government regarding export cartels, the U.S. officer stated that export cartels (or export associations) are no longer important for the U.S. economy[17].

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[17]Source: the correspondence email between the U.S. government and the author.

The world is now driven by the pro-competition paradigm, according to which different forms of inter-firm agreements such as cartels are accused of restraining competition and slowing down the economic progress of the firms and, more importantly, countries. Over the last few decades, a large number of countries worldwide have enacted competition laws to outlaw cartels under the guidance of leading international organisations such as the World Trade Organisations (WTO) (Wells, 2012). Under the pro-competition paradigm, cartels in most countries have been declared illegal *per se*, i.e., illegal regardless of their intention or impact (Spagnolo, 2008). It seems that export cartels should then be prohibited, just like all other types of cartels. The myth which this study aims to challenge[18].

Widespread use of export cartels

Export cartels have always been an integral part of the global economy. They were ubiquitous in now-developed countries during their catch-up periods. Too few have realised the fact that export cartels once, before the Second World War, governed almost forty per cent of world trade (League of Nations. et al., 1947). Arguably, all developed countries have used export cartels to a certain degree. Some of these countries such as Germany and Japan once promoted or even coerced their export firms to form export cartels. Moreover, export cartels were formed in some of the most crucial and fastest growing industries, such as steel, potash, rubber, and paper (Jensen-Eriksen, 2013). Even the United States, as the key promoter of Antitrust law, have enacted laws to exempt export cartels from their Antitrust law, i.e., the Webb-Pomerene Act of 1918 and the Export Trading Company Act of 1982. The ETC, in particular, was influenced by the *sogoshosas*, which are the export trading companies formed in East Asian countries such as Japan and Korea during their *miracle* periods (Howard, 1989). Therefore, it is hard to ignore the prevalence of export cartels in the global economy, especially in relation to economic development.

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[18]This study focuses on export cartels. However, there have been some recent works in which the authors started to question the legitimacy of the *illegal per se* approach towards cartels in general. These works include, for instances, Fear (2006, 2008); Schröter (2013).

The current situation of export cartel exemptions: Turning a blind eye

Nowadays, export cartels are still exempted from competition laws in most countries worldwide (Martyniszyn, 2012). The situation of the policy towards export cartels is well summarised in the note by a secretariat in the WTO document labeled WT/WGTCP/M/4 in 1998 which states that "the extent of export cartels was probably greater than was widely known, since most countries did not insist on registration of such cartels; they simply turned a blind eye to them". Sweeney (2007) therefore made a suggestion that we need to establish the conditions under which export cartels should be allowed or prohibited, the request to which this research aims to ultimately respond.

However, since the late twentieth century, the policies towards export cartels worldwide have started to switch from prohibition or explicit exemption (i.e., requiring export cartels to be registered or authorised beforehand) to implicit exemption (i.e., exempt export cartels from the jurisdiction of the domestic competition law) (see Table 2.5 for the lists of countries exempting export cartels and their types of exemption). Therefore, subjective discretion by allowing export cartels to be formed arbitrarily without any *a priori* registration or authorisation seems to be the route by which countries follow (Sweeney, 2007).

The current situation is therefore that export cartels exist in rather random and unidentified industries without proper understandings of their effects on economic development, the point which will be elaborated further in the next chapter. Such existence of export cartels could possibly have an adverse consequence on economic development if export cartels were excessively formed under the counterproductive conditions. The historical evidence discussed in Chapter 3 will show that the systematic and explicit exemption or even promotion of export cartels were actually the practices of export cartels in their "primetime", during which the concurrence of export cartels and economic development in some notable countries such as Germany, Japan and Finland is evident (Jensen-Eriksen, 2013; Khun, 1997a).

Table 2.5 Exemptions of export cartels in different countries from Levenstein and Suslow (2004) (the askterisk marks a developing country)

COUNTRY (Year of Most Recent Relevant Statute)	EXEMPTION CLASSIFICATION	NOTIFICATION REQUIREMENT
Argentina* (1980)	Implicit	No
Australia (1974)	Explicit	Yes
Austria (1988)	Implicit	No
Belgium (1991)	Implicit	No
Brazil* (1994)	Implicit	No
Canada (1986)	Explicit	No
Chile* (1973)	Implicit	No
China*	Implicit	No
Czech Republic* (2001)	Explicit	No
Cyprus	Implicit	No
Denmark (2002)	Implicit	No
Egypt*	No substantive antitrust laws	–
Estonia*	Implicit	No
Finland (1992)	Explicit (vis-a-vis non- EU member states)	No
France (1986, amended 1996)	Explicit	No
Germany (1999)	Implicit	No
Greece (2000)	Implicit	No
Hong Kong	No substantive antitrust laws	-
Hungary* (1996)	Implicit	No
Iceland	Explicit	No
India* (2002)	Explicit	No
Indonesia*	Explicit	No
Ireland (2002)	Implicit	No
Israel (1988)	Explicit	Yes
Italy (1990)	Implicit	No
Japan (1947, amended 1997)	Implicit	No
Kenya* (1988)	Implicit	No
Korea (South) (1980)	Implicit	No
Latvia*	Implicit	No
Lithuania*	Explicit	No
Luxembourg	-	No
Malta	Implicit	No
Mexico* (1993)	Explicit	No
Netherlands (1998)	Implicit	No
New Zealand (1986)	Explicit	Yes
Norway (1993)	Explicit	No
Pakistan* (1970)	Implicit	No
Poland* (1990)	Implicit	No
Portugal (1993)	Implicit	No
Russia*	No statutory exemption	-
Singapore	No substantive antitrust laws	-
Slovak Republic* (2001)	Explicit	No
South Africa* (1998)	Explicit	Yes
Spain (1989)	Implicit	No
Sri Lanka* (1987, 2003)	Implicit	No
Sweden (1994)	Implicit	No
Switzerland (1995)	Implicit	No
Taiwan (1992)	Explicit	Yes
Tanzania* (1994)	Implicit	No
Thailand*	No statutory exemption	No
Turkey* (1994)	Implicit	No
United Kingdom (1998)	Implicit	No
United States (1890)	Explicit	Yes
Uruguay* (2000)	Implicit	-
Venezuela* (1992)	Implicit	No
Zambia* (1994)	Implicit	No

2.4.2 Export cartels: Barely understood

The assessment of the academic understanding is far from being clear-cut either. The conventional view on export cartels promotes a strict prohibition of export cartels, believing that export cartels are purely beggar-thy-neighbour and detrimental for the exporting firms themselves. However, some scholars have recently proposed that export cartels are more likely to be beneficial when they originate in developing countries than those from developed countries (Bhattacharjea, 2004; Dick, 1990; Jensen-Eriksen, 2013). It seems that the effects of export cartels on economic development are not as detrimental as claimed by scholars and policymakers (Buccirossi and Spagnolo, 2006; Kühn, 2001; Schultz, 2002; Victor, 1991).

2.4.2.1 The conventional view on export cartels: A strict prohibition

The ideology that optimal competition is maximum competition is currently driving global competition policies. The World Bank Group (1991) concluded that "*competitive markets are the best way yet found for efficiently organising the production and distribution of goods and services. Domestic and external competition provides the incentives that unleash entrepreneurship and technological progress.*

The dominant view among academic and most developed countries regarding export cartels is to prohibit export cartels due to the beggar-thy-neighbour consequence of the policy, by which an exporting country benefits at the expense of importing countries (Anania et al., 1992). Such policy cannot (and should not) last long because no one will benefit and all parties are likely to suffer once the policy becomes ineffective. Therefore, the proposal to allow developing countries to have the exclusive rights to use export cartels was turned down by some countries. For example, Japan claimed that, apart from the loss in importing country's consumer welfare, export cartels also lead to inefficiencies and decreased economic development of the exporting country itself (Sakakibara and Porter, 2001).

The beggar-thy-neighbour consequence of export cartels is based on the idea that export cartels, by raising prices above the competitive level, enrich producers (producer surplus) at the expense of both consumers (consumer surplus) and the economy as a whole (inefficiencies) (Amsden and Singh, 1994; High, 1985; Leibenstein, 1966).

Export cartels may effectively raise prices above the competitive level (either by directly fixing the prices or indirectly as the effect of the other agreements such as output restraint). Consumers then have to pay more than necessary and the gap between their willingness to pay and the price they actually pay (i.e., the Ricardian rent) decreases. In other words, consumer surpluses decrease. At the same time, producers get extra profit which consequently increases the producer surplus. In principle, there is a portion of surplus which was transferred from consumers to producers by export cartels. Up to this point, if the society puts more weight on consumer surplus than producer surplus (i.e., *consumerism*), such transfers are certainly undesirable (Belleflamme and Peitz, 2010). Export cartels may also create additional loss which is the portion of welfare that the economy loses without anyone benefiting from it, i.e., **allocative inefficiency**. This loss is commonly known as the **deadweight loss**. Equation 2.1 shows the composition of the change in total welfare.

$$\Delta\text{Total Welfare} = \Delta\text{Consumer Surplus} + \Delta\text{Producer Surplus} - \Delta\text{Deadweight Loss} \quad (2.1)$$

Moreover, export cartels (and other cartels) can lead to underproduction (i.e., controlling the output volume to increase the profits and hence the price level), overpricing (i.e., charging the higher prices at a given level of outputs), distortions of prices and costs which mislead investors and buyers, sluggish innovation (i.e., firms do not have to innovate to overcome the competitors), inadequate realisation of scale economies (i.e., firms need not push costs down by scale economies due to the absence of pressure from competitive prices), or lack

of incentives to innovate or develop production or management system (X-inefficiency) (Graham and Richardson, 1997).

Another concern is the fact that export cartels may facilitate domestic cartels (Becker, 2007). Cooperation through export cartels facilitates the understandings among firms upon which tacit collusion or further agreement to form domestic cartels could be built (Schultz, 2002). Whether and when domestic cartels should be promoted or prohibited are, however, out of the scope of this study. It is evident that some recent works have started to propose that cartels may not be as harmful as recently suggested (see Fear (2008); Schröter (2013)). Given this, policymakers must compare between the benefits of eliminating domestic cartels by prohibiting export cartels and the cost of giving up productive export cartels altogether. As this study will discuss further, the cost of giving up the productive export cartels could be substantial in developing countries. If export cartels were to be explicitly exempted from competition laws, the authority would also be able to keep track of their domestic activities as well. Consequently, as countries worldwide chose to turn a blind eye to export cartels, the potential relationship between export cartels and domestic cartels gives another reason to dismiss the *trendy* implicit exemption of export cartels instead of prohibiting export cartels (Sweeney, 2007).

2.4.2.2   A welfare-improving scenario: When the gain in producer surplus outweighs the losses

Theoretically, there are conditions under which an increase in producer surplus is likely to exceed the sum of the loss in consumer surplus and deadweight loss, and, hence become welfare-improving. These conditions are determined by the degree of heterogeneity of firms and the demand elasticity. The former influences the level of producer surplus and deadweight loss and the latter determines the level of consumer surplus.

According to Bos and Pot (2012), there are three main conditions under which cartels may improve total welfare. If one supposes that firms have different unit costs, where the price is lower than the unit costs of at least one firm, a welfare-improving cartel agreement could be made by setting the price to be as high as the unit costs of all firms. The other two conditions depend on whether cartels have a side-payments structure, under which the one who violates the quota has to pay compensation (side-payment) to the others. If the side-payments structure is installed and unit costs are different across firms, cartels with side payments allow production to be shifted towards more efficient firms and hence welfare improvement. If the side-payments structure is absent and if the market demand is sufficiently inelastic[19], the profit margin on all sales must be positive and the difference in unit costs across firms is sufficiently large in order to make a cartel agreement welfare-improving. These conditions are generally satisfied in the situation under which the inferior firms gain a substantial improvement in terms of producer surplus while consumers are less sensitive towards changes in prices. This situation resembles small and medium firms from developing countries successfully exporting into more developed markets in which consumers have a substantial purchasing power.

However, the pitfall of the allocative efficiency lies in the static nature of the notion. As economic development is achieved not by allocating existing resources but by enhancing productive capabilities, then, even though there may be tradeoffs between short-term allocative efficiency and long-term productive capabilities (or dynamic efficiency), a decrease in allocative efficiency may be more than offset by an increase in productive capabilities in the long term. The next section introduces the dynamic settings under which the strict prohibition of export cartels becomes arguably invalid.

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[19]Notice that inelastic demand does not only makes cartels more likely but also increase the likelihood that cartels are welfare-enhancing.

2.4.2.3   An inclusion of the dynamic settings

The arguments against export cartels are mostly based on the static setting, under which a decrease in allocative efficiency (deadweight loss) is an absolute loss for the economy *ceteris paribus*. However, there is a tradeoff between short-run efficiency and long-run productivity growth. The latter concept is also called **dynamic efficiency**, which is defined as the achievement of "highest long term productivity growth rate" (Amsden and Singh, 1994). In other words, an economy may need to give up allocative efficiency now in order to gain a greater increase in productivity later on, the process which is defined as dynamic efficiency (Amsden and Singh, 1994). The productivity growth rate is, in turn, described in Equation 2.2 (Amsden and Singh, 1994).

$$\text{Productivity Growth Rate} = \frac{\Delta \text{Productivity}}{\text{Current Productivity}} \tag{2.2}$$

Recalling the definition of economic development (the goal of economic development is the increase in an economy's productive capabilities), it is easy to see that dynamic efficiency should be prioritised over allocative efficiency (see further discussion in Chapter 4). Now, the arguments against the use of export cartels in developing countries by incorporating the dynamic dimension into the analysis can be revised.

Potential enhancement of welfare

Export cartels have been accused of raising the price level and hence depleting welfare *ceteris paribus* in the recent literature. However, there are two reasons why a reduction in welfare by export cartels may not occur.

Firstly, export cartels may promote global competition by introducing additional players into the market which reduces the overall price level or provides more variety of products for consumers (Evenett et al., 2001; Immenga, 1995). By definition, export cartels are single-country oriented and formed exclusively for exporting activities[20] (Sweeney, 2007; Waller, 1992). As a consequence, export cartels from developing countries are partial cartels from the global perspective (i.e., not formed by all firms in the global market) and have no market power (Dick, 1992; Jensen-Eriksen, 2013). Some export cartels were even formed to reduce prices in order to be competitive and be able to penetrate the global market (Sweeney, 2007). The empirical evidence in different countries such as Germany and Japan also shows that export cartel formation was related to price reduction (Audretsch, 1989; Dick, 1992; Levenstein and Suslow, 2006). Therefore, the argument that consumer surplus will be depleted by the existence of export cartels is rather vague when it comes to export cartels from developing countries.

Export cartels from developing countries in the global market could be seen as an analogy of cartels formed by SMEs in the domestic market, which is generally acceptable due to their potential to preserve the long-term competition[21] (Bhattacharjea, 2004; Bridgman et al., 2015). Therefore, domestic cartels were often allowed to be formed among SMEs in some countries such as Germany in the mid-twentieth century (Khun, 1997a). The same analogy can be made in terms of firms from developing countries surviving the competitive force

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[20]In reality, apart from an export firm, a firm often finds it difficult to tailor some certain activities exclusively for exports. These activities are generally upstream activities such as design and research and development. Under this assumption, a pure export cartel seems to be quite a strict presumption. However, an assumption is generally reasonable when an agreement is made on relatively downstream activities such as logistics, packaging, marketing including pricing, sales, or service among exporting firms. Empirically, export cartels are usually formed to regulate these downstream activities (Bhattacharjea, 2004; Jacquemin et al., 1981; Jensen-Eriksen, 2010; Martyniszyn, 2012; Webb, 1982).

[21]Neoclassical economists argued that inefficient (weaker) firms should exit the market so that only efficient (stronger) firms are preserved. However, such a mechanism has at least two pitfalls. Firstly, inefficient firms nowadays do not need to be consistently inefficient or less efficient in the future. Most of the efficient firms have once been inefficient previously and competition is certainly not the only reason for their increased efficiency. Secondly, even though only efficient firms were preserved, competition could be simultaneously dispelled. In the long run, the more persistent monopoly power may prevail and those efficient firms then lack of the competitive incentive to develop further.

against the larger firms from developed countries or the multinational enterprises in the global market. Therefore, the inefficiency might not even be created under the dynamic setting. SMEs in Germany were particularly allowed or even encouraged to form cartels in the mid-20th century to buffer against overwhelming competition from both domestic and foreign firms. For example, in 1904, two smaller German banks, the Dresdner Bank and the Schaaffhausen Bankverein, agree to form, under our definition, a territory and profit-sharing cartel (Liefmann (1932) considered it as the interest-group which is a type of concern). The purpose of the cartel was "to strengthen the capital power and influence of each of the banks by means of common action in big business deals" and, more importantly, to help stimulate their "competitive power against their two big rivals the Deutsche Bank and the *Diskontogesellschaft*."

Secondly, even if firms can agree to fix export prices, as independent firms, they have an incentive to push their costs down (to prepare for the resumption of competition in the future or enhance their capabilities of the other activities along the value chain to compete in the present, e.g., increasing product quality) (see further discussion in Chapter 4). Consumers, naturally, do not get additional welfare solely from the fact that they spend less money but also from the fact that the quality or other characteristics of the product satisfy their needs better (improvement in the willingness to pay). As consumers value the products more, their willingness to pay increases (the demand curve is more inelastic and becomes steeper). As a consequence, the magnitude of an increase in the willingness to purchase (a decrease in the demand elasticity) may outweigh that of an increase in prices. In this case, export cartels may enhance consumer surplus and hence welfare.

Potential absence of inefficiency

The argument that export cartels lead to inefficiency is based on the presumption that export cartels eliminate or, at least reduce, overall competition among firms. The presumption is

questionable because export cartels could enhance overall competition among firms instead. By forming export cartels, firms choose to limit competition in certain activities while other activities remain untouched. Therefore, the consequences for efficiency and productivity largely depend on the way in which the agreement relocates competition across activities. Knowing that the cartel agreement will expire or terminate sooner or later and competition will resume afterwards, firms have no reason to be complacent and are likely to use the opportunity (of being under the protection of cartel agreement) to equip themselves in other activities, in which they are still free to compete. Moreover, export firms could also equip themselves in the agreed activity in order to prepare for the future competition and the ongoing competition against the other (foreign) firms as well. Therefore, even under export cartels, firms still have incentives to improve their efficiency due to remaining, or even fiercer overall, competition (see further discussion in Chapter 4).

2.4.3 Bottomline: Blindly ubiquitous yet barely understood

Export cartels are ubiquitous yet barely comprehended among both academics and policymakers in terms of their consequences. This incomprehension is partly due to the fact that export cartels have only recently attracted the attention of scholars. Therefore, a rigorous study on export cartels, especially in terms of economic development, has not been conducted yet. Despite the widespread studies and policy movements regarding cartels during the twentieth century, it was not until the 1990s when scholars started to question the legitimacy of the existence of export cartels, e.g., see Victor (1991). Until now, the number of literature articles to studying export cartels has been minimal (Sweeney, 2007). Moreover, export cartels may allow incompetent firms to enter the global market and thus arguably be beneficial for developing countries. In other words, "Cartels can offer crucial advantages to those newcomers who are trying to break into international markets dominated by vast industrial giants from developed countries" (Jensen-Eriksen, 2013, p. 1086).

We hardly know the conditions that determine the consequences of export cartels (Sweeney, 2007). Oddly, most countries choose to turn a blind eye to export cartels by implicitly exempting them from their laws without any registration or required authorisation needed (Levenstein and Suslow, 2004). Export cartels may be formed arbitrarily in most countries while the governments have no information regarding their existence or in which industries they are formed. This legal yet implicit status of export cartels potentially brings about two adverse outcomes.

Counterproductive export cartels (i.e., those impede economic development) may be formed in excess but the government is unable to detect and deter them (Levenstein and Suslow, 2006). In such cases, empirical evidence might misleadingly reveal that export cartels hold back economic development. As a consequence, an overly stringent approach against export cartels might be imposed, which is obviously suboptimal in terms of economic development because it will wipe out both productive and counterproductive export cartels.

Conversely, too few productive export cartels may be formed. Knowing that export is demanding in terms of effort and risk, each firm may individually abandon the foreign market entirely, despite knowing that the benefits of exports are much greater than remaining in the domestic market. The case will be apparent when our model of export cartels in Chapter 5 is proposed. The model will reveal that export cartels and competition are equally likely (both are Nash equilibria) whenever export cartels are more productive than competition (technically, whenever both choices are Nash equilibria). As a consequence, the government sometimes cannot simply leave the choice to the firms themselves but have to convince or even coerce firms to form export cartels.

In the subsequent chapter, the history of, and the literature concerning, export cartels will be discussed in order to give an overview of the academic progress to date. There are two main points to be argued. Firstly, despite the significance of export cartels discussed in this chapter, the attention on, and understanding of, export cartels in academia is still limited.

Secondly, export cartels have been crucial economic policy tools throughout the history of now-developed countries.

Chapter 3

Export cartels: The evolution of practice and the academic literature

In the previous chapter, export cartels were defined and the significance of them in terms of economic development was discussed. This chapter will discuss the history of, and the literature on, export cartels. The discussion of the history of export cartels aims to show how export cartels have been used in different contexts in the past in order to provide a framework from which the subsequent chapters will be developed. The discussion of the literature on export cartels aims to demonstrate how the existing knowledge and literature regarding export cartels is insufficient to answer the questions posed in the previous chapter. In the literature, the effects of cartels on economic development have been largely overlooked and are usually not considered as a criterion of success for cartels (Levenstein and Suslow, 2006). To date, there are a limited number of works in which the topics of export cartels and efficiency or productive capability were touched upon (Dick, 1990; Jensen-Eriksen, 2013). A concrete theoretical framework regarding the use of export cartels and economic development remains non-existent.

3.1 The overview of the history of and the literature on export cartels

As the export cartel is a type of cartel, it is arguably as old as any other type of cartel. Therefore, it is not always possible to distinctly separate the history of or the literature on export cartels from those of cartels in general. As will be clarified in this chapter, the studies on export cartels in particular are also extremely scarce. As a consequence, even though this research aims to focus solely on export cartels, the literature on, and the history of, cartels in general will also be incorporated when appropriate.

In terms of **the history of export cartels**, the *persistent historical patterns* will be extracted, from which the relocation-of-competition framework in Chapter 4 and the theoretical model in Chapter 5 will be developed. The chapter will exhibit how the use of export cartels has evolved and persisted since the late nineteenth century. During this period, the view on cartels underwent change at the end of the Second World War. The overall picture could be concluded that: *It took decades for cartels to span a number of industries worldwide but just a few years after the Second World War to get delegitimised*. However, unlike the other cartels, export cartels were much less affected by the shift in the paradigm and were largely ignored until the late 1980s. Most of the countries globally still allow export cartels to be formed in any industry.

The history of export cartels will be discussed by country. Even though the intention is to incorporate as many countries as possible, this research particularly focuses on specific countries, namely, Germany, Japan, and the United States of America. Despite the fact that Germany and Japan once had cartels in almost every industry (although in different periods), most of the cartels were also used in the export-promoted industries because of the export-oriented regime during their catch-up periods (Bhattacharjea, 2004). The reason for emphasising the United States case is slightly different. The data for the United States are rich

and the country has two laws specifically focused on export cartels, i.e., the Webb-Pomerene Act of 1918 and the Export Trading Company Act of 1982, through which export cartels have been allowed to be formed and registered with the government since 1918 (Fugate, 1982).

In terms of **the literature on export cartels**, the general literature on cartels before and after the Second World War will be discussed along with more specific literature on export cartels and how they fit within the general literature on cartels[1]. Apart from the works on the Webb-Pomerene Act of 1918, it took over 36 years after the Second World War before the first study on export cartels written by Alexis Jacquemin, Tsuruhiko Nambu, and Isabelle Dewez was published in 1981 (Jacquemin et al., 1981). After that, a few studies on export cartels have been written but no substantial progress has been made. In the last section of this chapter, the literature on the effects of cartels on investment and productivity will be discussed, although this part is surprisingly short because the issue has been largely ignored to date.

3.1.1   The turning point: The Second World War

The Second World War was a major turning point in terms of the attitude and the policy towards cartels in general, by which export cartels were also affected, although to a lesser degree. It is crucial to understand why the Second World War has led to the *pessimistic* attitude towards cartels, including export cartels. This attitude has remained, to date, unchanged.

In terms of the history, the decades after the Second World War saw the worldwide movement against cartels, i.e., the decartelisation process. The process of decartelisation can be seen as a part of the economic liberalisation process, which was viewed as an essential part of the attempt to adjust the political alignment and the global economic structure following the Second World War in order to prevent the future conflicts and wars (see Section 3.5 below). After the Second World War, the US government and its allies made an attempt to

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[1]Noticeably, when it comes to the stability and formation of cartels, the literature usually do not distinguish export cartels from domestic cartels.

intervene in the economic order of the Axis countries like Germany and Japan. According to the vision behind the intervention, free trade and market economy lie at the heart of the economic and political liberal regime. One of the measures required these countries to enact the American-style competition law, by which domestic and export cartels were strictly prohibited. Moreover, decartelisation was partly an attempt to uproot Nazi power which heavily used both domestic and export cartels to govern the German economy during the inter-war period and the Second World War (Marburg, 1964). In Japan, although export cartels were not as widespread as in Germany during the same period, Japanese firms were not familiar with the American mindset of competition until they were forced by the US military government to enact the American-style competition after the Second World War.

One interesting fact is that the post-Second World War period saw the beginning of the transformation of export cartels into international cartels in well-established industries in developed countries. One notable example is the process of European integration which began with the 1951 Treaty of Paris, by which the European Coal and Steel Community (ECSC) were formed (Martin, 2010). It took six years for the European Economic Community (EEC) to be established in 1957 by the Treaty of Rome. The interesting fact is that the co-founders of both ECSC and EEC (Belgium, France, West Germany, Italy, Luxembourg, and the Netherlands) were also the leading users of export cartels in the coal and the steel industries before the Second World War. Therefore, the formation of the ECSC could be interpreted as the transition from export cartels into international cartels after the industries had become well-established (i.e., internationally competent) in their respective countries (Allen, 1979; Hexner, 1976). The hidden implication of the transition is the fact that export cartels became less important in terms of economic development in most developed countries (the model in Chapter 5 explains why not all developed countries find export cartels less useful).

Therefore, the repetitive call for a prohibition of export cartels after the Second World War was based on *double standards*. Export cartels were criticised because they were no longer needed in most developed countries while developing countries were not even allowed to try to use them. However, this chapter will later on show that some developed countries such as Germany did not immediately abandon export cartels and defied the heavily promoted economic liberalisation programme, by allowing export cartels to be formed in different industries in order to protect infant (or incompetent) industries and to deal with the post-war recessions. Moreover, some East Asian countries, especially Japan and Korea in the late twentieth century, also used export cartels (and other industrial policies) to enhance their economic development. The outcome turned out to be quite impressive. The subsequent chapters show the reasons why the strict prohibition of export cartels is totally mistaken in terms of economic development.

In terms of the literature, specifically in social sciences, the topics of research are largely determined by the questions or the issues being asked by the public at a particular time. After the Second World War, economic liberalisation fuelled the attempt to prioritise the prevention of future conflicts. The rise of the international organisations including the United Nations led to a number of studies on economic liberalisation being sponsored by the member nations. It was the period during which the literature on economic liberalisation was thriving (see Bhagwati (1969, 1989); Krueger (1998) for example).

Due to the rise of the influence of liberal economic thinking, scholars started to look at cartels through a different lens. Within a few years of the war, it became widely believed that all cartels were detrimental to the economy and should be prohibited (Levenstein and Suslow, 2006; Stocking and Watkins, 1948; Sweeney, 2007). Therefore, the research in the post-Second World War period largely focused on the formation and the stability of cartels. The purpose of a shift in the research's focus was to provide information to the government in order to aim their *crosshairs* at cartels with more precision. This occurred at about the

same period major advances in the Game Theory which followed the publication of seminal

pieces of research including John VonNeumann and Oskar Morgenstern's book "Theory of

Games and Economic Behavior" in 1944 and John F. Nash Jr.'s groundbreaking Ph.D. thesis

in 1950. A few decades later, Game Theory became the main tool adopted by academics in

the newly-founded field of Industrial Economics for studying the formation and the stability

of cartels, while the consequences of cartels were largely ignored.
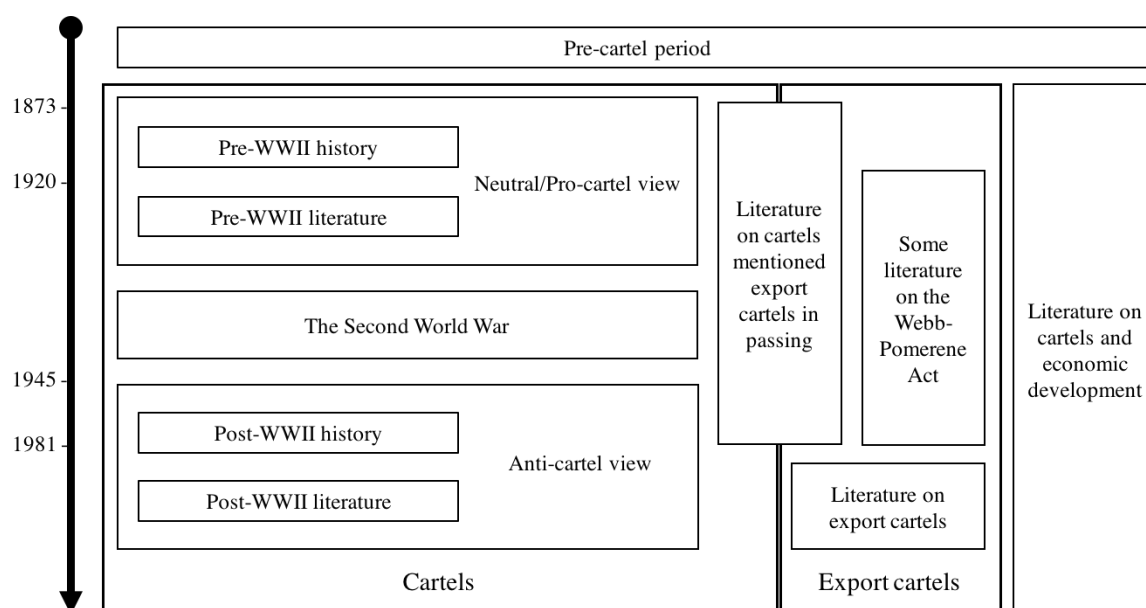
Figure 3.1 The organisation of chapter 3

3.2   The pre-cartel period

The cartel in its modern form emerged in the late nineteenth century. Before that, there

were some forms of agreement to regulate the interaction within the same trade. Back then,

the economy was still not as interconnected as it is nowadays. Therefore, the agreement to

regulate the interaction within the same trade was extremely limited to a specific geographical

area. In ancient and medieval times, in Europe, the *corners* or *rings*–a corner formed by

a group of people–bought up goods in the local market and made a monopoly profit from

selling them (Liefmann, 1932). In the Middle Ages, especially in Europe, collective action among economic actors engaged in the same business called *guilds* were widely formed. A guild is an association of craftsmen and artisans or merchants that is formed to improve the status and social interests of members and also provide exclusive rights of trading. During this period, society, such as in each state within Germany, was heavily divided into classes which included merchants, physicians and various guilds of artisans. The guild system has survived until nowadays to serve similar purposes in some (mostly, technical) professions, such as physicians, nurses, engineers, and so on. However, most industries have evolved from being handicraft or labor-intensive and small-scale industries into the capital-intensive and large-scale industries of today, thereby making guilds no longer viable. As a consequence, the traditional guild system has become trivial in terms of the economy-wide influence.

3.2.1   Cartels: A reaction to excess competition

Between the fourteenth and the sixteenth centuries, the traders of minerals such as copper, tin and mercury, salt, and aluminium in some big cities across Europe agreed upon prices. However, Liefmann (1932) argues that the modern cartel movement[2] was not directly related to these earlier forms of agreement. He argues that the root cause of cartels was *a reaction to excessive competition* that became a problem in the late nineteenth century. There were at least three main causes of excess competition in the late nineteenth century: the economic depression, the principle of open competition adopted by the major industrial economies at that time, and the construction of nationwide networks of transportation and communication in some countries, including Germany and the United States in the mid-19th century. These phenomena put firms in a difficult position where they are unable to gain a reasonable profit,

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[2]Interestingly, the first ever public mention of cartels was (mixed) export cartels. In 1879, the *Reichtag* was a cartel of German railmakers charging significantly lower prices from foreign buyers than those of domestic buyers. The growth of number and variety of cartels and export cartels accelerated afterwards until it became "one of the most significant factors in the modern economic life" in the subsequent couple of decades (Liefmann, 1932).

which could enable them to improve their productive capability or even to survive in the short term, as explained below.

The Great Depression of 1873 saw world prices for agricultural and industrial products substantially fall (Freedeman, 1988; Liefmann, 1932; Martin, 2010). As a consequence, (German) firms realised that competition, especially in prices, would harm all producers. Therefore, instead of undercutting each other's prices, firms decided to agree upon a reasonable level of prices under which they are able to survive the depression. The government was also actively involved in the agreement by intervening on prices and also setting the price floors and ceilings in different industries to make sure that the agreed level of prices was sufficient to serve the purpose and not excessively harm the welfare of consumers (Stucke, 2013).

The construction of nationwide transportation and communication networks reduced the transaction costs of firms to trade across countries. A consequence was an increase in size and in the organisational capabilities of firms in order to organise mass-production and mass-marketing, especially in the capital-intensive industries, such as natural resources and high-technology. These firms became what Chandler Jr. (1994) called the *modern industrial enterprises*, some of which, later on, developed into multinational enterprises. With the introduction of mass production, the production gradually changed from being made-to-order into made-for-stock. This meant that the risk for fixed capital and working capital increased because production was subject to the expected future demand which is prone to the uncontrollable market volatility. Intensification of competition further increased capital risks resulting in lower profits. An agreement to spread out the risk across firms by pooling their capacities (i.e., a cartel agreement) was considered as a wise choice among the growing firms.

The fierce competition among large enterprises in different industries did not only affect themselves but also SMEs. Even though the modern economic infrastructure also benefited

SMEs, it also increased the threat of large enterprises to SMEs. The latter usually outweighed the former and a number of SMEs were forced to quit the market or were bought up by the larger firms. Therefore, some SMEs found it necessary to *team up and form cartels in order to survive the fierce competition*. Moreover, as the modern industrial enterprises became larger in the market, they were not harvesting the benefits solely from the economies of scale but also from the economies of scope, by which they expanded their range of production to cover the other industries. SMEs thus were not dealing with only the existing larger enterprises within an industry but also the market entry of the larger firms from the other industries.

Chandler (1994) claims that both SMEs and larger firms benefited from modern infrastructures, such as railways and roads, and were able to cover a larger geographical area. However, the larger firms were able to exploit the same infrastructure and even to a greater degree because the extensive infrastructure was specifically designed to facilitate the use of economies of scale and scope in the production of standardised products, rather than product differentiation or customisation. Therefore, SMEs were unable to use differentiation or customisation to compete with large enterprises possessing the economies of scale, especially in the market in which consumers were more sensitive to prices (e.g., developing country). Therefore, a number of SMEs were forced to exit the market or be acquired or merged with larger firms in countries like Germany and the United States. In the late nineteenth century, large enterprises (e.g. Trusts) dominated most of the important industries in the United States, one of the key factors which eventually led to the enactment of the Antitrust law in 1890. To survive the fierce competition, SMEs needed to form cartels, not to gain monopoly power, but to remain in the business with a reasonable profit (Fear, 2008).

The fierce competition, however, did not necessarily come from domestic competitors. Intensification of competition also stemmed from international trade, through which domestic firms needed to compete with foreign firms which exported into the country as well.

Therefore, a cartel could also be formed to compete with foreign competitors in the domestic market. For this purpose, trade policies such as tariff could facilitate cartels. Liefmann (1932) argued that German cartels were facilitated by the protectionist policy in the late nineteenth century. He believed that tariff and other trade protections reduce foreign competition. Cartels were closely tied to tariff protection in the sense that tariff production may accommodate domestic cartel formation by increasing the prices of imports, hence a cartel agreement affecting prices was easier to form (Chang, 2002; Freedeman, 1988). However, this does not imply that tariffs will lead to cartels. On the contrary, both measures could be seen as reactions to excess competition from imports whereby tariffs were imposed by the government and cartels were formed by private companies.

More importantly, exporting firms were also confronting increased competitive pressure in the global market to which they were exporting their products. Excess competition could be caused by other countries' exporting firms which also export into the same market. Export cartels were formed to react to excess competition in the export market under which an individual exporting firm found it difficult to export at all, an analogy to the reason why SMEs needed to form cartels in order to just survive in the domestic market. The United States referred to the same reason when the Webb-Pomerene Act was enacted in 1918, by which export cartels from the United States were legalised (Fournier, 1932). As the main focus of this research is on export cartels, this type of excess competition is particularly emphasised and will be elaborated in the subsequent chapters. According to the above arguments, cartels including export cartels are more or less "the children of hard times", which is a reaction to excessive competition by introducing the "visible hand" for the unstable free market (Freedeman, 1988)[3].

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[3]Later in Chapter 4, the argument that excess competition is a cause of cartel formation will be increasingly convincing, especially when the other forms of strategic alliances such as merger and acquisition are taken into account. In brief, the nature of cartels is that firms agree to regulate their interaction in a certain set of activities and temporarily. If these firms aim to gain market power or to regulate all activities at once, there are other modes of strategic alliance such as merger and acquisition which should be used instead.

3.3   Export cartels in the pre-First World War period

The end of the nineteenth century and the start of the twentieth century saw most of now-developed countries experiencing periods of substantial economic growth (Chang, 2002). During this same period, the number of export cartels grew substantially across different industries in these countries (Audretsch, 1989). For example, in Germany, as we will see further, the number of cartels had consistently increased from 385 cartels with about 12,000 members in 1905 to over 1,500 cartels in 1923. The cartel was used during the First World War as well. The amount of cartels increased to over 3,000 by the end of the Weimar Republic in 1933.

During the early days of export cartels, during the pre-Second World War period, the view on export cartels was either neutral or even positive in most countries. For example, during the inter-war period, at the Interparliamentary Union in 1930, the international organisation of parliaments explicitly stated that cartels were "natural economic institutions", which are not possible to be prohibited (Boserup and Schlichtkrull, 1962). The meeting stated further that cartels should, however, be registered with the government and government action against them should be made if and only if a cartel engaged in abusive conduct. The approach was called an *abuse control* vis-a-vis ordoliberal, which quickly became a dominant view soon after the Second World War (Martin, 2010).

3.3.1   Germany

The main market for German products between the late nineteenth and early twentieth century was the foreign market (European market in particular), in which most German cartels were effectively export cartels (Audretsch, 1989; Chandler Jr., 1994; Khun, 1997b; Michels, 1928; Stockder, 1924). "The cartel concept is as sacred to German business as the idea of free enterprise is to the American business (Stocking and Watkins, 1948, 368)". Germany always

has treated cartels as a form of contract which relies on *freedom of contract*, i.e., the freedom of an individual to legally form a contract without any restrictions. Under the principle of freedom of contract, a contract is prohibited by the state only if it is *contra bonos mores*, i.e., contrary to good morals. The principle had been well established since Prussia conquered the German state in 1811. Until the late nineteenth century, the freedom of contract principle was adopted to overturn any attempts to prohibit cartels, including export cartels. Therefore, the precedents viewed cartels as not contrary to good morals[4].The point was well made by Wolff (1935, p.328), when he said that when firms "get together and enter into agreements regulating the ways and means of operating their industry with a view to promoting recovery ... such course of action would seem to be incumbent upon prudent business men." Therefore, *laissez faire* in Germany is more of a freedom of contract rather than of a freedom of trade, i.e., "*laissez faire* meant freedom from government-imposed restraints on competition. It did not mean government rules to control restraints imposed by some private parties on the opportunities of other private parties to compete (Martin, 2010)."

The turning point of the German economy was the nineteenth century, during which it was transformed from an agrarian economy into an industrialised one. Before 1850, Germany still lagged behind the most developed countries, such as Britain, France and Belgium. In the second half of the nineteenth century, Germany started its industrialisation and catch-up process. There seems to be a consensus, although not exclusively in relation to Germany, that cartels were first formed after the economic depression in 1873 to relieve the "excessive" competition and revive the "collective security" by restricting the freedom of individual enterprises. By 1900, there were 275 cartels in operation; by 1908, over 500. By some estimates, cartel arrangements may have numbered in the thousands at different times. It was the same period when the so-called *Second Industrial Revolution* in Germany, during which

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[4]Some of the precedents were the crisis cartel of brickmakers in Oberstes Landesgericht, Bavaria, April 7, 1888, Entsch. Des Ob. L. G. 12, 67; the Saxon Woodpulp cartel (Entscheidung des Reichsgerichts in Civilsachen vol xxxviii, pp. 156-158 translated in Seager and Gulick, 1929, pp. 553-553).

the government actively supported heavy industries to use cartels and export cartels as one of the tools for their survival (Perkins, 1981).

Between the late nineteenth and early twentieth century, the number of cartels was substantial. The number of all cartels in Germany at that time numbered in the thousands (approximately 1500 in 1923, 3000 with 2500 industries, 400 wholesalers, 150 retailers in 1925[5]). By 1925, all firms in the coal industry and ninety per cent of firms in the crude steel industry participated in cartels [6].

The strong role of the government

Germany had a strong state and relied upon centralised direction and authoritarian discipline for its economic advancement (Stocking and Watkins, 1948). In the late nineteenth century, they imported technology from England without gradual local development (Brown, 1998). The importation of advanced technology created an abrupt transition from small-scale handicraft production to large-scale mechanical industry in a short time. It took approximately 30 years from the introduction of Bessemer process in the 1860s to the development of high-speed steel production in the 1890s. This was in contrast with the century-long industrial revolution in England. Such abrupt transition created a great degree of competition in a short period and thus led to the need of some control over excessive competition as discussed earlier.

At that time, the "accredited mode of behaviour" to advance economic interests in Germany was the well-regimented collective action. The modern cartel therefore was born in Germany. Neither state nor businessmen believed in free competition as a method of

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[5]When reading the number of cartels, one has to bear in mind that a cartel is formed in the industry level and the economy in the early twentieth century was not as differentiated as nowadays. Therefore, the figure in excess of a thousand of industries is quite extraordinary

[6]It is interesting that, from the firms' structure point of view, these firms are highly vertically integrated and diversified. This structure is so-called a differentiated organization structure or the multidivisional structure. This is spectacular as scholars in business-related fields argued that this type of structure was stimulated by an absence of collusion, which invalidate the manufacturing conceptualization of control especially in the US in 1920s and 1930s.

organising production, controlling prices, or making economic adjustments. By the early twentieth century, "the cartel had become a fundamental characteristic of the industrial structure of Germany" (Stocking and Watkins, 1948).

During the early stages of their industrial development, German cartels had a direct connection with *Neomercantilism*, under which centralised supervision and control by the government were the distinctive features (Stocking and Watkins, 1948). Under the Neomercantilism regime, a cartel was used as a "mechanism for the restoration of security" for firms. Therefore, it was not surprising that the number of compulsory cartels, (*Zwangsyndikaten*), i.e., government organised cartels, was increased significantly during the period. The Coal Act of 1919 established the National Coal Federation (*Reichskohlenverband*) as the embracing structure of sub-units such as the Rhine-Westphalia Coal Syndicate which was established in 1893 to control in excess of eighty per cent of German coal outputs (Stockder, 1924). Similar compulsory cartels were also formed in potash and steel industries during the same period (Von Beckerath, 1933).

The coordinating role of financial institutions

At the turn of the twentieth century, export cartels were largely supported (directly and through regulations) by the German government through financial institutions (*Grossbanken*) (Chang, 2002; Stocking and Watkins, 1948). *Grossbanken* mainly financed the first movers' initial investment in production and distribution. *Grossbanken* helped these industries until they became established, their organisational capabilities were developed, and the structure of the industries was clearly defined (Chandler Jr., 1994).

One implication of this fact is that the majority of cartels in Germany were formed for other purposes (mainly, rationalisation and instability in, e.g., prices and demand control) than the acquisition of market power. Specifically, export cartels in Germany were used in order to help nurture *national champions* by improving "the economic well-being of the

participating firms...in the form of higher efficiency and productivity" (Audretsch, 1989). Moreover, the German government also emphasised on promoting the use of export cartels by SMEs (Voigt, 1961).

The banking institutions (*Grossbanken*) supporting cartel formation included the Deutsch bank, the Dresdner bank, the Darmstadter bank, the Disconto Gesellschaft, and, before its absorption by Disconto, the A. Schaffhausenscher Bankverein. These banks acted as a central agency unit through their interlocking directorates, i.e., they had directors sat on each other's board of director. The *A. Schaffhausenscher Bankverein* was particularly active in promoting cartels and acted as selling agency, through which all products were sold, and as a clearing house (Passow, 1917). Through these banking affiliations and interlocking directorships, a complex web of joint interests, mutual interdependence and common association was founded. Therefore, a number of big corporate amalgamations were formed in different industries such as the I.G. Farbenindustries in the chemical industry, the Wintershall potash combine, and the Vereinigte Stahlwerke and Krupp in the iron and steel industry.

Moreover, apart from the support from the government and *Grossbanken*, there were some structures facilitating cartel stability such as the formation of I.G. (*Interessen-Gemeinschaft* or Syndicate) and *Konzern*, especially in the late nineteenth century, when *Grossbanken* was weakened by the war; *I.G.* is a profit pool in which cartel members need to pool their profit together, while *Konzern* has a similar function with a more vertical structure. The profit-pooling function of I.G. also enhanced the industry's position in foreign markets because firms could use the pool as a common *buffer* against uncertainties. It was also one of the reasons why German firms survived the crisis years following the German defeat in the First World War. Moreover, after the First World War, *Grossbanken*'s role was partly substituted by the emerging large industrial companies such as Rheinmetall, Henkel, Rutgerswerke, Deutsche Solvay, and I.G. Farben for the purpose of exploiting their *economies of scope*. The role of both *Grossbanken* and large companies in organising cartels in different industries

will play a key part in explaining when export cartels are potentially productive in the model presented in Chapter 5.

There were some types of industry in which financial institutions (*Grossbanken*) played a relatively more substantial role than other types of industries. These industries normally had high fixed cost, long pay-back period, and more than one first mover (so that *Grossbanken* can play the role of facilitator of cooperation among firms). Chemicals, electrical equipments, and metals were the examples. These industries were mostly standardised heavy industries, in which cartels were mainly formed in Germany between the nineteenth and twentieth centuries.

The scope of German cartels

During the late nineteenth century, foreign markets were the main markets for German enterprises while Germany placed more emphasis on the producer-goods industries, such as chemicals, machinery, and metals. Stocking and Watkins (1948) claimed that cartels were largely developed to exploit domestic market profitably in order to protect and promote the interests of German industries in their foreign operations. Conversely, Chandler Jr. (1994) argued that close inter-firm cooperation including cartels was used mainly to deal with the dependency on foreign raw materials and foreign markets. Cartels were therefore formed to give each industry a share in the European export markets "without the necessity of fighting for it" (Bruck, 1938).

Even though cartelisation might dilute the incentive to improve their productive capabilities (functional, technical, and strategic skills), the international market provided a stimulus for German firms to improve their productive capabilities instead. Another stimulus for German firms to improve their productive capabilities was the fact that firms needed to maintain and improve their facilities and skills to put themselves in a better position in the cartel negotiation process (Chandler Jr., 1994). Therefore, export cartels were allowed to

support German firms to deal with the risks of exporting aboard, while not eliminating the incentives for improving their productive capabilities.

The main fields of cartels in Germany were large-scale manufacturing industries, including mining and transportation. In the chemical industry, cartels spanned over hundred of products and one big company could be in more than one groups while a number of cartels were relatively small and frequently broken down and re-formed again. Immediately after World War I, the number of cartels decreased substantially. However, in the 1920s, there was a violent price volatility due to the post-First World War hyperinflation, which led cartels to be formed again or made public (the government directly controlled the formation and organisation of cartels) under the Cartel Decree of November 9, 1923 (Michels, 1928; Pribram, 1935).

In between the two World Wars, a number of cartels were formed and dissolved. Many of the selling-terms cartels, which were one of the most popular types of cartels during that time, were dissolved after September 1924 as a consequence of the Dawes Plan, by which the German currency was stabilised. Even though the Cartel law was enacted to prohibit cartels in 1923, it was not effective until the late twentieth century, even after the Act Against Restraints of Competition (GWB) was enacted in 1957 (Khun, 1997a). Between 1926 and 1929, there were still a number of state-sponsored cartels in different industries, including potash and coal in order to control prices and production during the depression (Schröter, 1996).

In Germany, the *first manufacturing-sector cartels* were iron and steel cartels. It was the first area where the advanced organisation of cartel was developed. Non-ferrous metal production (e.g., zinc, copper, brass, nickel, lead, and aluminium) was almost completely under the control of cartels spanning from extraction to finished products. However, overall, goods are tremendously varied. The use of rare (e.g., bismuth) or common raw materials (e.g., ironstone, limestone, and salt) was widely employe across specialists (e.g., busts for shop-

window decoration, cedar-wood veneers, and chemical specialities) or universal industries (e.g., coal, sugar, paper, and matches), for both simple and complex goods (e.g., railway trucks and locomotives), and were produced by many (e.g., sugar, cement, and soap) or a few producers (e.g., pharmaceutical, bicycle lamps and chains, artificial palm trees, and roller skates) alike. It was discussed earlier that there were several thousand cartels in Germany at that time was several thousands (approximately 1500 in 1923, 3000 with 2500 industries, 400 wholesalers, 150 retailers in 1925. However, Professor Liefmann admitted that "if one were to count all the local agreements which exist in the professional services, in handicrafts and in small trades, which are to be found attached to almost all guilds and Chambers of Commerce in every town, one would arrive at far higher figures even than these (figures above) (Liefmann, 1932, 31)".

The Nazis and cartels in Germany

In 1933, the Nazi party seized power and still preserved cartels. Indeed, the seizure of power was partly supported by the industrial hierarchy through the introduction of the notion of industrial master race (*Herrenvolk*), i.e., the Nazi divided the German economy into eight national groups, where each group was claimed to be just the new names for the existing cartels (Nathan, 1944)[7]. These cartels were adopted as an instrument to control the stability created by cut-throat competition (Motta, 2004). In 1932, the Ministry of Economics categorised industries into two economic groups, namely, *Fachfruppen* (functional trade groups) and *Wirtschaftsgruppen* (economic groups). The latter group particularly exploited a cartel as an instrument for executing different decrees by which the economy is segmented into different economic groups. Later in 1936, the Compulsory Cartel Law was enacted to allow the Ministry of Economics to make existing cartels permanent or to force industries to form cartels where none existed (Newman, 1948). After 1937, the *Reichsbank* (the central

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[7]There was a similarity between the Nazi's totalitarian state and Weimar Republic's method of re-establishing Germany as a great industrial power after its eclipse in 1918 (Stocking and Watkins, 1948).

bank) controlled all exports and incorporated export policies of all cartels into the Nazi sphere. In other words, export cartels were totally centralised and controlled by the government, probably the first time in history.

However, the Nazi's export cartels were slightly different from traditional export cartels. The Nazi's export cartels were more centralised in that each industry was led by a captain of industry who prioritised the benefits for the whole economy rather than those of individual industries (Fear, 2008).

3.3.2   The United States of America

The United States of America used export cartels, i.e., export associations, to help their smaller and incompetent exporters to compete aboard (Fournier, 1932). Even though the United States (US) have promoted the decartelisation campaign worldwide, particularly after the Second World War, export cartels have been left untouched until now.

3.3.2.1   From Alexander Hamilton to the First World War

Alexander Hamilton, the first Secretary of the Treasury under President George Washington, first proposed in the "Report on the Subject of Manufactures to the US Congress" in 1791 stating that *infant industries* must be protected in order to be able to compete in the global market, the underlying idea on which the relationship between export cartels and economic development in this dissertation is based on. Even after Washington's time, President Thomas Jefferson, despite the *Jeffersonian* democracy emphasising agrarian democracy, did not abandon Hamilton's basic policies. It was partially because Hamilton's ideas were very influential in the early days of the United States (Notz and Harvey, 1921).

The infant industry ideology served as a blueprint for the US economic policy until the end of the Second World War (Chang, 2010). The early period of industrialisation in the US was well-described by Alfred Chandler in his seminal work–the *Scale and Scope*. His

main thesis was that the *three-pronged investment* played a central role in the economic development of the US. These investments include the manufacturing investment (production facilities), marketing investments (marketing and distribution network), and management investments (management). Through these newly-invested factors, the building and the operation of the rail and telegraph system led to the new type of business enterprises, in which a separation of ownership and management had been clear-cut. This new type of business enterprise, in turn, enhanced the building and the operation of the rail and telegraph systems. Moreover, these new business enterprises also used mass marketing and production to enter the new markets (economies of scope).

Cartels played an important role behind the construction of the rail and the telegraph systems, which could be considered as the foundations of the industrialisation process in the US. For example, the US railroad cartels played an important part in operating and further building of the railroad system during the early period. These cartels include the Iowa/Omaha pool, the Southern Railway and Steamship Association (SRSA) (Hudson, 1890). The main purpose of these cartels was to help relieve the high fixed costs, low margins, and high concentration of the railroad industry in the regional markets. Moreover, it is arguable that, without cartels, the so-called *three-pronged investment* would have been less likely. This is because, in order to achieve a greater scale of production to fully benefit from the upgraded infrastructure, firms need a considerable amount of resources for the investment, the argument which is in line with the infant industry argument discussed earlier.

During the inter-war period, cartels were still used in various industries. However, there were some factors by which export cartels became more necessary to exporting firms, especially small- and medium-sized exporters. Stocking and Watkins (1948) argued that there were three factors stimulating cartel formation, including export cartel formation during the period: war-time (the First World War) mobilisation of industry, maladjustment of productive capacity to market demands, and monetary instability.

For the war-time mobilisation of industry, a number of industry-wide organisations of production supervised by the government were formed for the first time and had proven more productive than solely relying on the market. These organisations were formed to improve efficiency, price and quantity controls, standardisation of products or processes, specialisation of plants, exchange of technical information, coordination of outputs. However, Stocking and Watkins (1948) argued that, in peacetime, the US domestic consumers may resist such suppression by businessmen (this is in contrast with Germany as discussed earlier) and the limitations on consumer freedom of choice. Still, export cartels were found to be a compromise between the government's direct intervention and the businesses free competition.

As for the industrial maladjustments, productive capacity could not be adjusted to meet the demands of war time. The maladjustments were particularly severe in some strategic industries, such as steel and shipbuilding (to be exploited in warfare production), but also in other relevant industries such as foodstuffs and raw materials (to serve the military missions). Due to their war-specific needs, the demands in these industries increased significantly during the war but decreased sharply immediately afterwards.

3.3.2.2   The post-First World War period

When peace came, adjustment back to the old demand pattern proved difficult, as evident in the huge increase in world commodity stocks from 1922, with wheat, sugar and rubber stocks at almost double their pre-war levels (Kaldor, 1976). Therefore, cartels were used to manage the readjustment process because the market was unable to adjust itself solely through the price mechanisms alone. Moreover, an absence of sufficient population growth due to the war casualties also made it difficult for the demand to match the excessive supply.

The last stimulus of cartelisation during the post-First World War period was the monetary instability, which was caused by the government attempt to finance the war. During the

First World War, the US government's public debt was increased almost twenty-folds. A substantial increase in money supply also caused currency devaluation. Businessmen were forced to either write down inflated capital values or increase their earning power. Cartels (and other concerted actions) were formed precisely to support the latter. In contrast to Germany, where cartels were formed largely to rationalise industries, the US cartels were mainly formed to organise stabilisation in the post-war period.

Export cartels were much needed after the First World War, especially by SMEs, in order to deal with the global volatility. However, these enterprises were reluctant to form export cartels due to the existence of the Sherman Act or the Antitrust law. As a consequence, in 1918, the last year of the First World War, the US Congress passed the **Webb-Pomerene Act (WPA)** to exempt the formation of export cartels (i.e., the export associations) from the provisions of the Sherman Act. The government tried to support smaller exporting firms through the WPA and encouraged them to advance their collective interests (by reconciling their individual interests). The WPA was partially a counter-measure to foreign export cartels and partially a supporting regime for exporters, who found themselves unable to secure financial support either domestically or abroad. These exporters were typically expected to be small firms in unconcentrated industries so that they could gain economies of scale (Larson, 1970). Evidently, Herbert Hoover, the Secretary of Commerce at that time, actively supported trade associations (export cartels) (Stocking, 1954). The WPA explicitly aimed to encourage firms to form a full export cartel (involving all firms in the industry) by disallowing export cartels to exclude or suppress other non-associated exporters from joining an export cartel (Stocking and Watkins, 1948).

After the WPA was enacted, the number of national trade associations attained new highs. Between 1918 and 1940, there were over 120 export associations involving over 2,000 firms filing registration statements with the Fair Trade Commission (FTC). In 1940 alone, there were 44 registered trade associations with 434 participating firms (Gilbert and Dickens,

1940). The functions of these trade associations spanned from price fixing, output restriction, to trade channel confinement. The idea behind fixing prices at that time was particularly interesting. One of the prominent trade association executives stated that "competition at all times should be based on quality and service and never on prices" (Berk, 1996). The statement provides a foundation on which the subsequent chapters discussing how export cartels may promote productive capabilities by relocating competition across activities will be based.

In the 1930s, export cartels were an essential part of the movements to deal with the Great Depression. Under the **New Deal**, a number of domestic laws were enacted between 1933 and 1938. These domestic laws were both passed by the Congress and the presidential executive orders during the term of President Franklin D. Roosevelt. One of the laws that is directly related to export cartels was the **National Industrial Recovery Act** of 1933 (NIRA). The NIRA was enacted to avoid the so-called *cut-throat competition*, the concept which is closely related to *excessive competition* in Germany and *ruinous competition* in Japan.

The NIRA was soon declared unconstitutional by the Supreme Court in 1935, which ruled that the NIRA infringed the separation of powers under the United States Constitution (i.e., the *Schechter* decision). This is because the NIRA allowed the government to have a non-predetermined discretion to defy the Antitrust law legislated by Congress. Some authors questioned the effectiveness of the NIRA in the first place by saying that the high-cost firms were sustained by it (Alexander, 1997). Even though the NIRA was declared unconstitutional, the business conducts in the US had never returned to full competition during the New Deal period. For example, during the term of President Franklin D. Roosevelt (1933 - 1945), with the assistance of Judge Thurman Arnold, the side-stepping of competition still persisted. Similar laws to NIRA were legislated during the period, e.g., the Agricultural Adjustment Program of 1938 and the Bituminous Coal Conservation Act of 1937 (Stocking and Watkins,

1948). The resistance against cut-throat competition persisted until at least the outbreak of the Second World War.

3.3.3   Great Britain

The British government also used export cartels (trade associations) as a part of the reconstruction process after the First World War. The government was largely influenced by and borrowed the *new industrial system* from Germany. The *Dusseldorf Agreement* signed in 1939 to support cartels between two countries, by which cartels from one country were safeguarded from the competition laws of the other country.

Moreover, the terms destructive competition and unhealthy competition were also adopted in British policy circles (Stocking and Watkins, 1948). The British government at that time believed that reconditioning of British industries was necessary. The reconditioning process significantly involved the formation of producer associations to obtain the full benefits of large-scale production, elimination of waste, and standardisation and simplification of one or more of the production processes (Balfour Committee, 1929). In the report of the Committee on Industry and Trade (Balfour Committee) submitted to the British government in 1929, the Committee recommended the rise of coordination above competition, individual acquisitiveness and self-seeking, by calling coordination (of science and service) "the keys to the new order". The Balfour Committee backed up this claim by arguing that the collective organisation of industry was adopted in leading nations like France, Germany, and the US. They emphasised further that the collective organisation was meant to coordinate the application of scientific results to industry by utilising research, training management, pooling ideas, and establishing cooperative selling organisations.

The view of destructive competition in the British economy was re-emphasised by Sir Alfred Mond, the leader of Imperial Chemical Industries Ltd. (ICI) in 1927, when he spoke of "outmoded competition" (Mond, 1927). He argued that cooperation had some "rationalisa-

tion" advantages over the "discomfiture" of competition. The discomfiture of competition was, for instance, wasteful duplication of physical plants and excessive inventories of raw materials, work in process, and finished products. MacGregor (1927) summarised the view on export cartels at that time by saying that export cartels were "no longer seriously opposed by economic theory or public policy".

The British government went as far as forcing some industries to form compulsory cartels like the German *Zwangsyndikat*, i.e., compulsory cartels. For example, the coal industry was cartelised by the Coal Mining Act of 1926 followed by the iron and steel industry, the shipbuilding industry, the cotton textiles industry (by the Cotton Industry board in 1939), the flour milling industry, and agriculture (by the Agricultural Marketing Acts of 1931 and 1933). The Agricultural Marketing Acts of 1931 and 1933 were similar to those policies in Denmark around the same period, where joint sales agencies were formed to prescribe output quotas and fix the price under the Board of Trade and the Ministry of Agriculture.

3.3.4   The Netherlands

The Netherlands has a reputation for being an open economy (relative to other countries, at least) throughout its history. Export cartels were established in several industries and, more importantly, served as a very successful instrument in developing Dutch industries (Bouwens and Dankers, 2005). For example, a tin cartel was formed before the First World War under the name of the Dutch East Indies Company, of which the Dutch government was the owner and thus the largest tin-mining company in the country itself.

All cartels including export cartels were freely allowed until they became regulated by the Business Agreements Act (BAA) of 1935. However, the BAA was not really enacted to deconstruct export cartels. In fact it proved quite the opposite, for under the BAA, the government was able to coerce membership to eliminate the free-riding incentives and could recommend cartelisation during times of depression or under deadly competition.

The main purposes of export cartels (and other cartels) were to temporarily protect small and/or traditional producers from the uncertainties of business caused by changing market conditions, technological innovation, or mounting competition. Therefore, cartels were usually allowed to form in the belief that they would help standardise and rationalise the firms.

The Dutch glass cartel supported the point that an export cartel could be exploited to help improve productive capabilities (hence, economic development). At the turn of the twentieth century, Michael Owens invented a machine to produce bottles at a very high speed and low cost. In 1907, European producers including the Dutch producers formed the European Association of Bottle Producers (the *Europaischer Verband der Flasschenfabriken*) to purchase a patent for Owens' machine and divide the right among the participants. Likewise, the salt cartel (*Zoutconventie*) was formed in the early twentieth century (1900 - 1940) to "ward off" fierce German competition and was proven successful in protecting Dutch trading positions for more than fifty traditional producers. The government even directly intervened in some industries, such as the brick industry. The Ministry of Economic Affairs assisted by installing a price-fixing committee for all kinds of bricks in 1936 (Bouwens and Dankers, 2005).

3.3.5   France

Baumgart (1982) underplayed the existence of cartels in France before the First World War, emphasising the dominant role of small family enterprises in manufacturing industries. However, Freedeman (1988) showed that cartels had actually been influential in France well before that date.

Cartels, or *entrente* in French, were most often found in a form of **comptoirs** (common sales agencies). These comptoirs were formed to regulate the sales for a certain period such as three to five years subject to extension. Comptoirs normally assigned customers' orders to members according to their *quantum*, which was settled by rounds of negotiation

among members. The allocation of customers' orders was essentially a production quota. In the early twentieth century, **comptoirs** were a prominent feature of all heavy industries in France (Stocking and Watkins, 1948). Like most European cartels, the French cartels were consequences of the economic stagnation of the 1880s and 1890s (Freedeman, 1988). As Article 419 of the Penal Code of 1819 delegitimised cartel formation affecting a domestic market, it did not rule out export cartels as the practice does not affect a domestic market. Therefore, comptoirs formed for export purposes did not fall under the enforcement of the Penal Code. Moreover, the 1819 Penal Code was not particularly effective in practice when it came to domestic comptoirs either. Freedeman (1988) argued that judges and other public officials at that time did not unequivocally support the free market ideology.

Comptoirs may take different organisational forms including a modern corporation (*Socitete anonyme*), a limited partnership with shares (*Societe en commandite par actions*), and a full partnership with unlimited liabilities (Freedeman, 1988). In the beginning, comptoirs were founded in specific industries such as iron and pig iron (the Comptoir de Longwy of 1876) and salt (the comptoir for Eastern salt producers in Nancy) in the late nineteenth century. The Comptoir de Longwy, in particular, accounted for over 25 per cent of total French production of pig iron with over 10 members towards the end of the twentieth century (Freedeman, 1988). Other industries started to form comptoirs, encouraged by the court verdict in 1902 which decided that the Comptoir de Longwy was not illegal under the Article 419 of the Penal Code of 1819 because it did not necessarily adversely affect domestic consumers and the export activities were not under the enforcement of the code. Other comptoirs included, but not limited to, the Comptoir des Poutrelles of 1896 (steel), the Comite des Forges (metal), the Comptoir des Essieux of 1892 (Axles), the Comptoir des Glaces of 1862 (plate glass) (Rust, 1973). The Comptoir des Glaces of 1862 is particularly interesting as it was formed between Saint Gobain, an industrial giant at that time with over 75 per cent of

the French market, and smaller producers. The agreement lasted for over forty years until 1903 (Lévy-Leboyer, 1979).

The main motivation for cartels in France was claimed to be, similarly to other countries, the escape from excessive competition. Moreover, cartels (mainly, comptoirs) were seen as an (temporary) alternatives to the merger and acquisition process, by which the American-style trusts were formed during the same period. Some notable benefits of French comptoirs were used to save transport costs through a judicious division of orders and commonly purchased raw materials, to aid the struggle to survive the competition of foreign competitors, to organise the export of surplus products, to promote standardised products and technical progress, and to provide stable employment from which workers would benefit (Freedeman, 1988). In some cases, comptoirs were also found to be a substitute for the price-fixing agreements, such as the case of the *Societe commerciale de carbure* of 1904, a comptoir for producers of calcium carbide (*carbure de calcium*) (Freedeman, 1988).

In conclusion, there were at least a hundred of cartels in France before the First World War (Laur, 1907). Similar to the other countries, the idea of "wasteful competition" was also shared among French scholars at that time, including Francis Leur, Edouard Dolleans, Paul de Rousiers, and Jules Meline. Cartels were seen as an intermediate form in between wasteful competition on the one hand and trusts or large companies on the other (see further details in Freedeman (1988)).

3.3.6   Finland

Finland had one of the most vivid cases by which the relationship between economic development and export cartels could be presented: the forest industry. Jensen-Eriksen (2013) argued that the forest industry (paper, pulp and timber) in Finland is one of the best cases for studying the impact of export cartels on the economy. The case exhibits how export cartels can help facilitate the development of the industry.

Finland is a small open economy whose income mainly depends on export trade. The government chose to use export cartels to support industrialisation for most of the twentieth century. The forest industry accounted for over 80 per cent of Finland's export revenue before the Second World War. The study conducted by Niklas Jensen-Eriksen explained how export cartels (associations) helped small and insignificant firms become significant players in the global market.

Finland's forest industry faced great economic difficulty in the early twentieth century. The difficulty was due to the loss of Russian market share following Finland's declaration of independence in December 1917. The difficulty was also compounded by the Wars of that period (the First World War and the Finnish Civil War). Finland's GDP and its industrial production slumped by at least a third and by a half respectively between 1917 and 1918. With a great need for export revenues to import raw materials and machinery in other sectors, the government realised that Western Europe had to be their alternative destination for the country's export of forest products. However, competitiveness of Finland's forest industry was relatively low. Finland's share in the global market was roughly five to ten per cent of the shares of the United States and Germany; the two global leaders at the time. The difference in terms of scale and quality was much greater when individual firms were compared with big firms such as the United States' *International Paper* (Heinrich, 2001).

As a consequence, the Finnish Paper Mills Association and the Finnish Cellulose Union, *Finpap* and *Finncell* respectively, were founded in 1918 to take over shipping and sales activities from the member companies (Jensen-Eriksen, 2013). During the interwar period, the Markka (Finland's currency) depreciated by almost 90 per cent. Therefore, exports from the forest industry were partially promoted by their low prices. Finpap and Finncell also set low prices to compete against traditional suppliers in Western Europe to attract new consumers. Apart from combining marketing and sales activities, the members of Finpap and Finncell also organised the joint gathering and analyses of trade information, controlled the

quality of production, and collectively borrowed funds from foreign sources for individual members (Jensen-Eriksen, 2013).

The benefits of Finpap and Finncell were substantial. Between 1920 and 1938, paper and pulp exports increased by three and eight times respectively. The timber industry, which is relatively labour-intensive, was also industrialised and the number of firms reduced. By the 1960s, the paper industry replaced the pulp industry as the leading export industry by which time the quality had improved significantly. In the 1990s, Finland became one of the largest paper producers in the world. By the effective use of export cartels, Finpap and Finncell helped transform Finland from a labour-intensive producer of timber with a small share in the global market into an industrialised producer of high-quality paper with a substantial share in the global market.

3.3.7   Other countries

In the early twentieth century, cartels were formed in almost every important industry in Belgium (Stocking and Watkins, 1948). Before the Second World War, almost every branch of industry in Norway was cartelised, despite the fact that the cartel registration bureau reported the filing of only 192 cartel agreements and only 51 undertakings (Stocking and Watkins, 1948). Moreover, before the First World War, the Spanish and the Italian governments used a common selling agency to expand their mercury markets.

3.4   The pre-Second World War literature

3.4.1   The slow start and a short hiccup: 1900 to 1930

During the early twentieth century, especially before the Second World War, the views on cartels in the literature were mixed.

Bullock (1901) investigated cartels that were active during the 1890s one of the pioneering works. In an attempt to test the hypothesis that cartels were formed to exercise market power over prices, he failed to find sufficient evidence for it, a conclusion which was also shared by Ripley (1916). Ripley (1916) was also one of the first to propose that a *case study of industry* should be adopted to learn the organisation of cartels, by which a number of subsequent studies were guided which started to adopt the case study as their research methodology. One of the first case studies was the work by Henry R. Seager and Charles A. Gulick, who studied the Michigan Salt Association, founded in 1876. The study tried to answer why and how the association was sustained for years (Seager and Gulick, 1929). The reasons given were inelasticity of demand and a sophisticated design of the cartel organisational structure.

However, there was a *hiccup* in the stream of literature during the 1920s (the inter-war period). Considering the ubiquity of cartels in Europe during that interwar period, cartels seem to be, as Robert Liefmann argued, normal and widely used as tools of economic planning by firms as well as by governments. There were a few other works studying cartels during the 1920s. Overall, the literature during this period was inconclusive as to whether cartels were beneficial or detrimental [8] (Levenstein and Salant, 2007).

One of the most extensive studies on cartels in the early twentieth century was the book *Cartels, Concerns and Trusts* originally written in 1897 by the German economist Robert Liefmann. The book was later edited and translated into English in 1932.

In section 2.1, it was argued that the definition of cartels in Liefmann (1932), in which the monopolistic control of the market was a necessary condition of cartels, is too narrow to serve this study's objective. He stated explicitly that cartels *do not* include non-monopolistic associations regulating conditions of contract, fix standards and uniform specifications,

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[8]One reason of the inconclusiveness is that, in the early twentieth century, solely the fact that prices were above competitive levels proved insufficient in supporting the claim that cartels were detrimental. At that time, different criteria were adopted to analyse cartels. For example, Liefmann (1932) discussed the consequences of cartels on different stakeholders such as insiders, outsiders, industry, economy, consumers, and other economies. Levenstein and Suslow (2006) concluded that different works tried to "understand what determines the success of collusion, with varying success of their own".

carrying out central purchasing of raw materials, or setting up joint selling organisations or agencies, and so forth. These activities are however included in this study. In Liefmann (1932), it was argued that cartels were more likely to be found in mass-produced goods subject to few quality differences (homogeneous products), in an industry with a high ratio of fixed capital to the value of product (e.g., heavy industries such as iron and steel) in which a vast outlay on plant and equipment is needed, and in an industry with a small number of firms.

Liefmann (1932) also considered the effects of cartels on different parties including member and non-member firms, workers, and consumers, and on different aspects of industry including expansion of industry, technological progress and rationalisation of industry. However, the study was not calling for imposing a ban on cartels. It, instead, admitted that cartels were "normal economic phenomenon", by which different economic parties were affected differently. According to Liefmann (1932), one of the most prominent benefits of cartels (including export cartels) is the ability to deal with volatilities such as price volatility. He interestingly considered a price-fixing cartel as a coordination tool for price adjustment during the period when demand changes. In reality, even though the competition works to push the price down at a given level of demand, it complicates the price adjustment mechanism during the period when demand increases (the boom period). During the boom period, an individual firm will be afraid of increasing the price unilaterally through concerns that others may abstain from such action and attract consumers away. Moreover, in unfavourable situations such as depressions and crises, cartels prevent prices from going down below the solvency level, allowing firms to survive in the long term.

3.5   Export cartels in the post-Second World War period

The end of the Second World War until the 1980s became the period of *embedded liberalism* or *mixed economy*. It was not until after the 1980s that there was extensive trade liberalisation

(under the so-called *Washington Consensus*) through the push by the International Monetary Fund and the World Bank. During these periods, export cartels, however, continued to be used by most now-developed countries including the US, Germany and Japan. Only domestic cartels were affected by the new *liberalism*. Indeed, most European countries at that time "came reluctantly to the idea of competition policy ... from their mercantilist heritage" (Martin, 2010). This section also reinforces the point made in Chang (2002) that export cartels seem to be another "ladder" being kicked away by now-developed countries.

3.5.1 The United States: Decartelisation

3.5.1.1 The attempt to promote trade liberalisation by the United States

There was an attempt by the US, the new global hegemon, to maintain peace through trade liberalisation after the Second World War (Gonta, 2010). Martin (2010) called the ideology behind the attempt *Ordoliberalism*, based on which a competitive market is seen as a bulwark of political freedom. Unsurprisingly, cartels were also affected by such mechanisms. The process of *decartelisation* began, by which cartels started to be delegitimised and eradicated through policies and regulations. Moreover, decartelisation was partly an attempt to deracinate the Nazi exercise of private economic power through cartels by strengthening free decisions in markets in the absence of government intervention. Therefore, one of the reasons for the policy recommendation against cartels in the post-Second World War period was to dismiss socialism and communism and to promote democracy. Stocking and Watkins (1948) explicitly stated that "elimination of cartels may be a necessary price for continuation of private enterprise. By their cartel affiliation, they may become, in effect, brothers-in-arms of socialists and communists." This is because cartelisation is based on the concentration of private control instead of an equally dispersed one. Soon after the end of the Second World War, the negative view on cartels was set and quickly became the dominant view on cartels in the post-Second World War period.

3.5.1.2 Export cartels as an exception

Despite the fact that the US was trying to introduce its own view on liberalisation, George W. Stocking and Myron W. Watkins admitted that the US view at the time differed greatly from those held by the rest of the world. The United States' hostile attitude towards cartels was "internationally a minority attitude". They claimed that the United States, by a unilateral liberalisation process, would become "*an island of free enterprise in a sea of collectivism*". Moreover, despite an attempt to liberalise its economy (and other economies including the Axis countries, such as Japan and Germany), **export cartels remained an exception even in the US**. American firms had always been free to take part in export cartels (Bhattacharjea, 2004; Schultz, 2002; Stocking and Watkins, 1948). The United States Congress continued to permit American firms to "enter into international business agreements valid under the foreign laws provided they result in no reasonable restraint of trade within the United States" (Stocking and Watkins, 1948).

The WPA remained active after the Second World War. In the 1968 Federal Trade Commission 50-year report of the WPA, the compiled data from the government, United States and Woolley (1946), and the responses to FTC questionnaire in 1945 and 1952 showed that there were 40 and 28 export cartels registered under the WPA in the respective years[9]. The majority of export cartels in both years (21 and 11 respectively) were reported as *fully-functioned*, i.e., operating as the foreign sales arm of member firms and acting as agent for products exported through association (Federal Trade Commission, 1968). A similar pattern was also found by the FTC survey in 1963 (United States and Woolley, 1946). Apart from selling functions, export cartels were also formed to conduct other marketing and distributive functions, such as price setting and/or market allocation, gathering data

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[9]Besides the functions of export cartels under the WPA, the industries in which these export cartels were formed were considerably diverse, i.e., sulphur, potash, phosphate, milk, carbon black, machine tools, canned food, and plywood associations. The other fifteen limited-function associations include television and motion picture film (four associations), soybean oil, lumber, pulp, paper and paper board, coal, pencils, and tires and tubes industries.

Table 3.1 Functions conducted by Webb associations in 1962

Function	Number of associations
Price Setting and market allocation	19
Foreign sales offices and/or agents	13
Market research and information	9
Selling agent	8
Sales to US Government	9
Freight and insurance	8
Negotiating with foreign governments and international agencies	7
Promotional activities	6
Publications	6
Representing member firms before US Government agencies	5
Statistical services	4
Engineering and related services	4
Distributing and licensing activities	4
Market development	3
Foreign storage facilities	2
Financing exports	2
Credit information	1
Uniform sales contract	1

Data based on 23 active associations in 1962. Each association performed 2 or more of the functions listed
Sources: FTC Survey, Export Trade Associations, 1963.

on foreign market opportunities and facilitating contacts with foreign buyers and domestic suppliers (see functions in Table 3.1 and in Chapter 2).

The formation of these associations disproved the prediction by George W. Stocking and Myron W. Watkins, who, in 1947, argued that the American economy did not need the WPA anymore because promoting exports was not a major problem for the American economy after the Second World War. However, that appeared to be the case because American exports at the time were mostly made by larger corporations that do not need export associations to "equalise their competitive power" with that of foreign firms or export cartels. Even so, the fact is that the WPA has never been repealed mainly to keep supporting smaller firms, which are individually unable to export as the cost to individually export is too high.

Moreover, a number of large firms have continued to participate in export cartels under the WPA. For example, the ANSAC, an export cartel under the WPA formed among six American producers of soda ash (sodium carbonate), was formed because of the excess

supply in the domestic market in 1984. Moreover, the raw material of soda ash, trona, was mostly found deep inland (in Wyoming and Colorado) and, therefore, the transport costs were substantial, and therefore cartelisation allowed firms to substantially gain from economies of scale. The fact that firms were located close to each other and the product itself is relatively homogeneous also facilitated the use of export cartels in this case (Bhattacharjea, 2004).

The European Court of Justice (ECJ) however rejected the argument that ANSAC improved competition and should be exempted from the competition law in the 1988 *Wood Pulp* decision. The decision was however made on the grounds that each individual member could already export into the EEC prior to the formation of ANSAC, making the pro-competition argument (the argument that export cartels may introduce additional players into the market and therefore promote competition) invalid. The same arguments were used against ANSAC by the Indian court under the Monopolies and Restrictive Trade Practices Act of 1969 (now replaced by the 2002 Competition Act) (Bhattacharjea, 2004). These decisions imply that export cartels should be prohibited only if they have an adverse consequence on global competition. In Chapter 4, the reason why export cartels are more likely to promote global competition instead of the other way around is discussed.

Surprisingly, in 1982, the United States even enacted the Export Trading Company Act of 1982 (ETCA) to expand the scope of export cartel exemption under the WPA and cover export cartels in services and those formed by people and partnerships rather than corporations. As the evidence showed that the WPA was often used by larger firms instead of the SMEs, the objective of ETCA was to ascertain that SMEs were accommodated by learning from the Japanese and Korean trading company model, i.e., the so-called *sogoshosas* (Committee on Banking, Housing, and Urban Affairs, 1981). The functions of sogoshosas, which the ETCA imitated, were similar to those of the export cartels in Germany and many countries in Europe during the pre-Second World War period. They served as a buffer against the ruinous competition so that the members could survive periods of volatility or compete

against international competitors in terms of scale and productive capability, at least in the short term.

Under the ETCA, the applicants were required to submit applications to the Department of Commerce, with a review by the Department of Justice to ensure that there was no effect on the domestic market (Waller, 1992). Interestingly, since its enactment in 1982, no application for an ETC (Export Trading Company) certificate has ever been denied. Around 90 per cent of ETCs were in the manufacturing industry (Levenstein and Suslow, 2007). The certificate is indefinite but the ETC has to report back to the Department of Commerce annually. Moreover, the certificates usually include conditions, such as the limitations on the areas in which ETC could perform the joint export activities. For example, the US Textile Export Company (TEXPORT) was granted an ETC certificate in 1995. The company was allowed to: solicit orders from foreign customers; arrange for the transportation of merchandise sold from the members' plants and warehouses, etc. to customers' premises; arrange for financing and customs clearance; conduct market research; quote prices to potential customers from the members' price lists as long as the members' activities or methods of operation had no impact on the domestic market (Levenstein and Suslow, 2007).

In 2007, in the revision of the US antitrust law, the Antitrust Modernisation Commission (AMC) argued that export cartel exemptions in both under the WPA and ETC were not necessarily revoked but should be disfavoured and granted only for specific cases where export cartels met "a specific societal goal that trumps the benefit of a free market to consumers and the US economy in general" (Antitrust Modernisation Commission, 2007). Despite the recommendation provided by the AMC, the United States have not legislated accordingly and retains a positive view of export cartels, believing that export cartels are mostly formed among small firms who possess no market power.

After almost a century of the WPA and ETCA in the United States, a substantial number of the US exporters have benefited from these two Acts. Solely under the ETCA alone, as

of 1998, exporting firms had an aggregated income over $ 30 billion annually. Moreover, over 5,000 firms have been involved in the programme including a number of SMEs which individually were unable to export at all (Magnus, 2005).

The attempts to adopt the rule of reason on cartels in general

In the Court of Justice of the United States of America, the current approach to cartels is the *per se* rule, whereby cartels are illegal (against the Sherman Act) as long as the conduct has been executed, whatever their intention may have been. Export cartels, as discussed in Chapter 2, do not fall under the enforcement of the Sherman Act and they are not applicable to the *per se* rule in the US. Apart from the lenient approach towards export cartels, the *per se* view on cartels in the US had been unanimously agreed after all. Some of the US court decisions also shed light on the fact that even the public view was not unanimously against cartels during the late twentieth century. In other words, there were attempts to adopt the *rule of reason* (as opposed to the *per se* rule) on cartels, whereby the intention matered. Such examples included the US vs. Topco Associates and Rothery Storage & Van Co. vs. Atlas Van Lines, Inc. cases in 1972 and 1986 respectively[10]. In the US v. Topco Associates case, the District Court accepted that the use of exclusive territories by Topco Associates to promote competitiveness (by accommodating the use of the private label merchandising) of the members against the larger rivals was not contrary to public interest. The District Court actually believed that the agreement promoted competition between Topco members and national chains (Martin, 2010). The Rothery Storage & Van Co. vs. Atlas Van Lines case particularly emphasised the point made in the Addyston Pipe & Steel case that the *per se* rule will also rule out all efficiency-promoted cases as well.

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[10]See US vs. Topco Associates, Inc. 4-5 US 596 (1972) and Rothery Storage & Van Co. vs. Atlas Van Lines, Inc. 792 F.2d 210 (1986)

After the Second World War, the United States, as one of the most active public advocates (and frequent sponsors) of free trade, also tried to imprint the anti-cartel tradition in some of its occupied territories, notably, Japan and some other European countries such as Germany.

3.5.2   Japan: The late bloomer

Despite the fact that cooperation has prevailed in Japan since the nineteenth century[11], export cartels were not widely used until after the Second World War (Tilton, 1996). The "heyday" of export cartels in Japan was between the 1950s and the 1970s (Hadley, 2015). Since the First World War, Japan implemented export cartels in the form of trading companies (the so-called *sogoshosas*), which was supported by the public, given its positive view of the central planner system[12] (Rosenthal and Matsushita, 1997).

The post-war reconstruction and the failure of the Antimonopoly Law: 1945 to 1950

After the Second World War, the Japanese economy suffered severely. The heavy industries had devoted all of their production to military needs. Therefore, some of these industries were unable to produce products for commercial use and shortfalls were imminent, especially as many plants had been destroyed during the war. Moreover, some of the production capacities which survived the destruction became redundant due to the absence of the military demand in the post-war period. Merchant fleets had been destroyed during the war and the logistical

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[11]Unlike European and American businesses, Japanese business tended to welcome government involvement (Fear, 2008).The evidence for the use of export cartels in Japan may be traced back to the Meiji restoration period in the late nineteenth century. Japan in the early days of its industrial development largely adopted free trade because of the series of coerced unequal treaties with Western countries that existed since 1853. As soon as Japan re-acquired its autonomy, the use of protectionist trade policies resumed almost immediately. Fear (2008) claimed that cartels in Japan emerged in 1880s in the paper and cotton industries in order to control quality and, particularly, limit excessive competition.

[12]The variation in terms of the restriction of the AML on export cartels throughout the last few decades of the twentieth century was mainly due to the different interpretations of *public interest*, by which export cartels have to abide (Suzumura, 1997). In the early period of the AML (i.e., between 1950s and 1970s), the public interest was the balance between the view that the public interest means free competition and the view that the public interest means an enhancement of social welfare despite being opposed to free competition (see the Oil Cartel case in Matsushita (1997)). The latter view is known as the *Keidanren* (Federation of Economic Organisations) interpretation (Matsushita, 1997).

systems became paralysed (Johnson, 1982). Japanese export capabilities were thus severely constrained.

It took only less than a decade for the Japanese economy to recover the pre-Second World War levels of output. The post-Second World War growth rate was much higher than that of the pre-Second World War period. The early post-war years were devoted to rebuilding lost industrial capacity, especially in chemicals, coal, steel and electric power industries. Between 1953 and 1965, Japanese GDP expanded over nine per cent a year. Some core industries grew by over ten per cent. For example, there were figured of 13 per cent reported in the manufacturing and mining industry, 11 per cent in the construction industry, and 12 per cent in the labour force. These three industries accounted for more than 41 per cent of the labour force. These *miracle* years saw the government of Japan implementing different policies to stimulate economic growth, one of which is the use of export cartels to promote exports.

The United States, during their military occupation in Japan in the late 1940s and the early 1950s (until the end of the occupation period in 1952), successfully pushed the government of Japan to enact the Antimonopoly Law of 1947 (AML) (Singh, 2007). The AML was aimed at breaking up the *Zaibatsu*–the financial combines that dominated[13] industry and banking in Japan in prior to the Second World War[14]. As a consequence, the Zaibatsu system was dissolved by restricting on ownership, holding jobs of former Zaibatsu managers, and weakening the interlocking directorates among members (Stocking and Watkins, 1948). However, the United States found it difficult to implant a cut-throat competitive mindset into a highly monopolistic economy like Japan (Stocking and Watkins, 1948). A similar system

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[13]Before the Second World War, Zaibatsu accounted for 57 per cent of the coal industry, 88 per cent of steam engine production, 55 per cent of the pulp industry, and 69 per cent of the aluminum industry (See further detail in the Report of the Mission on Japanese Combines, publication No. 2628, Department of Stat, Washington, March 1946)

[14]"Japan, like Germany, emerged late from the feudal strait jacket, and never cast off entirely the habits of thought of a patriarchally guided, hierarchically stratified, mystically united community" (Allen, 2010). Japan welded a prefabricated industrial superstructure onto a subsistence economy of husbandry and handicrafts without disturbing its family-like solidary and authoritarian discipline. A half dozen Japanese families, principally the Mitsui, Mitsubishi, Sumitomo and Yasuda, together with the leading banking interests, constituted the so-called Zaibatsu (Stocking and Watkins, 1948, 369).

to Zaibatsu, Keiretsu[15], was formed shortly after the dissolution of the Zaibatsu system. The rise of Keiretsu in some key industries, such as automobiles, re-emphasised the predominance of the "harmony and peace" and the "live and let live" ideologies rather than the American "competition and rivalry" ideology. These large modern industrial enterprise groupings, i.e., *keiretsu* have helped coordinate activities within and across different industries more efficiently, a system in which smaller subcontractors were also incorporated. The ultimate goal was to satisfy two criteria by which the MITI guided the economy: productivity growth and economies of scale. Both of these played a key role in the economic rebuilding process after the Second World War (Chandler Jr., 1994).

In terms of export cartels, the AML was largely ineffective in breaking them. Eventually, in a five-year period after the enactment of the Antimonopoly Law of 1947, the Japanese government enacted the Export and Import Trading Act of 1952 (EITA) to exempt export cartels from the AML. Under the EITA, firms were allowed to agree upon prices, quantities, quality, or design of their products for their export activities, as long as they notified the Ministry of International Trade and Industry (MITI) within ten days after the conclusion of the agreements (Iyori and Uesugi, 1994). The MITI, however, were able to revoke the agreement if it violated certain conditions, such as injuring the interests of Japanese exports, contained unjustly discriminatory contents, unjustly restricted participation in or withdrawal from the agreement [16]. In other words, the MITI allowed export cartels to be formed as

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[15]Keiretsu is a unique form of industrial structure in Japan. An example of the idea of "harmony and peace" rather than "competition and rivalry" is the keiretsu relationships between Japanese automobile manufacturers and dealers. The manufacturers provide a guarantee against bankruptcy to dealers in exchange for the authority to partially control operations of the dealers. This reflects the philosophy of "live and let live" amongst Japanese industries. There are three kinds of Keiretsu: financial keiretsu (or enterprise group) such as Sumitomo and Mitsubishi; vertical keiretsu (or supplier networks) such as Toyota and Matsushita; and distribution keiretsu (Sheard, 1997). Keiretsu is a good example of the difference in sets of belief on the impact of government intervention. As the US could easily interpret Keiretsu as collusion, Japan considers Keiretsu as an efficient and historical form of organization. Sheard (1997) argued further that "keiretsu are not anticompetitive and have nothing to do with price-fixing". In the context of a relationship between the US and Japan, Keiretsu might lead to closeness between firms, which may eventually influence trade volume such that the US has consistently confronted current account deficit (Lawrence, 1993). Aoki (1994) similarly argued that Keiretsu is an input organisation ownership structure that leads to competitiveness.

[16]Another reason why the US were relatively lenient towards the Japanese bureaucratic control over a managed and protectionist economy and flexible on the use of export cartels was due to fears from Japanese

long as they exploited the full potential of economies of scale by including all relevant firms in the industry and promoted Japanese trade by increasing the trade value and production capabilities.

Between the 1950s and the 1970s, there was a conflict between the MITI and the Japanese Fair Trade Commission (JFTC) regarding industrial and competition policies, supervised by both authorities respectively. The MITI provided guidance to industries and firms in order to allow them to avoid so-called 'ruinous' competition. An elimination of ruinous competition was believed to raise profit to a certain level, above which firms were sufficiently incentivised to invest further (see Chapter 4 for further discussion). As a consequence, export cartels were allowed during that period in order to help exporters avoid ruinous competition (Amsden and Singh, 1994). However, the JFTC declined to follow the guidance and claimed its authority under the AML. Eventually, the court had to intervene and made a judgment. The court was lenient toward the pro-industrial policy (i.e., pro-export cartels) guidance issued by the MITI at that time (Matsushita, 1997). This is shown in the *Oil Cartel* case[17]. The court insisted that the action induced directly by the MITI was lawful. This gives an indication that, when there is an overlapping area between industrial and competition policies, the former is favoured.

The coexistence of export cartels and the Miracle years: 1950 - 1990

Interestingly, the period of highest growth in Japan was arguably between 1950 and 1973 throughout which export cartels were widespread. Just after a few years of active interventions by the MITI under the EITA, in 1962, export cartels accounted for forty two per cent of Japanese export trade and appeared in almost every major industry (Fear, 2008). These industries include textiles, apparel, publishing, ceramics, steel, non-ferrous metals, bleaching powder, wool, cement, coal, copper and shipping (Hadley, 2015; Iyori and Uesugi, 1994).

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pro-communist groups and the North Korean invasion of South Korea during that period. As a consequence, the abrupt change in competitive paradigm was unable to be fully executed in Japan (Rosenthal and Matsushita, 1997).

[17]For the full case, see the Production Cutback Case Decision of the Tokyo High Court, 26 September 1980, Hanrei Jiho [Current Court Cases Reporter], 983, 22 et seq. [1980]

The *miracle* period ended due to the first oil crisis in 1973, by which Japanese industrial growth was greatly affected (Allen, 2013).

Export cartels in Japan were particularly prevalent, and demonstrated exceptional success, in the *most dynamic sectors*, such as fishery and light industries (i.e. agriculture, fishery and food products, textiles, wood products and miscellaneous manufacturing, pottery and stone) and heavy and chemical industries (chemicals, non-ferrous steel and metal products, machinery, and electrical machinery). During the period, export cartels helped the Japanese economy mainly in two ways: enhancing economies of scale and supporting learning by doing from rapid growth in investment and the adoption of advanced technology from more advanced developed countries (Nafziger, 1997). Spearheaded by the MITI, export cartels were promoted over competition until the end of the economic miracle in 1980s. The *Japan Commission on Industrial Performance*, in 1998, also explicitly supported the idea of balancing between competition and cooperation in practice (Lazzarini, 2013).

Throughout the latter part of the twentieth century, Japanese export cartels had some distinctive characteristics from those of other countries, such as the United States. First of all, they had a broader scope than those of the United States under the WPA to exercise their cooperation. For example, Japanese export cartels were able to restrain domestic activities to support horizontal agreements in their export markets (Dick, 1992). Second, most Japanese export cartels did not have a large share in the world market and hence had no supra-competitive returns; this applies to industries like textiles, wood products, agricultural products and processed foods (Larson, 1970; Schwartzman, 1993)[18].

SMEs were the most frequent users of export cartels in Japan[19]. Andrew R. Dick emphasised the fact that Japanese export cartels were mainly formed to help SMEs by reducing costs of export through "coordinat(ing) firms' sales and distribution activities to avoid costly

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[18]The absence of market power was also confirmed by the study on Japanese export cartels between 1955 and 1977 by Andrew R. Dick in 1992.

[19]Japanese SMEs in textiles and fisheries and canned fish industries are amongst the most prevalent users of export cartels (Schwartzman, 1993)

duplication and exploit economies of scale in marketing...coordinating market research and development, providing common warehouse and distribution facilities, coordinating advertising, or operating joint overseas sales agencies..." Moreover, Japanese export cartels were also used to provide and enforce product quality standards. Dick (1992) elaborated such a function of export cartels as "reputational investments on behalf of member firms by setting product design and quality standards, establishing industry brand names, guaranteeing delivery schedules, and mediating disputes between individual exporters and foreign buyers (Dick, 1992, 278)."

It was not until the early 1990s that the JFTC and the Japanese courts became stricter in terms of their approach towards export cartels, i.e., export cartels were allowed only if they are necessary in terms of specific situation and period. Between 1992 and 1995, 17 out of 28 Japanese export cartels were abolished and the remaining cartels were forced to narrow down the scope of their agreements. By 1998, there were only two export cartels in Japan according to the *WTO trade policy review of Japan*. Nowadays, Japan, along with a few countries worldwide, has no exemption (whether implicit or explicit) for export cartels in its competition laws (Bhattacharjea, 2004).

3.5.3 Germany

As with Japan, the anti-cartel regime introduced by the US (mainly, by the *Marshall Plan*) was not particularly successful in Germany (Gonta, 2010). It is apparent that Germany had actively engaged in the use of export cartels long before the Second World War and has continued to do so afterwards (Scherer, 1994).

The "project of atomising German industry", proposed by Stocking and Watkins (1948), failed miserably. After the Second World War, the *Allied Control Council* (ACC) in Berlin tried several methods to decartelise the German economy. There was an attempt to compromise between *Ordoliberalism* (export cartels should be prohibited) and *Abuse Control*

(export cartels should be allowed unless they engage in abusive conduct) paradigms, the latter of which dominated the German economy before the Second World War. In other words, the ACC attempted to strike a balance between the American paradigm that cartels should be strictly prohibited and the German paradigm that cartels should be prohibited only if they engage in abusive conduct.

Subsequently, the German antitrust law (*The Act Against Restraints and Competition* or GWB) was enacted in 1958 to restrict and break up existing German cartels. In order to weaken the existing cartels, the ACC also seized patents and licenses from cartels. Moreover, the US government also persuaded countries in Latin America and some neutral countries during the Second World War, such as Sweden and Switzerland, to sell the shares of German firms to non-Germans in order to weaken and undermine German firms and with them, German cartels. Some Axis countries such as Austria and other East European countries were also asked to divest from German firms. Despite all these attempts, export cartels persisted and were explicitly exempted from the GWB (Levenstein and Suslow, 2004). Under the GWB of 1958, even though Section 1 prohibited horizontal arrangements to restrain trade (i.e., cartels), the exemptions in Section 2-8 "watered down" Section 1, which were particularly lenient towards export and/or SME cartels as long as they serve to protect or promote exports (Möschel, 1989). Moreover, the data of export cartels has been withheld by the German government since 1986 to protect the participating firms from foreign authorities (Khun, 1997a). An amendment to the GWB in 1999 repealed the exemption of export cartels.

Between 1958 and 1973, export cartels were the second-most important form of cartels next to SME cartels and were formed in a number of industries ranging from mesh wire fences to submarines and accounted for 14.8 per cent of all legal cartels (Haucap et al., 2010). During the period, the Federal Cartel Office (FCO) registered 864 legal cartels, of which 187 were authorised by the State Cartel Office (SCO). Among these, 204 cartels applied for an authorisation but were denied by the FCO. Of these, 95 cartels were accused of being illegal

under the GWB by the FCO. Interestingly, export cartels were found in both legal and illegal cases and accounted for 14.8 percent and 7.8 percent respectively towards the total amounts in both cases[20] It is therefore evident that export cartels were ubiquitous in Germany after the Second World War.

3.5.4   Other countries

The British government still supported export cartels after the Second World War. In the Review of Restrictive Trade Practices Policy presented to Parliament by the Secretary of State for Prices and Consumer Protection in 1979, there is a chapter which specifically comments on the export agreements (cartels). The export agreements are exempted from registration for the following reasons: "The main reasons for treating export agreements differently from domestic agreements were that they were thought to benefit the United Kingdom's (UK) balance of payment (H.M.S.O, 1979, 76)" It was pointed out that such a conduct (export cartel formation) was allowed internationally especially under other developed countries' competition laws and, thus that, the British government at that time had no reason to unilaterally protect the public interest of other countries. Therefore, export cartels have been implicitly exempted by the British government until now.

The pre-Second World War approach to export cartels persisted after the Second World War in France. The Article 10 of the 1986 Ordinance on the Freedom of Prices and Competition exempts activities that promote efficiency, for example, by reduction in costs and by innovations, given that the activity passes on an equitable share of the resulting profits to the buyers and does not eliminate competition on substantial portion of the market involved. In

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[20]Export cartels could be either legal or illegal because the legality of export cartels was based on the "rule of reason". In other words, given that an export cartel is not registered and the case is brought to the authority (here, the FCO), a cartel's legal status is assumed valid due to the freedom of contract principle. However, if the plaintiffs can sufficiently demonstrate to the FCO that the conduct had brought about detrimental consequences rather than beneficial ones, the FCO then ruled it as an illegal practice.

other words, the objective of the law was to increase net social welfare instead of solely the consumer welfare (Jenny, 2006).

In Canada, the Competition Act of 1986 explicitly stated that the Act should promote efficiency and adaptability, expand opportunities, and provide equitable opportunity to SMEs. The Act also has exemptions for the conspiracy provisions, by which export cartels are exempted from the Act. The exemption requires that the (export cartel) agreement must not decrease or limit the real value of exports, restrict any person from exporting, or unduly lessen competition in export-related services. Under the exemption provision, the export firms may cooperate in R&D, exchange statistical data, set common standards, or restrict the advertisements by which export firms directly discredit or devalue each other.

3.6   The post-Second World War literature: Stigmatising cartels

After the Second World War, the literature started to take the *adverse* consequences of cartels as given. Having that assumption in mind, most academics have believed that they have to understand cartels the same way that criminologists understand the criminals. They pooled substantial efforts to understand the factors determining cartel formation and stability in order to point out the industries in which cartels are more likely to be formed and, therefore, should be placed under surveillance. As a consequence, Game Theory, whose progress had been rapid after the Second World War, notably throughout the Cold War, was widely adopted by (mainly, Neoclassical) economists to study cartels, or, to be precise, the formation and the stability of cartels. The outcomes of this recent steam of research are the conditions under which cartels could form, stabilise, and endure (Connor, 2007a).

During the period, there were still academic works in which the diverse purposes and consequences of cartels were discussed. For example, Hunter (1961) argued that cartels were

created for the purpose of self-protection rather than to increase market power. In his view, cartels were formed to keep in existence the less efficient producers and cartels also reflected a "live and let live" spirit in the industry (e.g. Copper semi-manufacturers and Sand and Gravel in central Scotland). Fog (1956) conducted an in-depth research on cartel formation in Danish industries. He argued that the incentive of cartel formation was not to maximise profit but to gain *security with fair profit*. However, these works were, at most, exceptions to the mainstream works on cartels. In general, the optimistic view on cartels in the literature gradually faded away after the Second World War.

3.6.1   An overview of the literature on cartels in general

3.6.1.1   The change in the tone of literature: 1945 to 1950

The study that transformed the theme of the literature on cartels after the Second World War was the book, *Cartels or Competition*, written by George W. Stocking and Myron W. Watkins in 1948, as a part of the post-war project to study the consequence of cartels on the economy led by the US government. To be specific, Stocking and Watkins (1948) strengthened the "detrimental" view of cartels by concluding that cartels deterred investment, fostered the misallocation of resources, and protected uneconomic producers against competition. The study recommended the effective preservation of free competitive enterprise in the domestic market and thus prohibition of cartels.

Stocking and Watkins (1948) criticised the government approach towards cartels that, in practice, "government rarely follow a pure and universal gospel", i.e., the US government at that time was quite lenient in its approach towards cartels, especially export cartels. They therefore called for an unforgiving policy against cartels, which was widely adopted in the subsequent period.

In 1947, Don Patinkin was among the first authors who used a mathematical model to portray a cartel as a multi-plant firm. A cartel was viewed as a multi-plant monopoly firm,

with a central decision-making unit, which considered the industry's benefits over those of each individual firm. Members were assigned output quotas along with the system of **side payment**, by which those who violated their quotas needed to pay those whose quotas were affected, i.e., a redistribution system of revenues to compensate any misallocation in quotas. He raised concern over the problems of excess capacity and over-investment due to the race to gain a higher quota (Patinkin, 1947). These problems were, later on, emphasised by Bain (1948), who argued that, in the absence of the side-payment system, Patinkin's multi-plant model of cartels could not explain how the quotas system worked. Bain (1948) argued that the quotas system worked because firms within a cartel were far different from plants within the same firm because, unlike plants, firms had "antagonistic ownership interests" and would definitely race for quotas. Therefore, the dynamic within a cartel was more of a power-politics negotiation among members than that of a multi-plant firm. The fact that a cartel was based on negotiation and re-negotiation plays a key role in the argument in Chapter 4 that an export cartel agreement does not necessarily eliminate the incentive of firms to improve their productive capabilities.

Subsequently, mathematical models have been used to derive various conditions under which cartels are more likely to be formed and sustained. However, it was not until the 1960s before Game Theory started to be used to study cartels. It took less than two decades for Game Theory to become the main tool which academics adopted to study cartels. The increasing influence of Game Theory in the studies on cartels was partly because Game Theory was substantially advanced in terms of its applicability and theoretical concepts during the period, e.g., the introduction of Nash equilibrium by John F. Nash in 1950 and the expected utility theorem by John VonNeumann and Oskar Morgenstern in 1947. Therefore, most of the advancements in the knowledge on cartels in the past few decades have been largely concerned with the characteristics of the industries which influence the formation and stability of cartels, as analysed through Game Theoretical models.

3.6.1.2   The rise and the dominance of Game Theory and Industrial Economics: 1960 to present day

One caveat of the underlying assumption of research over the last few decades is the fact that cartels were usually defined narrowly as "price-fixing" or "hard-core" cartels, the definitions which were discussed in the previous chapter. Moreover, the studies on cartels were mostly based on the ability of firms to fix prices and/or their commitment to the agreement (cartel formation and stability). Having been introduced in the field of economics between 1950 and 1960, it was not until the 1970s before industrial economists started to use Game Theory to analyse the behaviour of firms in various settings. Since then, Game Theory has become the main tool by which economists study cartels.

In his seminal 1964 work, George J. Stigler argued that a collusive agreement may lead to a *price war* because of the free-riding effect, by which firms have incentives to deviate from the cartel agreement and attract as many customers as possible. That is, he argued that the cartel was unstable because of the free-riding problem (Osborne, 1976). Later in 1971, James W. Friedman developed a solution to this problem in non-cooperative indefinitely repeated games (i.e., the game is played repeatedly and indefinitely) or *supergames*. Given that cartels resemble the prisoner's dilemma, he argued that cartels could be stable in the supergames. One of the strategies by which players (firms) may adopt to sustain cartels is the so-called *trigger strategy*, under which each firm keeps cooperating until the other player defects and, upon defection, the firm defects forever too (Friedman, 1971). The conclusion that cartels could be stable is also applicable in a game with an unknown end or even a finite-but-long period game (Porter, 1983). Subsequent research mainly focused on how cartels could be stable under different circumstances. One of the most complete reviews in the literature on cartel formation and stability is the work by Magaret C. Levenstein and Valerie Y. Suslow, What Determines Cartel Success?, which was published in 2006 in the *Journal of Economic Literature*.

The most recent theme of studies on cartel stability has turned towards the cartel-deterrence policy called the "Leniency program" (Bigoni et al., 2008; Harrington, 2013; Leniency, 2010; Spagnolo, 2006). The policy aims to provide amnesty/leniency to the players who come forward (i.e., the firstcomers) and provide information regarding a cartel to the authority. This policy reflects how cartels are theoretically treated nowadays: *an illegal per se practice which should be deterred by all means*.

3.6.2 The literature on export cartels

The literature on export cartels is limited. There have been two main streams of research on export cartels to date: the literature on the Webb-Pomerene Act of 1918 (WPA) and the Export Trading Company Act of 1982 (ETCA) in the United States and the literature on export cartels in general. This section discusses these two streams consecutively.

3.6.2.1 The literature on the WPA and The ETCA: 1960 to the present

Fournier (1932), despite claiming that the scope of the WPA had been undesirably expanded into the domestic market, concluded that the original purposes (overcoming American exporters' handicap) of the WPA was well-grounded. Most of the research in the early period of the WPA enforcement placed emphasis on the description of the law, the objectives of the legislators, and the legal aspects of the law. They were unable to conclude the effects of the WPA due to the lack of sufficient empirical data (Diamond, 1944; Gilbert and Dickens, 1940; Jones, 1920; Notz and Harvey, 1921).

One of the earliest empirical studies on the WPA was the United States Fair Trade Commission's 50-year report on the Webb-Pomerene Act in 1968. The report attempted to evaluate the functions and the performances of export associations (export cartels) registered under the WPA over the 50-year period since its enactment in 1918. The report concluded

that the WPA was no longer needed for the US economy and, thereby, should be revoked (Federal Trade Commission, 1968).

A similar conclusion to the report by the FTC was drawn by David A. Larson in 1970. He dismissed the effectiveness of the WPA. One of the main reasons was that the WPA was typically used by large firms in concentrated industries, instead of small firms in unconcentrated industries. Moreover, he also claimed that the success of export cartels, as measured by the lifespan of them, correlates with high concentration and product homogeneity (Larson, 1970). In line with the concern of Leslie T. Fournier, David A. Larson claimed that export associations under the WPA also adversely affected domestic competition as well. He proposed that, if the WPA was not to be repealed, then some amendments could be made to focus on small firms or to avoid the conflict of interests in policy enforcement by transferring the administration of the law to the Department of Commerce or the State Department instead of the FTC, which was also enforcing the Antitrust Law. However, the former amendment would have a problem with the definition of small firms and the latter amendment may create conflict between departments, as in the case of the MITI and the FTC in Japan. Despite these arguments, the WPA has never been repealed and it is still in effect.

The studies on the ETCA are even more limited (Committee on Banking, Housing, and Urban Affairs, 1981; Fugate, 1982; Howard, 1989; Lacy, 1987; Levenstein and Suslow, 2007). The most comprehensive research on the ETCA was carried out by Magaret C. Levenstein and Valerie Y. Suslow in 2007. The data consisted of 195 ETC certificates between 1983 and 2004. They found that most certificates were granted in unconcentrated industries (as measured by the Herfindahl index). The empirical analysis showed that, when compensating for the growth rate of exports in the particular product group (industry), the ETCA had no impact on exports. The result confirmed what Spencer Waller found in his more qualitative research in 1992 Waller (1992). However, as firms normally selected themselves to be the ETC under the ETCA, the selection bias is also likely to create noises in terms of the policy

implication, because the ones who are more prone to failure usually select themselves to participate in the programme. Therefore, the framework proposed in the subsequent chapters circumvents this problem by judging the success of ETCs (and export cartels) in terms of economic development rather than export growth.

3.6.2.2 The literature on export cartels in general

Apart from the reports on the WPA and the ETCA in the United States, export cartels were not studied extensively by either academics or governments until the end of the 1980s (Jensen-Eriksen, 2013). Bhattacharjea (2004) admitted that the literature on export cartels in general is *limited*. Martyniszyn (2012) even argued that the most important role of export cartels might be to serve as a *symbol* of Neo-mercantilism rather than actually increasing exports. Sokol (2008) also warned policymakers worldwide that, given the lack of empirical evidence on export cartels, jumping into the conclusion by either completely abandoning or fully supporting export cartels was a risky move. In Chapter 2, the fact that there was an attempt by a group of developing countries including Thailand, China, and India to propose that developing countries should be allowed to unilaterally use export cartels was discussed. It is, therefore, beneficial to discuss the literature on the consequence of export cartels, especially in developing countries.

Some of the literature has attempted to support the use of export cartels by proposing at least two grounds on which export cartels should be favoured over competition. The first argument is based on the enabling role of export cartels. Evenett et al. (2001) argued that export cartels can allow firms to achieve sufficient scale to participate in the global market. On top of that, Dick (1990) added that, by cartelising the horizontal activities, the downstream market is forced to be more competitive, which could eventually lead to lower prices and efficiency gains. This situation is more likely when firms incur large fixed costs and have a relatively small market shares. The second argument is based on the defensive

role of export cartels. Becker (2007) claimed that export cartels could serve as a buffer against foreign trade barriers, such as foreign buyer cartels and other non-tariff barriers. As a consequence, additional players will be added into the global market and thus create more, instead of less, competition (Bhattacharjea, 2004).

Conversely, Immenga (1995) argued that there is a close link between export cartels and domestic cartels. As the capacity has to be allocated between domestic and foreign markets, a decision for export cartels certainly affects the domestic market. More importantly, the cooperation and the exchange in information in export cartels is also likely to facilitate the formation of domestic cartels afterwards (Schultz, 2002), possibly through tacit collusion (or conscious parallelism) (Martyniszyn, 2012).

Therefore, as Bhattacharjea (2004) pointed out, the impact of export cartels depends partly on the *nature of efficiencies claimed*. As argued in the previous chapter, economic development is based on dynamic efficiency, and therefore the arguments against export cartels based on the static efficiency (e.g. allocative efficiency and X-efficiency) are not particularly relevant when it comes to economic development. Economic development is mainly about enhancing investment and productivity, by which productive capabilities could be improved. Even though some articles discussing export cartels in the context of developing countries, e.g., Bhattacharjea (2004); Jensen-Eriksen (2010, 2013), **there has been no literature on the effects of export cartels on investment and productivity or economic development ever written so far**. The only possible alternative is to consider the literature on cartels in general instead.

3.6.3 The literature on the effects of general cartels on investment and productivity

Levenstein and Suslow (2006) stated that "perhaps the least studied, but most important issues, are the effect that cartels have on investment and productivity". As Bridgman et al.

(2009) discussed, the study of welfare losses from cartels has focused almost exclusively on the losses from higher prices, not from productivity losses (or gains). In the literature on cartels, the debate on whether cartels promote or hinder productivity growth is still ongoing.

Promotional effect of cartels on economic development

Most export cartels, especially those from developing countries, are comprised of small to medium-sized businesses and their aim is to increase the value of exports by reducing costs, sharing risk and improving products (Sweeney, 2007). Levenstein and Suslow (2006) claimed that, if prices have to be set at a competitive level, which is possibly lower than the long-run average total cost, firms will find no incentive to invest, especially if the investment is industry- or firm-specific. Instead, if prices are to be stabilised at profitable levels, especially in industries with high fixed costs or in industries that are prone to cut-throat competition, firms will have more incentive to invest to improve productivity growth in the long run. Empirically, Symeonidis (2003) argued that, in the case of British cartels in the twentieth century, investments in fixed capital are positively correlated with cartel formation.

It was Robert Liefmann, in his seminal 1932 work on cartels, who discussed extensively how cartels might promote economic development. Liefmann (1932) "generally considers cartels as favourable for an industry". He further concluded that "my observations of German economic life over a space of ten years lead me to conclude that there is absolutely no sign of stagnation under the influence of the cartels...cartels...were in some of the most important German industries actually a principle cause of the rapid economic development which has characterised the last decades... (Liefmann, 1932, 87)". He claimed that the rationalisation of production and marketing by cartels served the interests of a general enhancement of the productivity of the German national system by "smooth[ing] the transition process of technical improvements". A cheapening of production could be achieved by the agreements

to standardisation of methods, processes and products and division of activity. Moreover, cartels were much needed in highly specialised industries where risks were higher.

Liefmann (1932) also dismissed the argument that preservation of smaller and weaker firms under a cartel were inefficient. He said that the competition process by which these firms are driven out is ruthless and always associated with "a long-drawn-out struggle involving heavy losses for all parties". During what he called the intensive competitive suppression (excess competition), the older means of production are unable to realise their amortisation and are forced to withdraw through competitive warfare. Those who are hurt the most by the warfare are weaker firms. Instead of preserving weaker firms, an existence of export cartels could instead lead to the process of (horizontal and vertical) integration and hence a bigger firm. In reality, the evidence of vertical integration was found in Germany in the iron and steel industry. The integration was a reaction of the raw material cartels in a key input industry, i.e., coal industry. Specifically, the coal syndicate in 1924 attempted to integrate iron works into their business in order to make better use of their coal.

Moreover, Robert Liefmann also claimed that export cartels, through some agreements such as purchasing and sharing new patents, could slow down the amortisation process of the existing means, by which the process prevents overcapitalisation (accumulating more capital than is necessary for the industry, often through repetitive investment) in an industry. In other words, export cartels allow members to share the advantages of a new invention and prevent exploitation and competition-based violence. An example of this was a purchase of the Owens bottle production patent by the bottle combine discussed earlier. Moreover, he further claimed that an attempt by firms to increase their quotas was mainly achieved through an amalgamation of smaller firms into bigger firms not by internally expanding its capacities. Examples of amalgamations were bottle, potash, cement and other industries in the late nineteenth century. In the mining industry, cartelisation was actually inducing

integration of some firms and creating "greater" competition among more even competitors. This "fresh" competition would "prevent the extreme kind of monopoly".

Webb (1982) later on studied the relationship between cartels and the growth of the German steel industry between 1879 and 1914. The main conclusion was that cartels reduced the risk of capital-intensive technology investment, thereby enhancing productivity. A similar conclusion was also proposed by William J. Baumol in his work on the Dutch economy, which stated that cartels helped reduce risks in high-tech industries through cooperation in technology production (Baumol, 2004). These risk-sharing arguments are in line with the inverted U-shaped relationship between competition and innovation, proposed by Phillipe Aghion. In Aghion et al. (2009), excessive competition increases the risk that rents are insufficient to cover the investment in innovation. Empirically, cartels helped stabilise and increase investment and productivity in some industries such as the shipping cartels in the liner industry. The study by Stephen Craig Pirrong used an example of the six liner markets (as defined by the US Maritime Administration [MarAd], with three routes inbound to the United States and three outbound between 1983 and 1985) (Pirrong, 1992; Sjostrom, 1989).

It is also interesting to consider that Dutch economists in the early twentieth century largely supported the use of cartels on the grounds that an accumulation of producer surplus in the short run would induce investments and therefore would benefit the consumers in the longer run (Petit et al., 2015). Cartels (i.e., semicollusion - collusion in some, not all, activities) may improve consumer welfare in the long run through an increase in the variety and the quality of products despite an increase in prices (Fershtman and Gandal, 1994; Fershtman and Muller, 1986; Fershtman and Pakes, 2000). Steen and Sørgard (1999) and Peters (1989) also proposed theoretical models to support the empirical evidence that Norwegian cement cartels and German coal cartels outperformed unrestrained competition in terms of investment. Salin (1996) likewise considered the cartel as a structure by which firms could increase the value of production and improve production processes through the

extra investments made possible by cartels, such as various British industries in the empirical work conducted by Symeonidis (2003).

In some cases, agreements (apart from a cartel agreement) could also be made to specify the type and the amount of investment permitted. The International Steel Cartel (ISC), as discussed earlier, was formed in 1926 to set production quotas with a side payment, in which the member who violates its quota has to pay the penalty ($4 per ton to be precise). Apart from the agreement of quotas, the ISC also "monitored and sought to limit the installation of new production facilities among any of the members (Barbezat, 1990)." The limitation was meant to control the production capacity of members. Given that steel has a low elasticity of supply of capital, firms will all have an incentive to have some excess capacity, by which the cartel's chances for super normal profits will decrease. Moreover, as the steel producers usually maintain small stocks at a time, the limitation of capacity in the steel industry was necessary to prevent excess capacity, by which the operation of cartels will be more complicated (Hexner, 1976).

Hindering effects of cartels on economic development

On the negative side, the rationale explaining why cartels are detrimental to productivity is largely based on the positive effect of competition on innovation in products, processes, and methods of management, which, in turn, enhance productivity growth (Holmes and Schmitz, 2010; Porter, 2001; Sakakibara and Porter, 2001; Van der Wiel et al., 2010; Van Reenen, 2011). The argument is that export cartel members would have found that the profit of launching new products was too high compared with the incomes they could earn and thus have no incentive for investment. Kaplow (2013) similarly argued that monopoly power acquired from a cartel, unlike monopoly power temporarily established by laws such as the Intellectual Property laws, disincentivises firms from the improvement in productivity to outperform their competitors because "the price elevation (by a cartel) does not reward firms

to the extent that they outperform their competitors", but it instead reflects the firms' ability to abstain from competition. Therefore, firms will simply try to abstain from competition to preserve their monopoly power instead of making investments to increase their productive capabilities.

Moreover, cartels are argued to lead to misallocation of production (e.g. quotas and size/capacity restrictions) and to persistence of inefficient firms, which should exit the market in the absence of cartels (Broadberry and Crafts, 1992; Cole and Ohanian, 2004). The misallocation of production was actually discussed in several works such as Liefmann (1932), Patinkin (1947) and Bain (1948). They argued that **excess capacity** was likely under a cartel arrangement, because the quota system strongly stimulated the expansion of production to increase quotas and the existence of a cartel also leads to the entrance of new firms to enjoy the higher profits. It was argued similarly by Stocking and Watkins (1948) and by Liefmann (1932), that firms in a cartel will not stop the expansion of capacity at the point where the marginal efficiency of capital is equal to the interest rate (i.e., the point where marginal benefit of investment is equal to the marginal cost of investment in Neoclassical investment model). Liefmann (1932) also pointed out that excessive capacity is particularly strong when the struggles for quotas is high, when there is an economy of scale, and when the bargaining power over quota relies on capacity. The excess capacity problem, however, could be solved by having a central cartel office to coordinate quota and its auxiliary mechanisms, such as side payments (Patinkin, 1947). For example, the ISC in 1926 also had an agreement to control the capacity of its members.

Zitzewitz (2003) compared productivity growth between the US and the UK tobacco industries from 1890 to 1939. He proposed that the US tobacco industry's growth rate was lower due to the existence of cartels.Gunster et al. (2011) arrived at a similar conclusion for a sample group of European firms and industries (141 publicly listed firms active in 49 European cartels between 1983 and 2004), using the ratio of sales and employees and

R&D expenditure as measures of productivity. Monke et al. (1987) studied a flour-milling cartel in Portugal in the mid-twentieth century. They claimed that the profits were destroyed due to misallocation of production resulting from quota assignments and limitation of scale economies by the imposition of size restriction. Röller and Steen (2006) investigated the Norwegian cement industry and found that firms found it profitable to produce beyond the assigned quota and export to Europe at a price below the marginal cost of production. Bittlingmayer (1995) and Taylor (2002) claimed that NIRA cartels in the US during 1930s had a negative impact on efficiency. Moreover, Petit et al. (2015) tested the impact of cartelisation on the total productivity growth in the Netherlands between 1982 and 1998 and claimed that cartels reduced productivity growth during the period. Ma (2011) used competition law enforcement as a proxy of competition to study the cross-sectional data of 101 countries before claiming that competition promoted productivity growth.

3.7   Conclusion: It depends

This chapter concludes by reviewing the key lessons learned so far from the evolution of practice of, and the academic literature on, cartels in general and export cartels in particular as discussed in this chapter.

The first lesson is drawn from the fact that cartels were originally a reaction to excessive competition. The implication is that, cartels including export cartels should aim at demolishing excessive competition, not any competition. Later in this dissertation, excessive competition is a level of competition at which competition is worse than cartelisation for enhancing productive capabilities (the argument will be developed further in subsequent chapters). In an extreme case, excessive competition may make it difficult for firms to even survive. The idea is closely linked with the infant industry argument, under which firms from infant industries need a certain level of protection, by which firms and the industry could survive the infant stage. This is why historical evidence shows that SMEs were usually

regular users of cartels in developing countries. Moreover, further implications could be made in the context of export cartels. Both SMEs and larger firms from developing countries could usually be seen as novices (or relatively smaller firms) in the global market, whose export cartels are much needed to mitigate excessive competition in the global market. It was discussed that excessive competition may come from exporters from the same and other exporting countries and from domestic producers in the importing country. Therefore, an export cartel formation potentially mitigates excessive competition in two ways. First, an export cartel allows exporters from the same country to make an agreement to regulate their interaction, by which excessive competition is reduced. Second, an export cartel, in some cases, may enhance productive capabilities of firms, which exporters may use to compete with the exporters from other countries and the domestic producers in the importing country.

The second lesson is derived from the first. This dissertation by no means proposes that export cartels are always preferred to competition. Even though, in this chapter, a number of successful cases of using export cartels to promote economic development have been seen, there have been some cases under which export cartels contribute so little or even hinder economic development (e.g., the US tobacco industry from 1890 to 1939 in Zitzewitz (2003)). It was also shown that most countries promoted export cartels in just specific industries and during specific periods. One noticeable fact is that, once the industry's productive capability has been increased, export cartels usually become less necessary. For example, the number of export cartels in the US have been significantly decreasing in most industries, in which the US have significant prowess as exporters. However, it does not always follow that some countries, to a greater extent than other countries, have developed *facilities* (e.g., central coordinating units, cartel offices, and departments with knowhow of cartel formation) and *traditions* (e.g., positive public view on cartels, the business practice by which cooperation between firms is promoted, and a long-term relationship between firms within the same industry), on which cartelisation could be easily formed. Similarly, some

countries have made several attempts to promote competition through government policies and the legislation process, where cartelisation has been indirectly viewed negatively in public. These *path-dependent* factors also determine how export cartels affect productive capabilities compared with competition. In other words, we need to be more precise in defining the terms *excessive competition* before we can say that an export cartel formation is a (proper) reaction to excessive competition.

The third lesson is trivial, yet so important. It was the government who was at the heart of all policies related to export cartels. Moreover, as was shown in different countries, allowing export cartels to be formed alone is not sufficient with regard to economic development. In other words, mere exemptions of competition law for export cartels are not sufficient to guarantee that export cartels will be formed in the situations under which productive capabilities are promoted. For example, Germany, led by its strong government, used financial institutions as a coordinating unit to facilitate and monitor cartel formation in various industries. The United States enacted the laws (e.g., the WPA and the ETCA) and assigned the responsibilities to government agencies (the Ministry of Commerce and the Department of Justice). Likewise, the Japanese government assigned MITI to take charge on organising cartel formation in various industries in the late twentieth century. It is therefore clear that the government has to be actively involved in promoting export cartel formation. However, what remains unclear is the conditions under which the government (or the government agencies) should promote or prohibit export cartels.

The last lesson is essentially the chicken-or-the-egg question. We have seen from history that competition was not always desirable nor easy to be introduced at all. For example, in the cases of post-Second-World-War Japan and Germany, the US attempts to introduce American-style competition failed miserably and both countries continued to use cartels in various industries for several decades before gradually abandoning them only recently. One of the recent arguments against cartel usually revolves around the lack of incentive

to invest in productive capabilities caused by lack of competition. However, the point concerns the sources where firms could draw sufficient resources for such investments from the beginning. Moreover, competition, despite providing incentives to invest, also places a downward pressure on the profitability of firms, which they may use to invest. Therefore, even though competition enhances incentives to invest in productive capabilities of firms, it also decreases the capability of firms to do so. Thus a framework is required to properly analyse the conditions under which competition or cartelisation should be promoted over the other cases when it comes to productive capabilities and economic development.

In the next chapter (Chapter 4), the main thesis of this research, the relocation of competition will be introduced. In short, it will be argued that export cartels do not eliminate competition but relocate competition across different activities instead. Therefore, the point is how competition could be optimally relocated by an export cartel to promote economic development.

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Chapter 4

The relocation of competition

"*When the prices of the products of an industry fall to an unreasonably low level, and the successful operation of the industry is thereby endangered or made impossible, the resulting crisis is detrimental not only to the individuals affected but to society at large. Therefore, it is to the interest of society that prices in any given industry should not remain long at a level that is below the cost of production...it cannot be simply and generally contrary to the public welfare that producers interested in a given branch of industry should unite in order to prevent or to moderate price-cutting and the consequent general decline in the prices of their products...when prices are for a long time so low that financial ruin threatens the producers their combination appears to be not merely a legitimate means of self-preservation, but also a measure serving the interests of society*" – A decision of the German Supreme Court of Justice in *Saxon Woodpulp* case Martin (2010).

4.1 Optimal competition and dynamic efficiency

4.1.1 Optimal competition: economic development as an objective

Optimal competition is not maximum competition when it comes to economic development (Amsden and Singh, 1994). Rather than enhancing competition in all activities, optimal competition for economic development is achieved when competition is enhanced in the activities in which competition promotes productive capabilities more than cartelisation does, and cartelisation is also enhanced in the activities in which cartelisation promotes productive capabilities more than competition does. The enhancement of both competition and cartelisation is conducted through the *relocation of competition* process, the concept which will be introduced shortly. In other words, optimal competition is achieved by relocating competition across activities in the most productive allocation possible.

In this study, economic development is defined as "a process of economic growth that is based on the increase in an economy's productive capabilities: its capabilities to organise–and, more importantly, transform–its production activities" (Chang, 2014). Therefore, **competition is a means not an end** when it comes to economic development (Posner, 2009). It is true that competition serves as the best tool by which allocative efficiency can be achieved. However, the objective of an improvement in productive capabilities leads to the alternative concept of efficiency: **dynamic efficiency**, which is defined as the *highest long-term productivity growth rate* (Amsden and Singh, 1994).

There is a tradeoff between allocative efficiency and dynamic efficiency. Amsden and Singh (1994) argued that dynamic efficiency is achieved through enhancement of investment and acceleration of technological development, two activities which are not specifically promoted or even demoted by allocative efficiency. As the foundation of economic development lies in the productivity growth through investment and technological development, dynamic efficiency should then be prioritised over allocative efficiency. Therefore, optimal

competition for economic development is not maximum competition, by which export cartels should be allowed to form given that they enhance productive capabilities. Moreover, it is not only export cartels which are generally allowed to be formed, but other cartels are also allowed to be formed in most developed countries including the EU and the US if they promote technological progress through the likes of research and development (Connor, 2007a). However, neither the policy guidelines nor the academic works have ever precisely described or explained how export cartels may actually promote technological progress or, even, economic development. This chapter discusses the framework in which the optimal level of competition could be achieved: the relocation of competition.

4.1.2 Excessive competition: creative destruction in competition

Rosenthal and Matsushita (1997) discusses the difference between competition in Japan and Germany and the West. They emphasised the importance of cultural difference, by which the economic consequences of competition are influenced. Japan and Germany treated the idea of competition in a relatively pessimistic way by using such terms as "excessive competition" or "ruinous competition". Particularly in Japan, Chapman (1991) claimed that a discussion amongst MITI's top planners concerning an imposition of antitrust policy was generally negative. The reason the Japanese perceived competition differently was due to historical reasons (as discussed in Chapter 3). Even though the terms "excessive competition" or "ruinous competition" have been cited several times throughout the previous chapters, the precise or pragmatic meaning has never been proposed. This chapter proposes an alternative interpretation of "ruinous competition". In short, under the framework of the relocation of competition, *competition is excessive or ruinous when it prevails in the activities in which it is less productive than cooperation*.

An alternative way to look at excessive competition is through the point that excessive competition today may lead to inadequate competition tomorrow. In other words, the

restriction of competition today may enhance future competition. The argument is actually well captured in the US Supreme Court decision on the *Overlap* policy used by a group of leading universities in 1992. The Massachusetts Institute of Technology (MIT) and the eight Ivy League universities formed the *Overlap* group to coordinate their financial aid processes. The Court overturned the claim of the DOJ in which the DOJ argued that the group is essentially an *illegal per se* price-fixing cartel and should be dissolved immediately. The court argued that the Overlap group "regulate(s) competition in order to enhance it, while also deriving certain social benefits".

4.2   An introduction to the relocation of competition

Liefmann (1932) explained that cartels were originally formed as a reaction towards excessive competition. In this study, excess competition is interpreted as a consequence of competition in too many activities such that firms are unable to accumulate necessary resources to keep up with the change in technology or to improve their productive capabilities. Therefore, cartels were formed to reduce excess competition by regulating some activities instead. Fear (2006) and Posner (2009), among some scholars, recently re-interpreted the movement by which firms form cartels as a reaction towards excessive competition as the *relocation of competition*, namely, that cartels make firms relocate competition away from the cartelised activities into the non-cartelised activities.

Another concept to which the relocation of competition is closely linked is the concept of *competitive mix* (Demsetz, 1992). Harold Demsetz argued that the mix of competitive forms between price and non-price competition, not the absolute level of competition itself, is what was affected by the Antitrust law. Therefore, it is not surprising that the empirical evidence showed that the Sherman Act had at most a modest effect in reducing concentration (Pashigian, 1968; Stigler, 1966). The most crucial implication of the competitive mix on export cartels is the fact that restriction on price competition restores firms incentives to

cooperate and contribute to a provision of public[1] goods such as foreign marketing services, which, in turn, stimulates competition in terms of product quality and reputation.

However, the concept of relocation of competition (or other relevant concepts such as competitive mix) has never been fully developed in literature. To be specific, it does not identify the factors determining how firms relocate competition across activities. This study therefore elaborates on the concept and use it to analyse export cartels and economic development. An attempt is made to elaborate how firms actually relocate competition across activities when they have to make a decision to form export cartels in given activities. Ultimately, the way in which competition is relocated across activities will determine the productive capabilities of firms and the economy as a whole, hence the pace of economic development.

Export cartels, instead of eliminating competition altogether, actually allow firms to relocate competition across different activities (Fear, 2008). In turn, the relocation of competition across different activities may promote their productive capabilities. Chang (2010) argued that "economic development is about acquiring and mastering advanced technologies". *How do firms acquire and master advanced technologies?* Neoliberalism suggests that free trade driven by comparative advantages is the answer. However, even though trade is essential for economic development, to conclude that free trade is the answer is rather misleading. Free trade does not imply that more trade and countries could also trade more in an absence of free trade. For example, during its protectionist period (1930s to 1970s), Mexico grew at double the growth rate of the free trade period (1984 to the present) (Chang, 2010). The essence is therefore how a country may promote exports to maximise the supply of foreign currency needed to purchase better technology (machinery and technology licences).

As their productive capabilities are enhanced, firms are able to export more and acquire additional foreign currencies to import additional inputs and more advanced technology, by

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[1]The public consists of all the firms in the industry

which productive capabilities are further increased. After they have upgraded their productive capabilities, the process of competition relocation (i.e., whether firms will compete or form an export cartel after considering both their possessed resources and environmental factors) comes into action again to optimise the use of the upgraded productive capabilities. This circular process flows continuously (see Figure 4.1). The model in Chapter 5 will eventually reveal that export cartels will be needed less as firms accumulate more advanced productive capabilities, by which a country also becomes more developed. As a consequence, at a certain point, competition could eventually become more productive-capability-enhancing compared to cartelisation. Therefore, the recent promotion of competition policy in developing countries might be the right move at a wrong time.

The process in Figure 4.1 shows that the analysis of export cartels and economic development requires an inclusion of the dynamic settings as well as the static settings. As a consequence, the arguments against export cartels discussed earlier, which are based mainly on the static settings, have to be revised to draw the alternative arguments on export cartels and economic development. The rationales for the use of export cartels by developing countries in the literature are mostly based on the process from export cartels to export enhancement (from (1) to (2) in Figure 4.1), which is called as the enabling role of export cartels.

4.2.1 The enabling role of export cartels

Export cartels potentially enable firms from developing countries to export more. In the absence of export cartels, each export firm might be unable to export on its own due to their lack of individual capability to export and/or the barriers in foreign markets (Graham and Richardson, 1997; Martyniszyn, 2012). The situation is apparent in developing countries in which their firms find it difficult to individually compete with larger or more established exporters from other countries or multinational enterprises. These firms could be both newly-
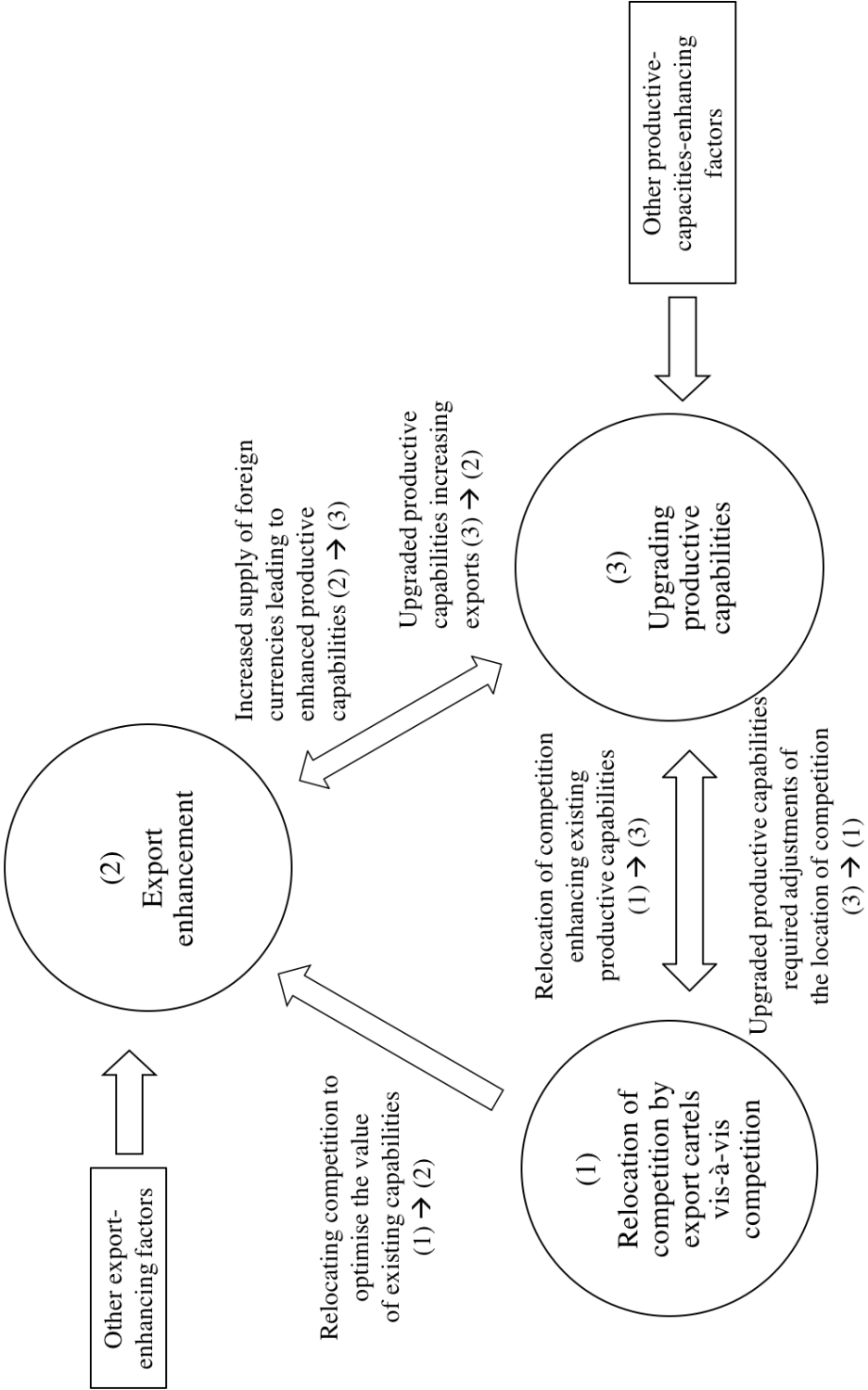
Figure 4.1 The process of economic development via export cartels.

founded exporting firms or existing exporters who plan to climb up the global value chain. For example, original equipment manufacturers (OEMs), after a certain period of acting as an outsourcing unit for a larger firm aboard, would like to start producing end-user products. However, each OEM finds it difficult to upgrade their productive capabilities, especially, to compete against their downstream buyers in the global market.

One group of the largest potential beneficiaries of the enabling role of export cartels are SMEs from developing countries. As the main source of jobs in the business sector (SMEs contribute up to 45 percent of total employment and 33 percent of GDP in developing countries (OECD, 2017)), an ability to export of SMEs means that a great amount of people in developing countries will be about to acquire more income and accumulate greater wealth. However, as of 2015, SMEs are less connected than large firms to international knowledge networks by at least a half in most countries and even lower in developing countries (OECD, 2015). Moreover, SMEs in developing countries represent only 7.6 per cent of total sales of SMEs in the manufacturing sector, compared to 14.1 per cent for large manufacturing enterprises. Among developing countries, SMEs in Asia has only 8.7 per cent of export share, while Africa has only 3 per cent (World Trade Organisation, 2017). The number is much lower in services industries, in which only 0.9 per cent of total services sales are accounted in the direct exports compared to 31.9 per cent for large enterprises. Moreover, SMEs from developing countries, according to the World Bank Enterprise Survey data on SMEs, take much longer time (as long as 17 years on average) to start exports. These numbers are totally in contrast with SMEs from developed countries which represent the majority of trading firms (over 90 per cent in many countries). The 2016 World Trade Organisation Report on Levelling the Trading Field for SMEs stated that "...exporting ... is often considered to be an important strategic option to enable SMEs to expand." Considering the above discussion, the enabling role of export cartels has a great potential for SMEs from developing countries, on

which the well-beings of people in developing countries greatly rely, to be able to penetrate into the currently inaccessible global market.

There are largely two ways by which export cartels enable developing countries to enhance their export capabilities. Firstly, export cartels may allow export firms to expand the scale of certain activities to a level required for export (Bhattacharjea, 2004). Developing countries generally have a small domestic market. Therefore, the scale required for export is generally much larger than that of required for the domestic market. For example, in a logistic activity, export firms could agree not to compete but pool their logistic facilities such as ports, cargos, trucks, and so on, in order to increase their scale and gain from economies of scale. An increase of scale by an export cartel is particularly relevant in an industry with high fixed cost. In the industries with high levels of fixed cost, most of the firms from developing countries are unable to invest on the high fixed cost and, therefore, there will be too little (global) market entry in an absence of an export cartel or other subsidies (Mankiw and Whinston, 1986).

Secondly, an export cartel may allow export firms to gain from the *synergy* between assets or knowledge they possess. For example, one firm may possess a good relationship with export market distributors while the other firm possesses large production facilities. Each of these two firms alone might be unable to compete with other exporters unless they form an export cartel to share the distribution opportunities and to combine their production facilities. As a consequence, an export cartel helps firms to compete with competitors in the global market, a situation which is unachievable by an individual exporter.

The United States used the same reasoning to support the enactment of the WPA in 1918, allowing American exporting firms to form export associations (export cartels). The US policy-makers argued that export cartels actually empowered the exporters who were incapable of exporting individually to gain extra advantages. For example, export cartels may be formed to exchange necessary market information across firms or may be formed

to combine a whole or a part of production units of firms to gain economies of scale (Evenett et al., 2001). The contributions of export cartels on export capabilities of firms are particularly noteworthy when exports incur relatively large fixed costs and when the market share of export firms is small, the situation resembles that of export firms from developing countries trying to enter the global market (Bhattacharjea, 2004; Dick, 1990). The lack of individual capability may be due to the entry barriers to foreign markets as well (Becker, 2007; Federal Trade Commission, 1968). These entry barriers may be non-tariff barriers, market power of the indigenous firms or the buyers, and other aspects of distorted competition (including import cartels by which market access from developing countries becomes more difficult) (Martyniszyn, 2012). Therefore, export cartels have a potential to enable firms from developing countries to overcome the barriers both nationally (exporting incapability) and internationally (importing market barriers).

4.2.2   More exports are the means not an end

An increase in exports does not always lead to economic development. An increase in exports just provides resources which firms potentially can exploit to enhance their productive capabilities and, hence, economic development. If an increase in exports via the use of export cartels does not eventually enhance the productive capabilities, export cartels could be just a *beggar-thy-neighbour* policy, by which an exporting country benefits at the expense of importing countries. Such a policy cannot (and should not) last long because no one will benefit and are likely to be worse off, due to the policy. Moreover, an increase in exports may lead to the so-called *Dutch disease* whereby a sudden inflow of export earnings from natural resource bonanzas causes overvalued currencies. As a consequence, the export industries from developing countries, which normally involves low-tech products with a high elasticity of demand to price, are adversely affected (Chang and Andreoni, 2016). Therefore, what really matters is how firms convert the benefits from an increase in exports in the short

run (possibly at the expense of the others) into higher productive capabilities and, hence, economic development, through which both countries can benefit in the longer run through greater trade and investment.

An increase in exports gives firms additional foreign currencies to spend on upgrading productive capabilities (see the transition from (2) to (3) in Figure 4.1). As export cartels enable firms from developing countries to export more, an increase in exports subsequently give firms an additional amount of foreign currencies, the resources which the economy could use in importing additional inputs and, more importantly, more advanced technologies from abroad in order to upgrade their productive capabilities (Freeman, 1995). As developing countries are able to emulate productive capabilities of the technological leaders, they are in a good position to catch up with developed countries in terms of economic development (Reinert, 2009).

There is certainly a tradeoff between capability and incentive to improve productive capabilities. Although competition stimulates incentive, it discourages capability. In reality, enhancement of productivity and efficiency, whereby innovation, scale economies, and improvements in production and management systems are achieved, require capability as well as incentive (Chang, 2010). This fact is another obvious yet overlooked issue: **the right balance between incentives and capabilities** (see a discussion on the infant industry argument in Chapter 3 of Chang (2010)). There are broadly two sources from which firms in an export cartel can raise their resources to improve productivity: from an increase in exports and from resources not spent on competing in the cartelised activities.

According to Figure 4.1, such a chicken-or-egg problem is the linkage between (2) and (3) and the linkage between (3) and (1). These additional resources to invest do not appear spontaneously but need to be acquired somehow. Therefore, even though firms have a tremendous incentive to improve their productivity, the facts that firms have to spend excessive amounts of resources on competing in *unnecessary* activities (excessive

competition) and the fact that they are also unable to acquire the resources necessary for enhancing their capabilities (due to the low value of export or even an absolute inability of exports) disallow them to optimally improve their productivity. In other words, firms have to reconcile between incentives and capabilities and export cartels might provide the tool with which they could improve their export capabilities in the first place, which then can subsequently be used to increase their overall productive capabilities (see the linkage between (1) and (2) in Figure 4.1 on page 125).

4.2.3 Rationalisation and relocation of competition

The rationalisation objective of cartels, which was the main objective of cartelisation in most countries including Japan and Germany (see Chapter 3), could be seen through the lens of relocation of competition. In other words, rationalisation could be seen as the process whereby competition is relocated across activities to improve a productive capability. In Chapter 2, a rationalisation cartel was defined as a cartel whereby an increase in productive efficiency is the main objective. Rationalisation, in turn, was defined as "an organisation (of economic activities) ... through a division and coordination of activities ... for the purpose of achieving greater efficiency and productivity" (Freund, 1968).

For example, in Japan and Germany, rationalisation was often conducted by suspending price competition while the firms' concerns were mainly investing in better machines and technologies. It could be seen as the process whereby competition is relocated away from pricing activities into the other activities (in conjunction with the use of machines and technologies). By a reduction in pricing competition, firms could gain an additional profit from charging higher prices. Firms therefore have more resources to invest in better machines and technologies to compete among each other in order to attract more consumers or to get government support (the latter is particularly the case of Japan).

4.3   The paradigm shift: Relocation of competition

The prevailing understanding of the relationship between export cartels and export enhancement and economic development is still rather superficial. In other words, even though export cartels are known to enhance exports and also economic development (see Chapter 3), it is still unknown how export cartels help firms and the economy to achieve both objectives. The existing body of knowledge on export cartels is mostly based on case studies such as the study of market information sharing across firms under the joint marketing unit in the Danish dairy product industry or the study of scale expansion through combination of the production lines across firms in the Finnish paper industry (see more cases in Chapter 3 in which both literature and historical evidence were discussed).

The concept of relocation of competition is adopted from the idea of *competition rechanneling* mentioned in Jeffrey Fear in 2008, in which a similar idea is also discussed in Posner (2009). Fear (2008) argued that "cartels did not eliminate competition, but rechanneled it. Competition remained within the cartels through a number of mechanisms which go beyond the standard story that cartels attract new competitors or encourage chiseling". Cartels could be seen as a process by which other competition aspects, apart from estimated market demand, is encouraged to be used in the negotiation and re-negotiation processes (of cartels). As a consequence, firms have to get themselves as ready as possible to strengthen their bargaining power by improving the bargaining position, e.g., expanding into other geographical areas or products and enhance the capacity growth. As a consequence, sharing of information could also protect firms against outside competitive forces and market volatility and gets firms ready for the next round of negotiation (e.g. IG Farben in standard oil cartel and the British radio and telephone industry) (Barjot, 1994).

Therefore, export cartels (or any cartels) could be alternatively seen as the process of competition relocation instead of the traditional *elimination of competition* view (Fear, 2008;

Posner, 2009). In other words, an export cartel agreement does not eliminate competition among firms but, instead, relocates competition into activities other than the activities subjected to the agreement. Therefore, this idea is used to consider *how export cartels exactly enhance firms' productive capabilities and, hence, exports*. Essentially, firms have to try to get the most out of what they already have in hand (see circle (1) in Figure 4.1). The crucial role of relocation of competition by which firms are able to optimise the value of their existing capabilities and get additional exports as a consequence, is discussed next.

4.3.1   An incentive to preserve competition

One needs to distinguish competition from rivalry. Competition is the act of competing in a certain activity and one of its sources is rivalry. Robert Liefmann, in his renowned book *Cartels, Concerns and Trusts*, interestingly pointed out that "competition is, in many fields of economic life, as good as excluded even if only temporarily" (Liefmann, 1932). On the contrary, rivalry is "the circumstance that everyone would like to earn as much as others" and is more intrinsic, hence in-excludible. He therefore argued that rivalry, unlike competition, cannot be agreed upon to be restrained. Based on this idea, relocation of competition has a grounding in the logic that, **even though competition is limited in a certain activity (or certain activities), rivalry remains**. As a consequences, the other activities not included in the export cartel agreement become the arena into which rivalry is redirected.

Therefore, even though a cartel agreement may limit competition in certain activities, firms still have an incentive to compete in other activities. In reality, firms realise the fact that, despite being under the export cartel agreement, they are independent firms and have to compete in the other activities. Moreover, the cartel agreement is unlikely to last indefinitely and the members will be forced to move into a competition stage sooner or later (Levenstein and Suslow, 2004). Firms also realise the fact that new entrants with advanced technology

may enter the market at some point, regardless of how strong the market barriers are (which is highly likely when it comes to the global market and export cartels).

Moreover, an incentive to preserve competition could also be promoted by the government. Considering how export cartels were actually used in Japan, apart from when they are assigned to particular industries or activities within a particular industry, the approach of Japanese policies was well-described by what Alan Hughes called "choosing races and placing bets" (Hughes, 2012). Instead of intense competition in the market, which the Japanese government believed would create a ruinous competition, competition was redirected from the market to competition for government support. This is called the *organised contest-based competition for government subsidies*, where the level of government support is based on a firm's performance in an export market, technology advancement, new product introduction and so on. As a consequence, firms have an incentive to keep improving their performance in order to gain government support. In Japan, between 1950 and 1973 in particular, the competition was preserved among firms by *performance-based government support*, by which firms want to perform well either individually or on aggregate to gain financial and regulatory supports from the government (Singh, 2007).

4.3.2   Relocation of competition at the early stage of development

Restriction of competition could lead to greater investment and, hence, greater productive capabilities. The Japanese case properly exhibits the point. Alice H. Amsden and Ajit Singh argued that, despite having restricted competition, the Japanese government in the late twentieth century could still promote the race in investment among firms. Japanese firms were able to compete in terms of investments because an absence of competition allowed firms to accumulate the necessary resources. Instead of enforcing competition in the market and hoping that the competitive pressure would subsequently force (or incentivise) firms to invest, the Japanese government directly aimed at competition in investment, which is

a fundamental driver of productivity growth, and allowed firms to earn an extra profit by abstaining from competition in the market (Amsden and Singh, 1994).

In terms of economic development, it does not matter whether a firm has an above-competitive profit (after all, which firm does not have this in the real world?). What really matters is how it uses the profit. The Japanese government realised this fact and therefore aimed at ensuring that the profits were to be used to improve productive capabilities through investment. The outcome of the policy was that investment and outputs rose rapidly leading to the market entry and the eventual growth of small firms. It was not until the later stages of the process that competition was increased and concentration was reduced. The evidence seems to indicate that the greater degree of competition was more of a consequence rather than a cause of economic development.

Relocation of competition is most beneficial when it maximises the productive capabilities, especially in the long run, of the firms involved. Therefore, a framework is needed to analyse the factors determining the value of products. In Chapter 3, it is obvious that the success of export cartels in terms of economic development is determined by multiple factors acting simultaneously, the same is true for other economic policies. There is no guarantee that an export cartel formed in a specific industry (e.g., steel industry) will enhance productive capabilities across different countries. Similarly, export cartels formed in different industries within the same country could also lead to different outcomes in terms of productive-capability enhancement. As a consequence, a framework is needed to capture how firms are different to each other in a given context and across different contexts (industries and/or countries).

In the next section, it will be argued that a firm could be seen as a bundle of resources. In turn, the amount of resources and the way in which resources were used (in competition or in an export cartel) then, combined, determine the final value of a product. Moreover, given the amount and the use of resources, the environment in which the firm is in also determines

the value of product. The general idea of these determinants is then subsequently discussed. The operationalisation of these factors (i.e., the process of quantifying these factors such as resources and environmental factors into the measurable variables) will be discussed in Chapter 5.

4.3.3 Individual firm as a bundle of resources: the resource-based view (RBV)

A firm can be seen as a bundle of resources (Penrose, 1959; Wernerfelt, 1984). These productive resources are used in different activities to create value. In Penrose's terms, these resources have services, from which firms are able to derive values. Resources, which are broader than factors of production in Neoclassical economics, may include information technology, strategic planning, organisational alignment, human resources management, trust, organisational culture, administrative skills, top management skills, guanxi (relationships), and so on (Priem and Butler, 2001).

A firm combines its possessed resources to deliver, through activities, the final value of its products (**?**). Different activities, such as price setting, quantity control, and marketing planning (Barney and Wright, 1998; Kor and Mahoney, 2004), serve as *channels*, through which different combinations of resources are put in order to deliver the final value. The strategic decision to choose how resources are deployed (productive services) is made to maximise the value along the value chain (Mentzer et al., 2001; Rayport and Sviokla, 1995; **?**).

4.3.3.1 Strategic implementation: to compete or not to compete is a question

Productive resources provide different values subject to different deployments of resources (i.e., services). In other words, firms create value, not solely by accumulating more resources, but also by "effective and innovative management of resources (**?**)." Edith Penrose, herself,

also stated explicitly that "sub-division of resources may proceed as far as is useful, and according to whatever principles are most applicable for the problem in hand (Penrose, 1959, p. 66)." In this study, the research question emphasises a consequence of export cartels on economic development vis-a-vis competition. In each activity, a firm has to choose between two services of resources whether to compete in the activity or to form an export cartel agreement to regulate the activity (cartelisation).

These different *productive services*, i.e., whether resources are used in competition or cartelisation, give the same resources different values for the same activity.

We define the resources that are more productive when their services are delivered through cartel formation as the **shared resources**.**?** argued that the expansion of regulated activities (through cartel formation) may require the same capability for their undertaking or may represent different phases of a process of production. These activities, in Richardson's terms, are the so-called similar and complementary activities respectively. Similarly, we classify shared resources into supplementary and complementary resources (see further discussion in Chapter 5).

Alternatively, we define the resources that are more productive when their services are delivered through competition as the **exclusive resources**. Some of the resources gain a synergic or scaled effect, once they are shared among firms. Exclusive resources are mostly specialised machines or methods which complement resources, such as experts or technicians, could be found only within a company. Moreover, these specialised machines or methods, e.g. trade secrets, will significantly dissolve in value if the other firms were to acquire them as they have no significant synergic or scaling effect.

Therefore, a unit of resources, regardless of how the division of resources is defined, must be either shared or exclusive resources[2]. However, resources are not necessarily fixed as

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[2]In terms of measurability of resources, Penrose (1959) interesting discussed the measurability of resources as follows:

> "I have stressed over and over again that one of the most significant characteristics of such services (productive services) is their heterogeneity, their uniqueness for every individual firm.

shared or exclusive across different contexts and times. It depends on the nature of involving firms and their industry at a given period of time. Therefore, the subsequent analysis of resources are assumed to be measured in comparable units, that qualitative difference can be expressed as quantitative differences, without an attempt to claim for an atomic precision of any manner. A more precise measurement may be able to make if some generalisability is ready to be given up. For instance, resources might be narrowly defined as a quantitatively measurable type, such as the number of chips in computer or workers in a particular unit.

Figure 4.2 exhibits the elements of a firm i, which is a bundle of resources used for conducting different activities. In Figure 4.2, it is assumed that firm i conducts $N \in \mathbb{N}$ activities, among which $M < N \in \mathbb{N}$ activities are interdependent with those conducted by other firms. There is a portion of each type of resource which firm i specifically assigns to conduct each activity and a portion of which could be used for conducting all activities of firm i. For example, in the interacting activity 1, firm i allocates a certain amount of both types of resources to conduct the activity. Firm i has to make a decision whether to compete or to cartelise the activity, given the resources it possesses (see Figure 4.3). In reality, the market information that each firm possesses provides information in all marketing-related activities. Nonetheless, a team of experts may be specialised in a price-setting activity, hence, specifically assigned to conduct the activity.

4.3.4 The environments influencing a decision of firm

The environmental factors influencing the uses of both types of resources also influence the final value which firms could acquire in a given activity from its resources as well. Penrose (1959) also explicitly state that firms will be 'continually reappraising the profitability of their different activities as changes occur in external conditions'. Some factors, such as

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The productive services that the entrepreneurs and managers of any given firm are capable of rendering to that firm are not reducible to any common denominator and are therefore incapable of quantitative treatment (Penrose, 1959, p. 173)."

the understandings across firms and the government coordinating units, facilitate the use of shared resources across firms. Conversely, some other factors, such as the public market information and R&D by the public universities or research institutes, support the extent to which each firm can internally use exclusive resources. In this dissertation, these factors will be measured in terms of the **shared multiplier** and the **exclusive multiplier** respectively, the concept which will be discussed further in Chapter 5. These multipliers will influence the use of both types of resources in a given activity as exhibited in Figure 4.3.

Once firms gain additional productive capabilities through the relocation of competition, they export more and gain more foreign currencies in return. Penrose (1959) stated that firms will be adjusting their use of resources, as changes occur 'in the quality and quantity of the productive services internally available.' Firms then re-invest the acquired foreign currencies to improve their productive capabilities. Eventually, each firm revises the relocation of competition again after the upgrades. This process is in line with the explanation of the process that resources are subject to 'relocation' across activities provided by Edith Penrose as follows:

"...as long as expansion can provide a way of using the services of its resources more profitably than they are being used, a firm has an incentive to expand, or alternatively, so long as any resources are not used fully in current operations, there is an incentive for a firm to find a way of using them more fully. Unused productive services available from existing resources are a 'waste', sometimes an unavoidable waste ... but they are 'free' services which, if they can be used profitably, may provide a competitive advantage for the firm possessing them (Penrose, 1959, p. 60)."

The term 'success' is interestingly described by Edith Penrose as "a new activity must turn out to have been a better use of resources of the firm than any alternative use" in her

1959 book. Therefore, after firms decide which activity is optimally competing and which is optimally cartelising, firms successfully exploit their resources. After the relocation of resources is complete, the process in Figure 4.1 is then completed as exhibited in Figure 4.4 .
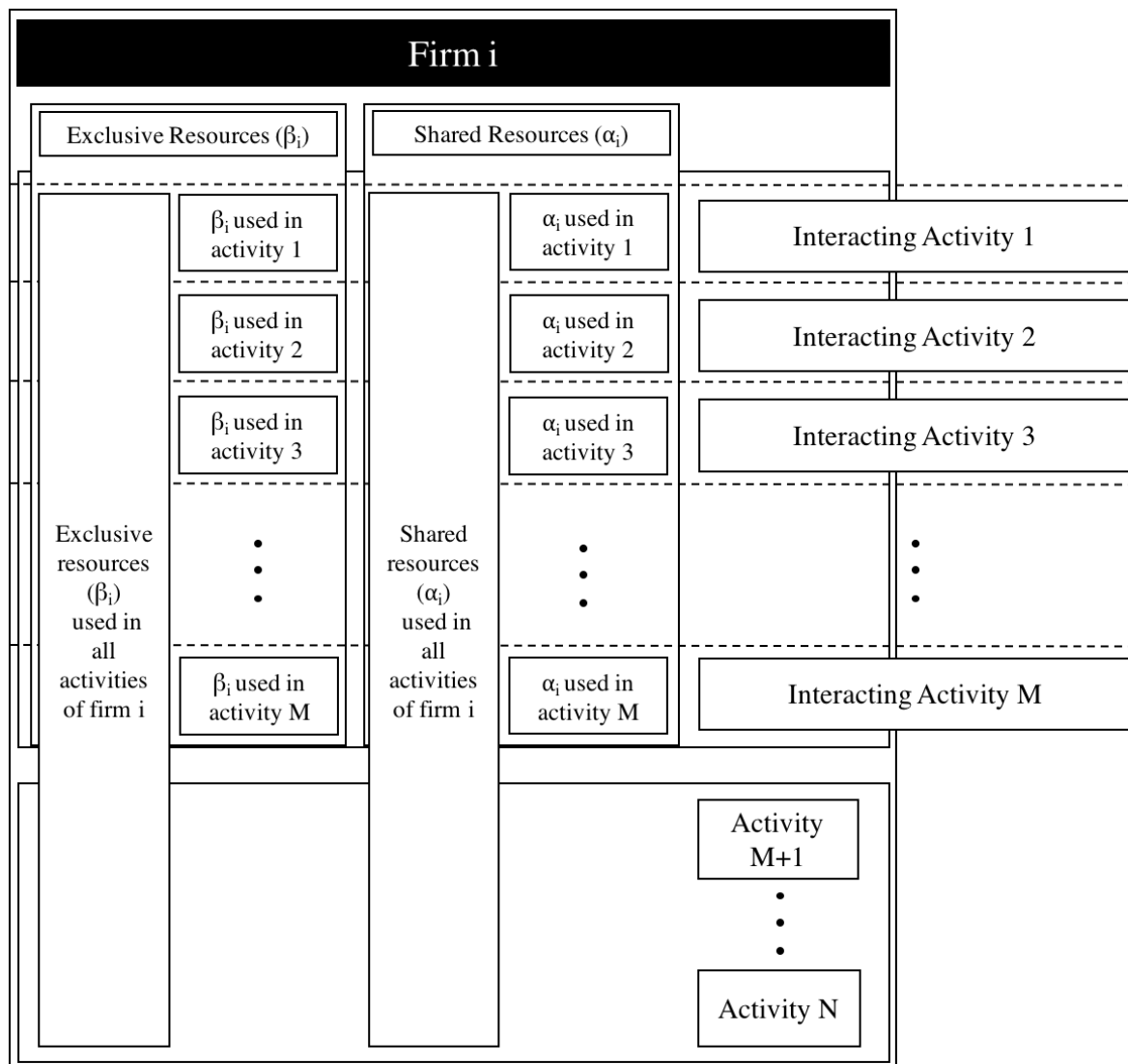
Figure 4.2 Firm i as a bundle of resources.
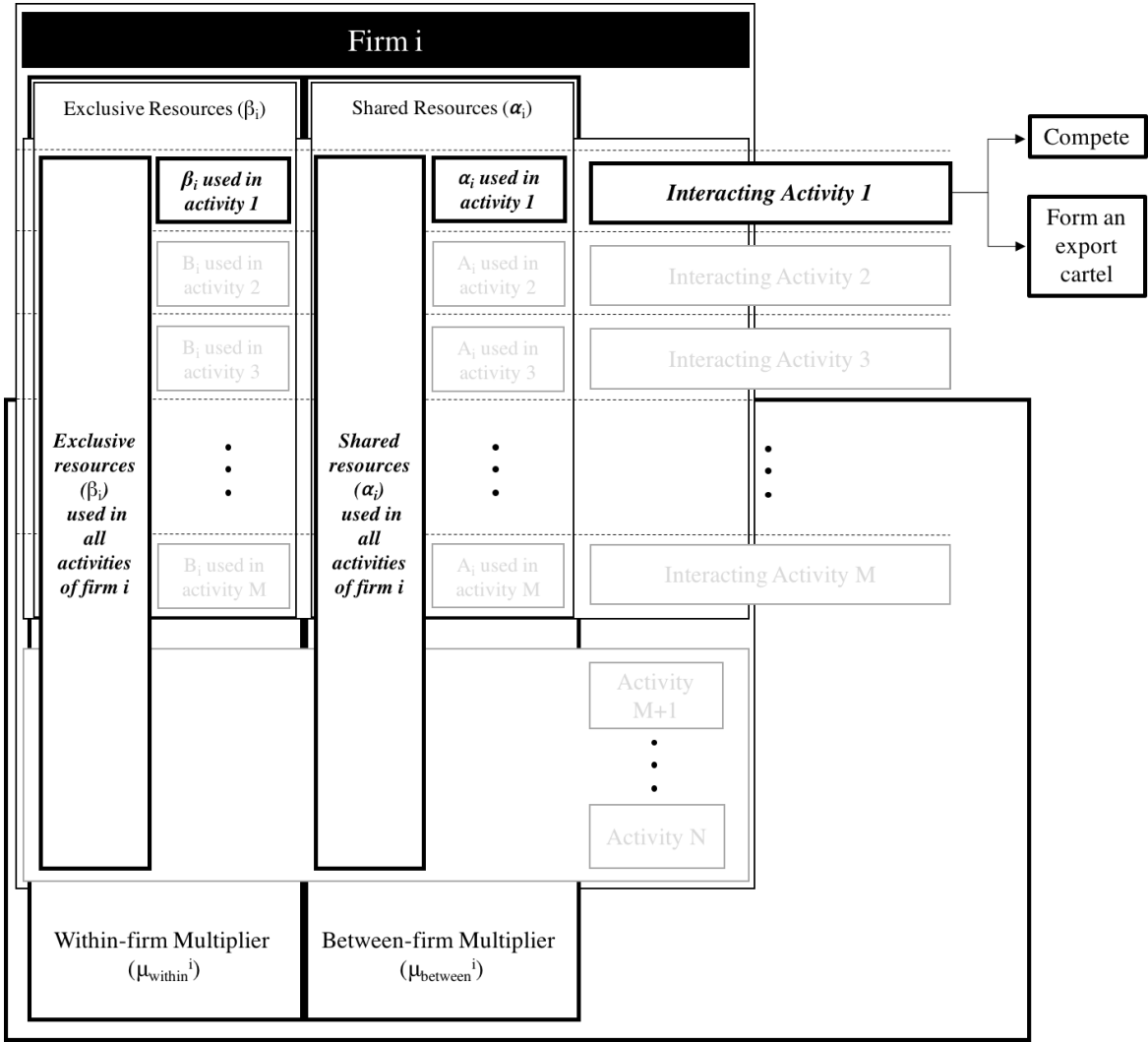
Figure 4.3 Firm i makes a decision on the mode of conduct (competition or cartelisation) given its allocated resources and the multipliers.
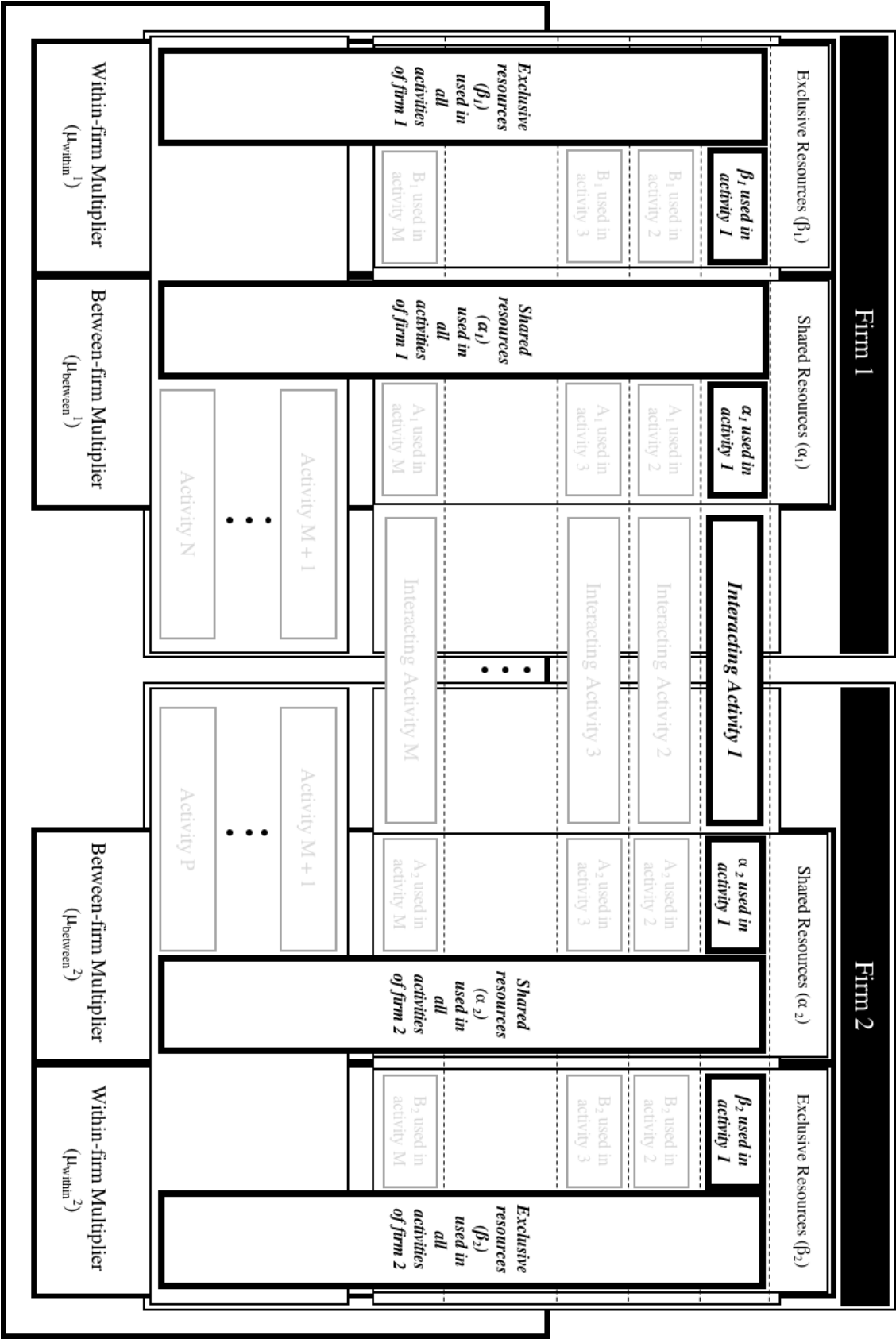
Figure 4.4 The relocation of competition framework.

Chapter 5

The model

5.1 An introduction: The stag-hunt game

The model in this chapter explains the conditions under which two firms will decide whether to form an export cartel or to compete. The decision to form an export cartel cannot be made by one firm alone, but only by mutual agreement. Each firm therefore takes the other firm's decision into account because the other firm's decision will affect its payoff. In technical terms, each firm is said to make a *strategic decision*. As was discussed in the previous chapters, in the literature, cartels have often been modelled as a prisoner's dilemma. However, this research argues that, in certain situations, the prisoner's dilemma is not the best way to represent export cartels, especially in the context of developing countries. To elaborate, a cooperative solution (cartel formation) is possible because firms may realise that the benefits of forming export cartels and then being able to export is greater than taking the risk of individually attempting to export and then being less able or even unable to export; the situation which often applies to exporting firms from developing countries. In game theoretic terms, the situation is modelled as the **stag-hunt game**.

The situation in the stag-hunt game was first discussed in *Discourse on the origin and foundations of inequality among men* by Jean-Jacques Rousseau (Rousseau, 1988). The story

concerns a group of hunters that are planning to hunt a large stag. If all of the hunters remain patient and, then once the stag is found, they hunt it together, they will be successful and a stag will be more than enough to share. Each hunter knows that, even though it is quite likely that the stag will follow a predicted path, it may never show up, in which case no hunter will have food. However, if a hare happens to pass close by, the group may be easily distracted by one of the hunters attempting to catch the hare for themselves and withdrawing from the group hunt, even though all hunters know that stags have a greater value than hares–in other words, the payoffs from cooperation are greater than those from competition.

The stag-hunt game exhibits the dilemma that each hunter has to decide to take the risk of the stag never coming and the risk of other hunters catching the hare and the hunters themselves ending up catching nothing. David Hume, in *The Treatise of Human Nature*, also discussed a situation resembling the stag-hunt game.The example he provided was a situation in which two people have to decide how to cross a flooded area by either rowing a boat or draining a meadow. Even though rowing a boat may be sufficient for each of them to travel across the flooded area, walking or even riding across a dry meadow is relatively quicker and provides a greater capacity to carry their belongings. However, each individual cannot drain a meadow on their own and needs other labour to succeed (Hume, 1978).

The game has also been applied to explain a number of biological phenomena, whereby coordination is required among cells or individuals to reproduce or even survive. For example, the coordination of slime molds leads to an aggregation of a group of unicellular protists into a singular larger body. Orcas also hunt fish by cooperatively corralling fish to the surface before stunning them with their tails (Skyrms, 2001).

The difference between the stag hunt and the prisoner's dilemma lies in the underlying incentive of the players. In the prisoner's dilemma, there is a conflict between individual and mutual benefits. In the stag hunt, the rational strategy for each player depends on the belief in the other player's strategies (Skyrms, 2004). David Hume argued (although obviously not

in game-theoretic language) that the stag-hunt game could be seen as a situation in which players in the prisoner's dilemma situation take into account future possibilities of reciprocal relationship before making a decision (Hume, 1978). Hume, unlike most philosophers of his time, rejected the argument that cooperation is only due to the altruistic nature of human beings. He alternatively claimed that one "learns to do a service" to the other player because they foresee the need of having the same or similar service repaid in return.

In terms of modern game theory, the stag-hunt game has the same outcome as the infinitely repeated version of the prisoner's dilemma (Friedman, 1971). In the infinitely repeated prisoner's dilemma, the *trigger* strategy–a strategy in which each player chooses to cooperate as long as the other one cooperates and indefinitely defects after the other player chooses to defect at any period–is a Nash Equilibrium under which cooperation may persist, given that both players sufficiently care about future payoffs (i.e., has a relatively low discount rate).

In terms of export cartels, if export cartel formation leads to a greater payoff than under competition, both firms can be more productive by forming an export cartel. However, each firm is tempted to desert their post and pursue the competition, under which circumstances firms need not bear the risk of paying the cost of export cartel formation while gaining the benefits of export cartels and also the chance to outcompete the competitor in the short run. All in all, this model attempts to propose the conditions under which export cartels resemble the stag hunt, from which all firms enjoy a greater-value 'stag', i.e., a greater productive capability and hence economic development, than a 'hare'.

5.2   An introduction to the model

Suppose that there are two firms in the same industry (Firm 1 and 2). There is no market entry or exit. Alternatively, this assumption could be seen a situation where any pair of

firms could form a partial cartel (i.e., a cartel which is formed by a subset of all firms in the industry). A discussion on this issue will be elaborated further in section 5.4.1.

Firms choose between competition and an export cartel to regulate an activity or a link (such as a pricing activity) along the value chain at a particular time. The final value of the product for each firm is assumed to be a strictly increasing function in (but not necessarily the sum of) the value of each activity. In other words, if the value of each activity is increased, the final value of the product must also be increased, *ceteris paribus*. Both firms share common knowledge of all parameter values, the payoffs, and the mutual choices (i.e., complete information).

The model considers one activity at a time. The factors determining the values of different activities are assumed to be mutually exclusive, i.e., the same unit of resources may be used only in one activity at a time, and may be rivalrous, i.e., the use of resources in one activity prohibits the use of the same resources in other activities. Therefore, there is a trade-off between the use of resources across different activities. According to the discussion in Chapter 4, these factors are the resources that firms possess (an internal factor) and the environment in which firms operate (an external factor).

Consumers are assumed to care solely about the value of the product they acquire and pay accordingly. As the final product value is a strictly increasing function in the value of each activity, consumers pay more for a product if an activity being considered produces greater value. To isolate the effects of firms' decisions on how to use resources from those of the changes in the environment, this model will let a price per unit of value of product be constant and normalised to one, so that income is equal to the value of production[1].

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[1] In the Neoclassical international trade theories, most of developing economies are the so-called small open economies. These economies, as are their exporters, are the price-takers and are unable to affect the world price level. However, unlike the Neoclassical model, the payoff in this model is not merely the price or the profit (i.e., the financial transfers) but the value of production, which exporters can manipulate regardless of the world price level. In other words, supposing that a firm has resources on hand and its choice is either to compete or form an export cartel, it chooses the use of given resources by maximising the value of the output.

Moreover, firms are assumed to be able to sell all of the products in the export market. This assumption maybe too strict in the circumstances like domestic cartels. However, as this model focuses on export cartels from developing countries, a case in which the size of the market is relatively large in comparison with the capacity of the exporters, this assumption is acceptable[2].

Resources are the only input that each firm uses to produce its product and it is assumed that they utilise all the resources at once (i.e., there is no saving of resources to be used in the future for a given activity). It is assumed further that firms either are unable to find more resources from the market or have purchased all affordable resources already. Moreover, the rights over the resources of each firm are assumed to be well-established and perfectly protected. Therefore, 'imitation' of resources is not possible without the consent of the possessing firm. Finally, each firm is assumed to use all relevant resources in accordance with the strategy being chosen in relation to each activity. For example, if a firm chooses to form an export cartel to regulate its marketing activity, it is assumed that all resources (of both types which will be subsequently elaborated) have to be pooled into cartel formation and cannot be spared for competition.

5.3 Parameters

5.3.1 The dichotomy of resources: Shared and exclusive (type-α and -β) resources

Chapter 4 introduced the resource-based view of firm (RBV), under which a firm could be seen as a bundle of resources (Penrose, 1959). These resources determine its decision and performance (Barney, 1991; Peteraf, 1993). However, only some resources may be valuable,

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[2]The view that a cartel's market share in the export market is much smaller than in the domestic market is also proposed in Davidow and Shapiro (2003)

rare, inimitable and organised enough to lead to profitability in the long run (sustained competitive advantages) (Barney, 1991). As a consequence, the RBV allows the objective of export cartel formation to be viewed in a new light: *firms may form an export cartel because it allows a more productive use of resources in the long run.*

In the context of export cartels, this study proposes that resources can be categorised into two types: **Shared** and **Exclusive** resources. The amounts of both types of resources are denoted $\alpha_i \in \mathbb{R}^+ - (0,1]$ and $\beta_i \in \mathbb{R}^+ - (0,1]$, where $i = \{1,2\}$ denotes the firms, respectively. The categorisation of resources is often relationship-specific, i.e., it depends on what resources each pair of firms possess. For example, one firm may possess well-trained human resources while the other firm possesses special information about the export market, both of which are used in a pricing activity. In such a scenario, if what one firm possesses is what the other firm needs, then human resources and market information are considered *shared resources*. Conversely, if the benefits of an exclusive use of human resources and special information about the export market within each firm is higher than the benefit of sharing these resources between firms, these resources should be seen as *exclusive*. Even though the categorisation of resources is often relationship-specific, there are some characteristics or situations under which certain resources are likely to be either shared or exclusive resources by nature. Next, the categorisation of resources will be discussed further.

Shared (type-α) resources

Shared resources are resources that are more productive when being shared between firms (when a firm chooses to form an export cartel) than when used within the firm for a given activity (Kogut, 1988). Shared resources could be either property-based (e.g., human, intellectual properties, and physical properties) or knowledge-based (e.g., organisation, technology, and management) (Das and Teng, 2000).

In this study, the definition of a cartel is comparable to what business studies literature calls a *strategic alliance*. A strategic alliance is defined as 'a coalition, where partners remain independent firms but which coordinate some of their activities while being competitors in other areas' (Fuller and Porter, 1986). One of the main rationales behind the motives of a strategic alliance and the mode by which it is conducted is the complementarity between resources that partner firms possess (Tsang, 1998). From the RBV, Eisenhardt and Schoonhoven (1996) proposed that firms are more likely to form a strategic alliance when they are 'attempting pioneering technical strategies', 'in high-velocity industry such as [the] semiconductors industry' or 'led by well-connected top management teams'. Later in this study, we model these cases either as the cases in which a firm possesses a considerable amount of the shared (type-α) resources or the cases in which the productivity of the shared resources is increasingly expanded when being used across firms [3].

Bruce Kogut proposed that a firm may *combine resources* across firms either to acquire the other's resources or to maintain one's own resources while benefiting from another's resources (Kogut, 1988). Ramanathan et al. (1997) characterised shared resources as "inputs owned by different parties (firms) and inseparable from the other assets of the firms", and thus imperfectly mobile (i.e., a decision to compete automatically disallows firms to use each other's shared resources). One of the model's assumptions was that the rights over resources were well established, which means imperfect imitability. These two assumptions on the properties of resources are quite robust as, even in the absence of well-established rights, mobility and imitability may be imperfect due to other barriers, such as causal ambiguity, asset interconnectedness, and resources indivisibility (Dyer and Singh, 1998).

If the shared resources owned by different firms are similar in nature, they may be called *supplementary (scale-generating) resources*, e.g., financial resources. The purposes of matching supplementary resources are for example, risk-sharing, enhancement of market

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[3]In the language of my model, this means that the sharing coefficient (σ), the concept which will be introduced below, is high in comparison with the sharing coefficient threshold ($\bar{\sigma}$)

power, and the achievement of economies of scale. Moreover, the member firms may also operate in other different industries and their supplementary resources, such as human resources, might have expertise in different industries from each other. Therefore, sharing supplementary resources across firms may also provide a solution to different problems across industries. The fact that shared resources could be a vehicle to transfer knowledge across firms and industries is closely linked to the concept of *learning in production*, which is the most fundamental driver of industrial systems and innovation dynamics (Chang and Andreoni, 2016). Conversely, if shared resources are dissimilar in nature, they may be called *complementary (synergy-generating) resources*, e.g., resources with technological complementarity (Dyer and Singh, 1998). The synergy effect may occur due to growth opportunities such as exploiting each other's distribution channels in order to expand the product's market coverage and acquiring each other's technology (Pearl and Rosenbaum, 2013). Furthermore, sharing complementary resources across firms potentially creates a *snowball effect*, whereby a change of production processes and structures in one sector induces changes in the others (Rosenberg, 1969).

Exclusive (type-β) resources

Exclusive resources are resources that are more productive when being exploited within the firm that owns it (when a firm chooses to compete) than being shared across firms (within a cartel). They are resources that firms use in order to compete against other firms. The literature on RBV implicitly assumes that resources are exclusive, unless stated otherwise (Das and Teng, 2000). In the RBV literature, shared resources are considered only if the decision is to be made whether to cooperate or to form a *strategic alliance*. Otherwise, firms are assumed to make a decision about their activities only considering the exclusive resources they own, in order to achieve *competitive* advantages over competitors. The RBV literature has proposed that each firm decides its strategy based on (exclusive) resources it possesses at

the time, in oder to maximise the value along the value (or supply) chains (Mentzer et al., 2001; Rayport and Sviokla, 1995).

Exclusive resources are diverse in terms of characteristics. Apart from Jay Barney's proposition that resources have to be valuable, rare, inimitable, and well-organised (the so-called VRIO framework in Barney (1991)), there are two fundamental conditions under which resources are likely to be exclusive (rather than being shared resources).

Firstly, the resources should have non-increasing return to scale (i.e., constant or decreasing return to scale). This condition can be seen as a situation under which sharing resources across firms does not lead to the scale effect but rather reduces the value of the resources. In other words, exclusive resources, when being shared across firms, will benefit some firms at the expense of the others (a zero-sum game). As there is usually a learning/transfer cost when resources are to be transferred across firms, the net benefit to all the firms in the industry of sharing exclusive resources is usually negative and, therefore the firms are worse off than when they keep their exclusive resources to themselves. For example, a firm may operate at or above its minimum efficient scale (MES) already. Therefore, an increase in scale by combining resources across firms does not benefit the firms but rather makes them less efficient. Another example of exclusive resources is the *trade secret*, which is defined as "a way for a firm to safeguard the income that flows from a piece of knowledge" (Martin, 2010). Therefore, a firm usually pays more than it gains by sharing the trade secret with the other firms.

Secondly, the resources possessed by a firm at the time are sufficiently *standalone*, i.e., they could be used to produce the final product without the need for complementarity. This condition can be seen as a situation under which sharing resources across firms does not lead to a synergic effect. It could be because exclusive resources are complementary with generic resources which could be easily acquired by any firm. For example, the best lecturer still uses an ordinary whiteboard (generic resources) to teach, but they combined this with their unique

teaching skills (exclusive resources). Usually, these resources are highly specialised and firm-specific such that the other firms in the same industry cannot conduct the same activity using the resources they possess with equal efficiency. For example, intrinsic knowledge–the knowledge that is impossible to explicitly explain by any means and, therefore, is inimitable in nature–allows a firm to build a better piece of machinery, train its workers more effectively, or devise a more productive system of work (Liebeskind, 1996).

5.3.2 The dichotomous environment: Between- and within-firm multipliers ($\mu_{between}$ and μ_{within})

A firm may make a decision to compete or to form an export cartel using the same amount of resources but acquire different values in different environments. Therefore, the second parameter affecting the value of the firm's decision is termed here the environment multipliers ($\mu_i \in \mathbb{R}^+$ where $i = \{between, within\}$) or henceforth, in brief, **the multiplier**.

Given that firms have decided to compete or to form an export cartel, the multiplier measures how the environmental characteristics (e.g., the public view) affect the value of each unit of resource. Note that the multiplier may take the value of less than unity ($\mu_i < 1$), which means that the value of each unit of resources is decreased by a certain proportion, as in a rather extreme example, in a society where cartelisation is condemned by consumers. In sum, these multipliers capture the degree to which the environment supports the use of resources (of any type) under the different choices of action (i.e., forming a cartel or competing).

The between-firm multiplier ($\mu_{between}$)

The between-firm multiplier ($\mu_{between}$) is a measurement of the degree to which environmental characteristics influence the value captured from each unit of resources when firms choose to form an export cartel (i.e., sharing resources in terms of RBV).

The between-firm multiplier captures things like the degree of government support in terms of coordinating and regulating cooperation among firms. In many countries, governments often establish a special body to govern cartel activities. The German and Japanese governments did not only allow export cartel formation but also encouraged firms in various industries to form export cartels. For example, after the Second World War, the Japanese government encouraged firms to form trading companies (joint ventures among the relevant firms and dedicated to export-related activities) in some industries, such as bleaching powder, wool, cement, coal, and copper (Fear, 2006). These governments also helped the process of cartel formation by setting clear set of objectives for firms to follow. In Japan, the objectives of export cartel formation were largely set in terms of helping SMEs overcome barriers to foreign trade, reducing costs of exports by sharing fixed costs, and resisting the power of foreign buying cartels (Jacquemin et al., 1981).

Apart from the **legal** support from the government, **soft** factors such as the public view on cartel formation (i.e., business norms) also affect the degree to which firms may acquire value from sharing resources under an export cartel (Nye, 2004). The social cognition research recently proposed that social interaction promotes risk-taking behaviour in a stag-hunt game (cooperation) (Bolton et al., 2016). In terms of export cartels, social interaction could be seen as the business norms under which cartel formation or similar types of cooperation are seen as a *usual business practice*–cartel formation was ubiquitous in Germany before the Second World War (Liefmann, 1932).

Additionally, Dyer and Singh (1998) proposed that any environmental factors supporting trust or enhancing compatibility in the decision-making process among firms should facilitate the use of resources across firms. For example, in the industry where firms are still family-businesses, linkage between firms through personal affairs such as marriage works as a crucial catalyst facilitating trust and compatibility among firms. This case is often found in developing countries, where most firms are still family-owned. Furthermore, a *connection*

between firms is also considered as a component of the between-firm multiplier (Gulati et al., 1999). In contrast, Das and Teng (2000) argued that inter-firm conflicts, including conflict of political interests, undermine the use of resources across firms, the situation under which the value of the between-firm multiplier decreases (and could even be less than unity).

The within-firm multiplier (μ_{within})

The within-firm multiplier (μ_{within}) measures the degree to which environmental characteristics affect or influence the value captured from each unit of resource (of both types) when firms compete against each other.

The within-firm multiplier could be seen as a reflection of how well the location-specific environment, including the government, can support the use of resources in the absence of the other firm's shared resources. As a consequence, the within-firm multiplier appears in two production functions, which represent the value captured when firms decide to compete against each other (see equations 5.8 and 5.10 on page 163).

A factor determining the within-firm multiplier is the level of complementary/facilitating resources provided by the government or the public sector. These complementary/facilitating resources are the efficacy of the government, interaction between state and private sectors, and the intermediate institutions in the public sector that provide critical inputs, such as research institutes or research universities (Chang, 1994, 2011; Dore, 1986).

From the example provided in the discussion on shared resources, when one firm possesses well-trained human resources while the other firm possesses the local market information, both may be used in a pricing activity. Suppose well-trained human resources are supplied by the government training institutes and the market information is also publicly provided by the government-run market research unit, these firms would find it less necessary to gain access to the other firm's resources. Even though, for this pair of firms, these two resources are still shared resources because they are more productive when they are shared

across firms, the within-firm multiplier may more or less compensate the loss from not sharing resources across firms (see equation 5.9 on page 163, where the value of using shared resources within the firm is a product of the amount of shared resources (A) and the within-firm multiplier (μ_{within})).

5.3.3 The sharing and exclusion coefficients (σ and χ)

How much more productive are resources when they are used in a mode that makes them more responsive to (cartelisation or competition)? In order to capture the degree to which different types of resources are more productive because they are used in an appropriate way, we introduce the concept of sharing coefficient (σ; $\sigma \in \mathbb{R}^+$), to measure the degree to which the productivity of shared resources is increased, when being shared across firms (cartelisation), and the concept of exclusion coefficient (χ; $\chi \in \mathbb{R}^+$), to measure the degree to which the productivity of exclusive resources is increased, when being exploited within the firm that owns it (competition). Therefore, the value of shared resources is multiplied by $(1 + \sigma)$ when being shared across firms and the value of exclusive resources is multiplied by $(1 + \chi)$ when being used within the firm.

The sharing coefficient (σ)

Shared resources (type-α resources) are more productive when shared across firms and could be either supplementary (when the sharing involves similar resources) or complementary (when the sharing involves different resources). In business terms, Tsang (1998) called this sharing of resources between firms as "an expansion of resource usage". The sharing coefficient (σ) measures the degree to which shared resources are more productive when firms form an export cartel and collectively use the shared resources. In other words, the value of the sharing coefficient describe how strongly the shared resources boost the productivities of the firms doing the sharing (that is, forming an export cartel).

Supplementary resources (similar shared resources) are used to enhance risk-sharing, market power, and economies of scale. The degree to which firms gain these benefits are reflected in the value of the sharing coefficient (σ). For example, the smaller firms in the steel industry are currently at the steeper part along their average cost curve (AVC) and would potentially enjoy greater benefits from economies of scale than the larger firms would. Smaller steel producers may jointly use their blast furnaces and jointly invest in the logistics system to transport raw ore across stock houses in order to coordinate their production processes. Moreover, they could also reduce and relocate blast furnace workers across firms in order to be more efficient in utilising their existing blast furnaces. Thus, their cartelisation will be characterised by a higher value of the sharing coefficient (i.e., an increase in σ).

Complementary resources (dissimilar shared resources) are used to gain synergic benefits. For example, different pieces of knowhow or information to conduct the same activity may be shared across firms. The synergic benefit of complementary resources partly relies on the ability of the possessing firm to create and transfer information and knowhow and partly relies on the ability of the recipient to absorb the information and knowhow (i.e., its absorptive capacity) (Cohen and Levinthal, 1990). The magnitude of such synergic benefit is measured by the sharing coefficient (σ).

The exclusion coefficient (χ)

Exclusive resources (type-β) produce higher value when kept inside the firm that own them. They are resources with which the possessing firm acquires competitive advantages over its competitors. Moreover, once a firm gives these away or is unable to exercise its exclusive rights over them, these resources are often easy to imitate or can even be taken away by other firms, e.g., trade secrets such as chemical ingredients. Therefore, the value per unit of these resources will be greater when kept inside the owning firm than when they are shared with

other firms. The degree to which firms gain from excluding other firms from the use of these resources is measured by the value of the exclusion coefficient (χ).

5.3.4 the cost of the cartel (γ)

the cost of the cartel ($\gamma \in \mathbb{R}^+$) is an irreversible and direct cost which a firm needs to bear after making a decision to form an export cartel, regardless of the decision of the other firm or the levels of parameters (e.g., resources and multipliers). the cost of the cartel formation consists of two elements: proposing and executing costs, denoted ρ and ε respectively (i.e., $\gamma = \rho + \varepsilon$).

The proposing cost (ρ)

The proposing cost (ρ) is the cost which a firm has to pay up-front when it decides to form an export cartel regardless of the choice of the other firm.

The proposing cost consists of the physical investment that a firm needs to make in order to signal its commitment to a cartel negotiation, i.e., a prior commitment for credibility. A prior commitment is one of the measures to relieve or prevent the so-called *hold-up* problem (Rogerson, 1992). The hold-up problem in export cartel formation occurs when both parties (firms) are unsure about the outcome of the agreement due to different reasons, including unpredictable external factors, lack of trust, uncertainty of contract execution, and asymmetric information (Klein et al., 1978). For example, a firm may propose to limit its output in the subsequent quarter. However, the other firm may be reluctant to agree as it will have no direct control over the first firm's production, once the agreement has been made and, therefore, cannot be certain if the agreement will be binding and the investment, if being made at all, will be worthwhile. In order to make the proposal credible, the proposing firm, therefore, could make a prior and credible commitment by, for example, shutting down or renting out some machines or factories. Therefore, factors reducing/eliminating the costs of

screening potentially complementary information should further reduce the proposing cost (Dyer and Singh, 1998).

The execution cost (ε)

The execution cost (ε) is the cost which a firm needs to pay to execute it only after both firms decide to form an export cartel. The execution cost normally consists of negotiation costs, legal costs, and investments further to the prior commitment.

Negotiation costs are agreement- or partners-specific costs that both parties have to pay during the process of trying to reach a cartel agreement. Starting at drafting a cartel agreement, firms also need to specify in terms of the agreement, and the processes which could be recursive until the agreement is finally settled. Negotiation costs could be seen in the light of the transaction-cost economics. Private coordination under cartels, like any coordination, has transaction costs. Transaction costs include search and communication costs (e.g., firms need to know each other and, more importantly, each other's demands and specifications before making an agreement for cartel formation), bargaining and decision costs (e.g., how an activity should be regulated, i.e., at what level the price, the quality, and the quantity of product should be set), and policing and enforcement costs (e.g., the side-payment system by which the firm which violates the quota or an agreement has to compensate the other members).

Negotiation costs could be substantially reduced if member firms know each other well. They may have a strong personal connections or the firms concerned may have cooperated in one way or another (i.e., have history of cooperation) (Connor, 2007a). To be more specific, history of cooperation lowers the search and communication costs and the bargaining and deciding costs by providing common understandings regarding the agreement, which firms could use as a starting point of the negotiation. The fact that firms produce homogenous products or have similar structures of cost and production process may also promote the

likelihood that firms will have the right expectation about each other and, therefore, decrease the negotiation costs (Alexander, 1997; Compte et al., 2002; Häckner, 2000).

Legal costs are the costs of being convicted under the competition (antitrust) law, which is measured by the harshness of the competition law against export cartels (e.g., punishment, legal procedures, and so on) and the capability of executing authorities to enforce the law. The recent practice, especially in some countries such as the US, is that a decision to form a cartel is sufficient for the firm to be filed or convicted and thus makes the firms concerned pay the legal cost immediately because cartel formation is illegal *per se*. The act of forming a cartel is sufficient to be proven guilty regardless of intention.

Legal costs may also be incurred when importing or when other foreign countries may exercise their judicial power against the use of export cartels. In this dissertation, the selective use of export cartels by the exporting-country's government is emphasised. Therefore, export cartels in this dissertation mainly refer to the state-sanctioned export cartels, which may be subject to the dispute settlement framework under the GATT (Martyniszyn, 2012)[4].

Under the WTO dispute settlement framework, in Article XI of the GATT on the general elimination of quantitative restrictions, members are prohibited from imposing or maintaining any quantitative import or export restrictions. In order for the practices to be considered as governmental measures and subject to the Article, the government has to provide sufficient incentives or disincentives for the practices to take effect, in other words, these practices have to be dependent on government intervention (Jackson, 1988). However, Article XI and other provisions in GATT contain some notable exceptions. These exceptions are mainly the special and preferential treatment provisions (SDT) discussed in Chapter 1. For example, according to Article XVIII: C and D, Article XI is not applied to the quantitative restrictions necessary for the development of a particular industry by a WTO Member in the early stages

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[4]If export cartels were to be formed privately, the topic of *extraterritoriality* has to be considered. Extraterritoriality is the competence of a state to make (prescriptive), apply (adjudicative), or enforce (enforcement) rules of conduct in respect of persons, property, or events beyond its territory. See Martyniszyn (2012) for extensive discussion

of economic development, i.e., the so-called infant industry provision (Sweeney, 2007). These special and preferential treatments are subject to the negotiation between countries and developed countries have no obligation to provide any to developing countries under the GATT. As was discussed in Chapters 2 and 3, the unsuccessful negotiation during the Doha Round regarding the non-reciprocal use of export cartels in developing countries was also initiated under the idea of the SDT on developing countries, as in the Article XVIII as well[5].

Finally, a *further investment in addition to the prior commitment* is the investment which firms have to make as a fulfilment or an expansion of the 'commitment investment' (made as a part of the proposing cost (ρ)). The commitment investment can be made as a proportion of the larger investment as long as it serves the purpose of making the cartel formation proposal credible. Usually, it just needs to be irreversible and reasonably substantial, such that it is not worthwhile for someone who has no intention to follow the export cartel agreement to make. Therefore, once the commitment investment has served its purpose (to make a credible proposal) and a cartel has been formed, firms may need to make a further investment. For example, suppose the prior investment was made in the form of installing new machines to expand its production capacity, additional workers will need to be hired to start the production, once a cartel agreement has been made, which is considered as a part of the execution cost (ε).

Therefore, the cost of a cartel consists of two parts–the proposing cost (ρ) and the execution cost (ε). The proposing cost is what each firm has to pay whenever it makes a decision to form an export cartel, whether a cartel is eventually formed or not. Each firm has to pay the execution cost, only when both firms have decided to form a cartel.

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[5]A further discussion on the special and differential treatment (S&D) provisions in WTO agreements and decisions can be found in the the WTO document WT/COMTD/W/196 published in 2013.

5.4   Game payoffs

5.4.1   A representative firm: Focusing on the industry level

In this section, we introduce an additional assumption that the two firms are identical in terms of the values of parameters (an assumption that could be easily relaxed in the future studies), both of which face the same level of each of the parameters. This assumption is required to focus on export cartels for the industry concerned, so that the analytical level at which policies towards export cartels become most relevant. Moreover, this assumption implies that the optimal outcome for the firm is also the optimal outcome for the industry and *vice versa*, because, in our model, the industry outcome is simply the sum of payoffs of both firms.

In reality, no two firms are identical. However, it could be argued that, for a group of firms to form an export cartel, there must be a certain degree of similarity in terms of the parameters. In particular, the degree of similarity in parameters tends to be higher when it comes to export cartels from developing countries, most of which were formed among SMEs. Similarity in parameters could be seen as the situation in which the possible values of these parameters in a given industry tend to be close to the average (i.e. expected values) with small dispersion. As the values of these parameters tend to closely revolve around the expected values, a *hypothetical firm* facing the expected values of these parameters serves as a *representative firm* of all possible firms in a given industry. Therefore, the levels of the parameters are identical across firms as shown in the following equations (5.1 to 5.6).

Suppose there are two firms, firm i and firm j,

$$\alpha_i = \alpha_j = \alpha \tag{5.1}$$

$$\beta_i = \beta_j = \beta \tag{5.2}$$

$$\mu^i_{between} = \mu^j_{between} = \mu_{between} \tag{5.3}$$

$$\mu_{within}^i = \mu_{within}^j = \mu_{within} \tag{5.4}$$

$$\sigma_i = \sigma_j = \sigma \tag{5.5}$$

$$\chi_i = \chi_j = \chi \tag{5.6}$$

5.4.2   The resource-location differential (RLD) production function

In section 5.3, the primary parameters of the model were discussed, including resources and the multipliers. In this section, the discussion continues on how these different parameters determine the value of an economic activity (payoffs).

The analysis is conducted through the **resource-and-location-differential** (RLD) production function. Under the RLD production function, the value of an activity is determined partly by whether firms choose to compete or to form an export cartel and partly by the values of the parameters (amounts of resources and the multipliers)[6]. The production function introduced in this section describes how exactly these parameters and choices determine the value of an activity.

Given that two firms face the same values of all parameters, the RLD production functions are as follows[7].

If firms decide to form an export cartel, the between-firm multiplier ($\mu_{between}$) influences the total value of production. We assume further that the amounts of resources (of both types) possessed by both firms are additive. If these resources are shared resources (α), their values are enhanced by the sharing coefficient (i.e., multiplied by $1 + \sigma$). Equations 5.7 and 5.8 are production functions when a firm decides to form an export cartel using shared and exclusive

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[6]In brief, choices are determined endogenously by the decision of a firm to compete or to form an export cartel. On the contrary, parameters are given exogenously such as the amount of resources, the market multiplier, and the cost of the cartel.

[7]A robustness test of the functional forms of the RLD production function has also been conducted. Different functional forms, including the situation under which the sharing and the exclusion coefficients are not used but the amounts of resources are squared instead, have been analysed to see if the propositions will be substantially changed or not. The result, however, turned out that the functional form of the RLD production function may be considered robust.

resources respectively. To avoid confusion, as resources are equal across firms, 2α and 2β are essentially a sum of shared and exclusive resources between two firms.

$$f_\alpha^{cartel}(\alpha, \mu_{between}) = (1 + \sigma)(2\alpha)\mu_{between} \tag{5.7}$$

$$f_\beta^{cartel}(\beta, \mu_{between}) = (2\beta)\mu_{between} \tag{5.8}$$

Conversely, if firms decide to compete against each other, the within-firm multiplier (μ_{within}) influences the total value of production. If these resources are exclusive resources (β), their values are enhanced by the exclusion coefficient (i.e., multiplied by $1 + \chi$). Equations 5.9 and 5.10 are production functions when a firm chooses to compete using shared and exclusive resources respectively.

$$f_\alpha^{competition}(\alpha, \mu_{within}) = \alpha\mu_{within} \tag{5.9}$$

$$f_\beta^{competition}(\beta, \mu_{within}) = (1 + \chi)\beta\mu_{within} \tag{5.10}$$

The RLD production functions are assumed to be additive. The payoffs of a firm under different choices (i.e., forming an export cartel or competing) are basically the different combinations of the RLD production functions.

5.4.3 The payoffs

If an export cartel is formed, both firms are assumed to have an equal bargaining power over the stake of the value acquired. As a consequence, each firm takes one half of the value of the final production.

If a firm chooses to compete, its payoff is a sum of equations 5.9 and 5.10 as follows:

$$f_\alpha^{competition} + f_\beta^{competition} = \alpha\mu_{within} + (1+\chi)\beta\mu_{within} \qquad (5.11)$$

if a firm chooses to form an export cartel, the payoff depends on whether the other firm chooses to compete or to form an export cartel. If a firm chooses to form an export cartel but the other firm chooses to compete, it pays the proposal cost (ρ) and its payoff is as follows:

$$f_\alpha^{competition} + f_\beta^{competition} - the\,proposal\,cost = \alpha\mu_{within} + (1+\chi)\beta\mu_{within} - \rho \qquad (5.12)$$

Conversely, if a firm chooses to form an export cartel and the other firm chooses to form an export cartel as well, an export cartel is then formed and it pays both the proposal and the execution costs. The payoff of the firm is a half of the sum of equations 5.7 and 5.8 minus the cost of the cartel (γ) as follows:

$$\frac{1}{2}[f_\alpha^{cartel} + f_\beta^{cartel}] - the\,cost\,of\,cartel = \frac{1}{2}[(1+\sigma)(2\alpha)\mu_{between} + (2\beta)\mu_{between}] - \gamma \quad (5.13)$$

The game is a simultaneous-move game, i.e., both firms are simultaneously making a decision and realising the result of that decision [8]. Figure 5.1 exhibits a normal form of the model after the assumption has been imposed.

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[8]It is trivial to see that the results are sustained if a game is played repeatedly. For example, by adopting grim-trigger strategy such that once a party defects there will be no subsequent cooperation ever afterwards, cooperation is sustained as long as the condition holds that

$$f_\alpha^{competition} + f_\beta^{competition} < \tfrac{1}{2}[f_\alpha^{cartel} + f_\beta^{cartel}] - the\,cost\,of\,the\,cartel$$

Equivalently,

$$\alpha\mu_{within} + (1+\chi)\beta\mu_{within} < \tfrac{1}{2}[(1+\sigma)(2\alpha)\mu_{between} + (2\beta)\mu_{between}] - \gamma$$

is satisfied. This condition is the same as the condition under which the profile (Forming an export cartel, Forming an export cartel) is a Nash equilibrium in the simultaneous-move game. Therefore, we have the same condition to acquire Nash in both simultaneous and repeated games regardless of the value of the discount factor through time. However, it should be noted further that this study does not put much weight on the formation or sustainability of export cartels because they are not the main factors determining the long-run growth of productivity.

		Firm 2	
		Compete	Form an export cartel
Firm 1	Compete	$\alpha\mu_{within} + (1+\chi)\beta\mu_{within},$ $\alpha\mu_{within} + (1+\chi)\beta\mu_{within}$	$\alpha\mu_{within} + (1+\chi)\beta\mu_{within},$ $\alpha\mu_{within} + (1+\chi)\beta\mu_{within} - \rho$
	Form an export cartel	$\alpha\mu_{within} + (1+\chi)\beta\mu_{within} - \rho,$ $\alpha\mu_{within} + (1+X)B\mu_{within}$	$\frac{1}{2}[(1+\sigma)(2\alpha)\mu_{between} + (2\beta)\mu_{between}] - \gamma,$ $\frac{1}{2}[(1+\sigma)(2\alpha)\mu_{between} + (2\beta)\mu_{between}] - \gamma$

Figure 5.1 A normal-form game of the model (under the representative-firm assumption)

5.5   A solution of the model

According to Figure 5.1, a strategic profile (Compete, Compete) is always a Nash equilibrium. Since the cost of the cartel is a positive real number ($\gamma \in \mathbb{R}^+$), there is no incentive for either players to unilaterally deviate from the strategic profile (Compete, Compete) given that the other player's strategy remains the same. However, this study places an emphasis on the situation in which the game has *multiple equilibria*, i.e., the situation in which a profile (Form an export cartel, Form an export cartel) is also a Nash equilibrium. In this situation, the game resembles the so-called *stag-hunt game* or the assurance game (Taylor, 1987) [9]. It is the situation in which no amount of joint benefit (e.g., export, which would have been impossible without the export cartel) can be provided unless both players contribute their efforts to a certain level.

5.6   Propositions

Propositions 1 and 2 present the conditions under which export cartel formation is a Nash equilibrium and the game resembles the stag-hunt scenario. It should be noted that these propositions are the conditions under which the condition that

$$f_\alpha^{competition} + f_\beta^{competition} < \frac{1}{2}[f_\alpha^{cartel} + f_\beta^{cartel}] - the\,cost\,of\,cartel \tag{5.14}$$

Equivalently,

$$\alpha\mu_{within} + (1+\chi)\beta\mu_{within} < \frac{1}{2}[(1+\sigma)(2\alpha)\mu_{between} + (2\beta)\mu_{between}] - \gamma \tag{5.15}$$

---

[9]Some other names of the game include coordination game and security dilemma (Osborne, 2004). The latest name, in particular, was coined because the game is proposed as an alternative to the prisoner's dilemma in explaining the arms races among countries. The only difference from the prisoner's dilemma is that a country, under the stag-hunt game, prefers a profile (Refrain, Refrain) to a profile (Arm, Refrain).

is satisfied, which is when the profile (Forming an export cartel, Forming an export cartel) is a Nash equilibrium in the simultaneous-move game. As we assume that all variables are positive real numbers, the terms $\alpha\mu_{within} + (1 + \chi)\beta\mu_{within}$ is always positive. Therefore, the terms $\frac{1}{2}[(1+\sigma)(2\alpha)\mu_{between} + (2\beta)\mu_{between}] - \gamma$ is always positive as well whenever this condition is satisfied.

The condition for a cartel to be a Nash equilibrium can be written in the following equivalent forms:

(1) Sharing coefficient is at a sufficiently high level

$$\sigma > \bar{\sigma} = \frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1 + \chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}} \quad (5.16)$$

.

(2) Exclusion coefficient is at a sufficiently low level

$$\chi < \bar{\chi} = \frac{\alpha((1 + \sigma)\mu_{between} - \mu_{within}) + \beta(\mu_{between} - \mu_{within}) - \gamma}{\beta\mu_{within}} \quad (5.17)$$

(3) The cost of cartel formation is at a sufficiently low level

$$\gamma < \bar{\gamma} = \alpha(\mu_{between}(\sigma + 1) - \mu_{within}) + \beta(\mu_{between} - \mu_{within}(\chi + 1)) \quad (5.18)$$

As the sharing coefficient measures how export cartels magnify the use of shared resources across firms, we specifically put an emphasis on the condition 5.16 in order to focus on the condition concerning the sharing coefficient under which the a cartel is a Nash equilibrium. If the condition is satisfied, it is recommended that the government should support firms to form an export cartel. The condition is satisfied only if an export cartel is more productive than competition in given activity and industry. However, legalising or exempting export cartels alone will not guarantee that firms will form export cartels because competition remains a Nash equilibrium as well. In this case, it implies that the government needs to be proactive and explicitly encourage the firms concerned to form a cartel, like the practices of catch-up economies' governments as seen in the United States and Germany in the late nineteenth century and by the Chinese government nowadays (Martyniszyn, 2012).

Propositions 1 and 2 show the conditions under which the payoff of export cartels is greater than the payoff of competition. From the settings of our model, the payoff is a direct measurement of the value of the product and, hence, the productive capability that a firm could produce. Therefore, if the payoff of export cartels is greater than the payoff of competition, economic development is enhanced by supporting export cartels, not through the prohibition of export cartels. After these propositions are introduced, subsequent sections will discuss what all these propositions mean in the real world.

Proposition 1 *Given that all parameters are positive real numbers, export cartel formation is a Nash equilibrium if*

(1.1) The between-firm multiplier is no greater than the within-firm multiplier ($\mu_{between} \leqslant \mu_{within}$) and

(1.2) The sharing coefficient is at a high level ($\sigma > \bar{\sigma} = \frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}}$)

Proposition 2 *Given that all parameters are positive real numbers, export cartel formation is a Nash equilibrium if*

(2.1) The between-firm multiplier is greater than the within-firm multiplier ($\mu_{between} > \mu_{within}$) and

    either

(2.2a) The exclusion coefficient is at a low level ($\chi < \chi* = \frac{\alpha(\mu_{between} - \mu_{within}) + \beta(\mu_{between} - \mu_{within})}{\beta\mu_{within}}$) and the cost of cartel is also at a low level ($\gamma \leqslant \gamma* = \alpha(\mu_{between} - \mu_{within}) + \beta(\mu_{between} - \mu_{within}(\chi + 1)))$). In this case, the terms $\frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}}$ is no greater than zero ($\bar{\sigma} \leqslant 0$) and the sharing coefficient can take any positive value ($\sigma > 0$). In other words, the condition for a cartel to be a Nash equilibrium is always satisfied.

    or

(2.2b) The exclusion coefficient is at a low level ($\chi < \chi* = \frac{\alpha(\mu_{between} - \mu_{within}) + \beta(\mu_{between} - \mu_{within})}{\beta\mu_{within}}$) and the cost of cartel is at a high level ($\gamma > \gamma* = \alpha(\mu_{between} - \mu_{within}) + \beta(\mu_{between} - \mu_{within}(\chi + 1)))$). In this case, the terms $\frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}}$ is greater than zero ($\bar{\sigma} > 0$) and the sharing coefficient must be at a high level ($\sigma > \bar{\sigma} = \frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu}{\alpha\mu_{between}}$

    or

(2.2c) The exclusion coefficient is at a high level ($\chi \geqslant \chi* = \frac{\alpha(\mu_{between} - \mu_{within}) + \beta(\mu_{between} - \mu_{within})}{\beta\mu_{within}}$). In this case, the terms $\frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}}$ is positive. The sharing coef-

ficient must also be at a high level ($\sigma > \bar{\sigma} = \frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}}$)

It has to be stressed that only the threshold of the sharing coefficient ($\bar{\sigma}$) is a necessary condition for a cartel to be a Nash equilibrium. The other two values in Proposition 2, i.e., the critical levels for the exclusion coefficient and the cost of cartel ($\chi*$ and $\gamma*$), are defined to distinguish between the cases in which the thresholds for the sharing coefficient is negative and positive. In other words, the critical levels of the exclusion coefficient and the cost of cartel are defined only for the purpose of describing the situation in which export cartels are always a Nash equilibrium. This is because the values of the exclusion coefficient and the cost of cartel under these critical levels ($\chi < \chi*$ and $\gamma \leqslant \gamma*$) will push the value of the threshold for the sharing coefficient (σ) to be no greater than zero, given that the between-firm multiplier is greater than the within-firm multiplier. These two critical values are tremendously important as the condition 5.16 ($\sigma > \bar{\sigma}$) tells us that export cartels are more productive than competition whenever the sharing coefficient exceeds the threshold. On the contrary, competition outperforms export cartels if the condition is violated ($\sigma < \bar{\sigma}$). However, having these two critical levels ($\chi*$ and $\gamma*$), there is a possibility that competition can never be more productive than export cartels. The situation is when the exclusion coefficient and the cost of cartel are still below their respective critical levels. This is why we explore these two critical values together with the condition for a cartel to be a Nash equilibrium ($\sigma > \bar{\sigma}$).

5.6.1 The power of the high sharing coefficient ($\sigma > \bar{\sigma}$)

One of the most straightforward yet useful questions is '*under which conditions are export cartels always more productive?*' (i.e., export cartel formation is always a Nash equilibrium).

The answer is when firms are facing a high level of the sharing coefficient, i.e., the sharing coefficient exceeds the sharing coefficient threshold ($\sigma > \bar{\sigma}$). If shared resources are

supplementary, firms may gain economies of scale from combining their shared resources because the factors of production (e.g., the same type of machines) being combined have a substantial increasing return to scale (Evenett et al., 2001). In some cases, combining firms' negotiation power (e.g., against foreign buyers on prices, delivery details or against the shipping company on shipping rates) could be seen as the use of shared resource across firms. If shared resources are complementary, firms may get synergic benefits from combining their resources under an export cartel and regulate specific activities, e.g., marketing activities. For example, one firm might contribute their expertise in the importing country's market information while the other firm may contribute its analytical skills and human resources in order to attain a better marketing strategy. If these sharing benefits, as measured by the sharing coefficient, are substantial enough (i.e., $\sigma > \bar{\sigma}$), export cartel formation is always a Nash equilibrium.

Therefore, **if the sharing coefficient exceeds the threshold, other conditions are virtually ignorable**. For example, if firms face a high level of the sharing coefficient ($\sigma > \bar{\sigma}$), export cartel formation is a Nash equilibrium even in the pro-competition environment (i.e., $\mu_{between} < \mu_{within}$). In such an environment, even though firms do not have the government's support for export cartel formation ($\mu_{between} < \mu_{within}$) or even though the benefit from competition is high ($\chi > \chi*$), cartel formation might still be more productive than competition.

The threshold of the sharing coefficient is not fixed

A word of caution is that the sharing coefficient threshold ($\bar{\sigma}$) is a function of other parameters, including the amounts of both types of resources (α and β), the levels of both types of the multipliers ($\mu_{between}$ and μ_{within}), the level of the exclusion coefficient (χ), and the cost of cartel (γ). Therefore, different situations, which are captured by different sets of parameter values, have different levels of the sharing coefficient threshold ($\bar{\sigma}$). We will consider

interesting situations in which the sharing coefficient threshold ($\bar{\sigma}$) is altered by different values of other parameters in Section 5.7.

5.6.2   "Maximum competition" is just a special case after all

As Amsden and Singh (1994) argued, optimal competition in terms of economic development never achieves maximum competition. In other words, there can be such a thing as excessive competition, the case in which competition is detrimental to economic development. This study, in terms of export cartels, proposes the conditions (Propositions 1 and 2) under which competition contributes to economic development (productive capabilities) less than an export cartel does. When any of these Propositions hold, competition is less productive than export cartels (there is excessive competition) and the government should intervene to limit, in order to promote economic development.

However, there are also situations in which competition should be promoted. One of the situations occurs when the cost of the cartel may exceed the threshold ($\gamma > \bar{\gamma}$) due to prohibition by competition law (i.e., an increase in the executing cost (ε)). A strict competition law simply imposes a burden in terms of a reduction in payoffs without altering the productive capabilities of firms (mathematically, it imposes a positive real number $\gamma \in \mathbb{R}^+$ into the payoff). Therefore, the cost of the cartels become excessively high because of overly-restrictive competition law. This is the reason why some scholars argued that competition law is not necessarily beneficial for all developing countries. For example, Chang (2002) disagreed with the view that developing countries need an "American-style anti-trust policy."

Thus seen, it is as if there is a self-fulfilling prophecy in terms of competition law, i.e., the imposition of competition law actually makes competition more valuable than cartelisation, despite the fact that competition is less productive for the overall economy. The *unnecessarily* high cost of the cartel (γ) due to overly-restrictive competition laws is detrimental in at least two ways. Firstly, as the cost of the cartel (γ) is independent of the productive capability of

firms, it may force firms to compete despite the fact that competition is less productive than cartelisation. Secondly, there is an administrative cost incurred in implementing competition law. Therefore, as the previous chapters argued, an appropriate approach towards export cartels is neither a strict ban nor a laissez faire approach but the selective use of export cartels in different activities and industries.

The other situations in which competition should be promoted are equivalently interesting. According to Proposition 2, in the pro-cooperation environment ($\mu_{between} > \mu_{within}$), as long as the cost of cartel is still below the critical value ($\gamma \leqslant \gamma*$), we only need a sufficiently low level of the exclusion coefficient ($\chi < \chi*$) in order to be in a scenario in which export cartels are always more productive than competition. However, if the level of the cost of cartel exceeds the critical level ($\gamma > \gamma*$), we need a certain level of the sharing coefficient to be greater than its threshold ($\sigma > \bar{\sigma}$) for export cartels to be more productive than competition.

Therefore, competition is only desirable when there is a pro-competition environment ($\mu_{within} \geqslant \mu_{between}$) and the benefit of sharing resources between firms is not substantial ($\sigma < \bar{\sigma}$). Such environments are largely found in the developed economies in which necessary public support (e.g., public research institutes) has been well established and firms possess sufficient exclusive resources to be used along with the public supports to enhance their productive capabilities. Alternatively, even when the between-firm multiplier exceeds the within-firm multiplier ($\mu_{between} > \mu_{within}$), competition could be more productive than an export cartel especially when the sharing coefficient is below the threshold ($\sigma < \bar{\sigma}$) and the level of exclusion coefficient is high ($\chi > \chi*$). The recent global trend of maximising competition, therefore, may promote economic development only under limited circumstances.

5.6.3   Pro-competition and pro-cooperation environment

According to Propositions 1 and 2, firms need to know first whether the environment in which they operate is pro-competition or pro-cooperation, i.e., whether the within-firm multiplier (μ_{within}) is greater or lower than the between-firm multiplier ($\mu_{between}$) respectively. An immediate consequence of knowing this information is that, if the environment is pro-competition ($\mu_{within} > \mu_{between}$), knowing the level of the sharing coefficient (σ) relative to the threshold is sufficient for understanding whether export cartel formation is a Nash equilibrium or not (and there is no need to consider the exclusion coefficient (χ)).

Competition is not necessarily preferred even in the pro-competition environment

It seems to be counterintuitive if someone says that competition should not be promoted in a pro-competition environment ($\mu_{within} > \mu_{between}$). An example of such an environment is where the state-of-the-art public R&D institutes provide knowledge on technology, which could be acquired by any individual firm and used together with their exclusive resources (β). Therefore, if the within-firm multiplier exceeds the between-firm multiplier($\mu_{within} > \mu_{between}$), i.e., if the environment is pro-competition, exclusive resources (β), which are more valuable when used to compete, become more valuable and competition is likely to promote the development of productive capabilities. However, as we have seen section 5.6.1 on page 170, even in the pro-competition environment, a high level of the sharing coefficient ($\sigma > \bar{\sigma}$) still makes export cartels more productive than competition.

Export cartels is also not necessarily preferred even in a pro-cooperation environment

Likewise, when the benefit of using exclusive resources within a firm is substantial (i.e., when the exclusion coefficient exceeds its critical level ($\chi > \chi*$)) and when the benefit of using shared resources across firms is relatively low (i.e., when the sharing coefficient is below its threshold ($\sigma < \bar{\sigma}$)), competition is more productive than export cartels, even when

firms are in the pro-cooperation environment ($\mu_{within} < \mu_{between}$). One vivid example is the case of large hi-tech German firms that possess advanced technologies, such as Siemens in the transportation industry. Even though Germany is still considered pro-cooperative in general, these companies realise that the value they have to give up when forming an export cartel (i.e., the exclusion coefficient (χ)) is too substantial.

5.7   Comparative static analyses

The government may be interested in the consequence of altering the parameters such as the multipliers on the decision of firms to form an export cartel. For example, the government may improve the public research facilities by establishing a research institute to support the use of resources within individual firms across different industries, which will lead to an increase in the value per unit of resources when firms decide to compete (an increase in the within-firm multiplier (μ_{within})). It would be interesting to understand how this change (an improvement in the public research facilities) will affect the decision of firms on export cartel formation. This section introduces a comparative static analysis of how changes in parameters affect the level of thresholds and critical values, which, in turn, affect the conditions in Propositions 1 and 2. Moreover, a comparative static analysis could be seen as an indicator of the robustness of the conditions in Propositions 1 and 2[10].

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[10]Using the model based on the argument in Chapter 4 in which export cartels should be used to relocate competition into the most productive activities, it can be elaborated further that, by relocating competition into an activity, a firm may relocate exclusive resources into that activity because exclusive resources are more productive when being used in competition. However, the analysis in this study is limited to the partial-equilibrium framework in the sense that only one activity in an industry is considered at a time. Certainly, future studies could be conducted to analyse a general-equilibrium framework by incorporating all activities along the value chain across different industries. For instance, a firm may decide to relocate a part of its exclusive resources from its pricing activity in the steel industry into other activities in the steel industry, such as a quality-setting activities, after making a decision to form an export cartel to regulate a pricing activity. It can be shown that the relocation of exclusive resources out of a certain activity will not change the decision to form an export cartel if firms were to form one but will actually reinforce the decision. For example, the same marketing expertise/knowledge could simultaneously be used to facilitate a number of different marketing activities, such as pricing, promotion, and the like. Interestingly, this assumption supports the categorisation of industries by the capability domain (which is the domain of techniques, productive knowledge, and production

Since one of the conditions is a relative size of the within-firm and the between-firm multipliers (μ_{within} and $\mu_{between}$), there are only three values to be analysed, namely, the sharing coefficient threshold ($\bar{\sigma}$), the critical value for the exclusion coefficient ($\chi*$), and the critical value for the cost of cartel ($\gamma*$).

The changes of these values have different significances. The change in the sharing coefficient threshold ($\bar{\sigma}$) directly affects the level of probability at which a cartel is a Nash equilibrium. An increase in the threshold decreases the likelihood of a cartel being a Nash equilibrium because firms need a higher level of the sharing coefficient for the payoff of export cartels to exceed that of competition and vice versa.

The changes in the critical levels of the exclusion coefficient ($\chi*$) and the cost of cartel ($\gamma*$), according to Proposition 2, are more specific. They affect the likelihood that export cartels should always be promoted, when the within-firm multiplier is no greater than the between-firm multiplier ($\mu_{within} \leqslant \mu_{between}$). To be precise, from Proposition 2 (2.2a), whenever the critical level of the exclusion coefficient or the critical level of the cost of cartel or both increase, the likelihood that a cartel is always a Nash equilibrium increases. This is because more values of the exclusion coefficient or the cost of cartel or both can fall under their respective critical levels.

It should be re-emphasised that we do not consider all equivalent forms of the condition for a cartel to be a Nash equilibrium here. As they are equivalent, we specifically choose the condition concerning the sharing coefficient (σ).

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technologies/equipment that show a high degree of similarity and complementary, the concept which was previously introduced in Chapter 4), rather than by the similarities of the final product.

5.7.1 The change in an amount of resources

5.7.1.1 The change in an amount of shared resources (α)

Proposition 3 *If firms acquired an additional unit of shared resources (α), the sharing coefficient threshold ($\bar{S}$) will rise as long as the between-firm multiplier is greater than the product of the within-firm multiplier and the net effect of the exclusion coefficient ($\mu_{between} > \mu_{within}(1 + \chi)$) and the cost of cartel is sufficiently low ($\gamma < \beta(\mu_{between} - \mu_{within}(1 + \chi))$). Otherwise, the sharing coefficient threshold will fall.*

Proposition 4 *If firms acquire an additional unit of shared resources (α), the resulting change in the exclusion coefficient critical level ($\chi*$) depends on the relative size of the two multipliers. If the between-firm multiplier is greater than the within-firm multiplier ($\mu_{between} > \mu_{within}$), the exclusion coefficient critical level will rise. Otherwise, $\mu_{between} < \mu_{within}$, the exclusion coefficient critical level will fall.*

Proposition 5 *If firms acquired an additional unit of shared resources (α), the cost-of-cartel critical level ($\bar{c}$) will rise as long as the product of the net sharing coefficient and the between-firm multiplier is greater than the within-firm multiplier ($(1 + \sigma)\mu_{between} > \mu_{within}$). Conversely, the cost-of-cartel critical level will fall as long as the product of the net sharing coefficient and the between-firm multiplier is greater than the within-firm multiplier ($(1 + \sigma)\mu_{between} < \mu_{within}$).*

5.7.1.2 The change in an amount of exclusive resources (β)

Proposition 6 *If firms acquired an additional unit of exclusive resources (β), the sharing coefficient threshold ($\bar{\sigma}$) will fall as long as the between-firm multiplier is greater than the product between the within-firm multiplier and the net effect of the exclusion coefficient ($\mu_{between} > \mu_{within}(1 + \chi)$). Otherwise, the sharing coefficient threshold ($\bar{\sigma}$) will rise.*

Proposition 7 *If firms acquire an additional unit of exclusive resources (β), the resulting change in the exclusion coefficient critical level ($\chi*$) depends on the relative size of the two multipliers. If the between-firm multiplier is greater than the within-firm multiplier ($\mu_{between} > \mu_{within}$), the exclusion coefficient critical level falls. Otherwise, the exclusion coefficient critical level ($\chi*$) rises.*

Proposition 8 *If firms acquired an additional unit of exclusive resources (β), the critical value for the cost of cartel ($\gamma*$) will rise as long as the between-firm multiplier is greater than the total exclusion coefficient ($\mu_{between} > \mu_{within}(1 + \chi)$). Otherwise, the critical value for the cost of cartel ($\gamma*$) will fall.*

5.7.1.3 An analysis of the change in an amount of resources

In Chapter 4, we argued that the reason why cartelisation relocates competition across activities, instead of eliminating competition, is that, even though competition could be limited, rivalry remains. The remaining rivalry between firms ensures that they will resume to (even more intensified) competition after the cartel is dissolved. Moreover, the possibility of moving into a new market, in which they need to compete with indigenous firms, also gives firms an incentive to improve their competitive capabilities, instead of being complacent. In order to improve their competitive capability, firms will invest in the resources, by which they could use to optimise their value in competition, which are, by definition, exclusive resources. Therefore, it is sensible to assume that firms tend to spend profits on accumulation of exclusive resources. An interesting situation is the impact of the fact that firms (or an industry) accumulate more exclusive resources on Propositions 1 and 2[11].

In the light of this model, accumulation of exclusive resources (type-β) affects the level of thresholds and critical levels and, thus, the likelihood of having situations in which parameters

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[11]To understand the consequences of accumulation of shared resources, as exclusive resources and shared resources are the *mirror* images of each other, the analysis in this section is straightforwardly applicable to the case of shared resources.

satisfy the conditions in either Propositions 1 or 2. Intuitively, if the threshold or the critical level rises, it is more likely that the parameter will fall below its threshold and less likely that the parameter will rise above its threshold. Moreover, Propositions 4 to 8 show that the impact of an increase in the amount of exclusive resources on the threshold of a parameter also depends on the values of the parameters in the model. In particular, the direction of the relationship between the amount of exclusive resources and the levels of various threshold and critical values depend mostly on the magnitude of the between-firm multiplier ($\mu_{between}$) relative to that of the within-firm multiplier (μ_{within}). As we defined economic development as an enhancement of productive capabilities, then if we assume that an enhancement of productive capabilities always leads to the accumulation of exclusive resources, the setting of our model allows us to use this section to understand how economic development affects export cartel formation.

A sufficiently high level of the between-firm multiplier($\mu_{between} > \mu_{within}(1 + \chi)$)

If the between-firm multiplier is at a sufficiently high level ($\mu_{between} > \mu_{within}(1 + \chi)$), it means that the between-firm multiplier exceeds the within-firm multiplier ($\mu_{between} > \mu_{within}$). In this case, accumulation of exclusive resources (an increase in β) pushes down both the critical level of the exclusion coefficient and the threshold of the sharing coefficient (reductions in $\chi*$ and $\bar{\sigma}$) and pushes up the critical value for the cost of the cartel ($\gamma*$). Whether the situation would still satisfy the conditions in Proposition 1 or 2 depends on the initial values of the parameters for the change.

As firms face a greater level of the critical value for the cost of the cartel ($\gamma*$) when they accumulate exclusive resources (β), it is less likely that the cost of the cartel will be above the critical level (a cartel is more likely to be affordable). Any level of the cost of the cartel that falls below the initial critical level level of the cost of the cartel will surely fall below the new (higher) level of the critical level. More than that, some levels of the cost of the cartel

which were slightly above the initial critical level may become lower than the new (higher) level of the cost of the cartel as well. Therefore, the change in the critical level for the cost of the cartel from accumulation of exclusive resources is likely to promote cartel formation, given that the between-firm multiplier is substantially higher than the within-firm multiplier.

We then consider the changes regarding the sharing coefficient threshold (σ). We know that, as long as the sharing coefficient is above the threshold ($\sigma > \bar{\sigma}$), the level of the exclusion coefficient (χ) does not matter and forming an export cartel is always a Nash equilibrium of the model. If the initial level of the sharing coefficient is above the threshold ($\sigma > \bar{\sigma}$), accumulation of exclusive resources pushes down the sharing coefficient threshold and will definitely not change any outcome of the model. However, if the initial level of the sharing coefficient is below the threshold ($\sigma > \bar{\sigma}$), further analysis is needed.

Suppose that the sharing coefficient threshold is sufficiently pushed down by accumulation of exclusive resources such that it falls below the level of the initial level sharing coefficient, export cartel formation becomes a Nash equilibrium in our model, regardless of the other parameters. The resulting magnitude of the change in the sharing coefficient threshold depends on the between-firm multipliers, the within-firm multiplier, the exclusion coefficient, and the shared resources. The rate of change of ($\frac{\partial \sigma}{\partial \beta}$) in other parameters is also interesting because it determines the magnitude, by which the sharing coefficient threshold will be pushed down by accumulation of exclusive resources. If the rate of change (i.e., the magnitude of the change in the sharing coefficient threshold caused by the accumulation of exclusive resources) is decreasing in a parameter, accumulation of that parameter reduces the rate of change and the rate of change might not be sufficient for the sharing coefficient to fall below the initial value of the sharing coefficient. Otherwise, accumulation of that parameter enlarges the sharing coefficient threshold and it is more likely that the sharing coefficient might fall below the initial value of the sharing coefficient. The rate of change is decreasing in the between-firm multiplier ($\frac{\partial^2 \sigma}{\partial \beta \partial \mu_{between}} = -\frac{\mu_{within}(\chi+1)}{\alpha \mu_{between}^2}$. As long as $\mu_{between} > \mu_{within}(1+\chi)$), which is the

case in point, it is increasing in the amount of shared resources ($\frac{\partial^2 \sigma}{\partial \beta \partial \alpha} = \frac{\mu_{between} - \mu_{within}(1+\chi)}{\alpha^2 \mu_{between}}$).

Finally, it is also increasing in the within-firm multiplier and the exclusion coefficient

($\frac{\partial^2 \sigma}{\partial \beta \partial \mu_{within}} = \frac{1+\chi}{\alpha \mu_{between}}$ and $\frac{\partial^2 \sigma}{\partial \beta \partial \chi} = \frac{\mu_{within}}{\alpha \mu_{between}}$). In brief, as long as the between-firm multiplier

does not increase, an increase in any other parameters enlarges the size of the impact of

accumulation of exclusive resources on the sharing coefficient threshold and it is more likely

that the sharing coefficient threshold would be sufficiently pushed below the initial value of

the sharing coefficient (and export cartels formation is always a Nash equilibrium).

However, the sharing coefficient threshold is not necessarily pushed down below the level

of the sharing coefficient (and, thus, the sharing coefficient remains below the threshold). We

should note that Proposition 2 stated that, if the sharing coefficient is below the threshold,

a decision to form an export cartel or to compete depends on the level of the exclusion

coefficient (χ). If the exclusion coefficient is below the threshold, export cartel formation

becomes another Nash equilibrium. Otherwise, firms prefer to compete with each other.

If the between-firm multiplier is at a sufficiently high level ($\mu_{between} > \mu_{within}(1+\chi)$),

what will be the net impact of accumulation of exclusive resources on cartel formation? Ac-

cording to Proposition 2, a fall in the sharing coefficient threshold increases the likelihood that

the sharing coefficient will exceed the threshold and, thus, export cartel formation becomes a

Nash equilibrium. In contrast, a fall in the exclusion coefficient reduces the likelihood that

the exclusion coefficient will be below the threshold and export cartel formation is not a

Nash equilibrium.

The above discussion shows that accumulation of exclusive resources has two opposite

impacts on the likelihood of export cartel formation. According to Tables **??** and **??** on pages

?? and **??**, accumulation of a unit of exclusive resources decreases the sharing coefficient

threshold by $|\frac{\partial \chi *}{\partial \beta}| = |\frac{\alpha(\mu_{within} - \mu_{between})}{\beta^2 \mu_{within}}|$ and decreases the exclusion coefficient by $|\frac{\partial \bar{\sigma}}{\partial \beta}| =$

$|\frac{-\mu_{between} + \mu_{within}\chi + \mu_{within}}{\alpha \mu_{between}}|$. It can be shown that, if the exclusion coefficient is above the

thresholds ($\chi > \chi *$), the effect of a change in the amount of exclusive resources on the

exclusion coefficient critical level ($\frac{\partial \chi*}{\partial \beta}$) is always greater than that on the sharing coefficient threshold ($\frac{\partial \bar{\sigma}}{\partial \beta}$). Therefore, as long as the sharing coefficient is still below the new (lower) threshold ($\bar{\sigma} + \frac{\partial \bar{\sigma}}{\partial \beta}$ where $\frac{\partial \bar{\sigma}}{\partial \beta} < 0$ when $\mu_{between} > \mu_{within}(1 + \chi)$), accumulation of exclusive resources increases the likelihood of competition (i.e., the likelihood that a situation violates the conditions in Proposition 1 or 2).

A moderate level of the between-firm multiplier ($\mu_{within}(1 + \chi) > \mu_{between} > \mu_{within}$)

Alternatively, if the between-firm multiplier is greater than the within-firm multiplier but the difference is less than $\chi\mu_{within}$, i.e. $\mu_{within}(1 + \chi) > \mu_{between} > \mu_{within}$, accumulation of exclusive resources will push down the critical levels of the exclusion coefficient and the cost of cartel but push up the sharing coefficient threshold. The only relationship which remains the same as in the previous case, in which the between-firm multiplier is sufficiently high, is a change in the exclusion coefficient critical level, which is negative. However, in this case, the sharing coefficient threshold is pushed up, unlike in the previous case, and the critical level of the cost of the cartel is pushed down, unlike in the previous case. We consider how these two changes may affect the likelihood of having situations satisfying conditions in Propositions 1 and 2.

The most significant difference between this case and the previous case is the fact that, as the critical level of the cost of the cartel is pushed down, firms become less willing to bear the cost of the cartel, once they accumulate more exclusive resources. Therefore, the likelihood that the cost of the cartel will exceed the critical level is increased and, as a result, it becomes more likely that competition is the only Nash equilibrium. If the new (lower) level of the critical level of the cost of the cartel falls below the initial level of the cost of the cartel, an export cartel becomes no longer affordable and firms always prefer competition. Under such situation, the conditions regarding other parameters are no longer relevant and competition becomes the sole Nash equilibrium.

Suppose that the cost of the cartel remains below the critical level even after the new (lower) level of the critical level of the cost of the cartel (i.e., an export cartel remains affordable), we then consider how an increase in the sharing coefficient threshold may affect the outcome. As the sharing coefficient threshold is pushed up, it becomes less likely that the sharing coefficient will exceed the threshold. From Proposition 2, we learned that, if the sharing coefficient is below the threshold and if the between-firm multiplier exceeds the within-firm multiplier, the exclusion coefficient becomes a determining factor of the outcome of the model. As long as the exclusion coefficient is above the threshold, competition remains possible to be a sole Nash equilibrium of the game (when the sharing coefficient is below the positive threshold ($\sigma < \bar{\sigma}$)). Conversely, if the exclusion coefficient is below the threshold, export cartel formation is a Nash equilibrium as well.

If the sharing coefficient is initially below the threshold, it will remain below the threshold even after the change in the amount of exclusive resources. In other words, if $\sigma < \bar{\sigma}, then \sigma < \bar{\sigma}*$ where $\bar{\sigma}* = \bar{\sigma} + \frac{\partial \bar{\sigma}}{\partial \beta}$ and $\frac{\partial \bar{\sigma}}{\partial \beta} > 0$ (see Proposition 7 on page 178). According to Proposition 2, a decrease in the exclusion coefficient critical level makes it more likely that the exclusion coefficient will be above the critical level and thus that competition is the only Nash equilibrium. In conclusion, comparing to the previous case, a moderate level of the between-firm multiplier makes it more likely that accumulation of exclusive resources will lead to more competition.

A low level of the between-firm multiplier ($\mu_{between} < \mu_{within}$)

We define the between-firm multiplier value to be at a low level when it is lower than the within-firm multiplier ($\mu_{between} < \mu_{within}$).

According to Proposition 1, as long as the sharing coefficient is below the threshold ($\sigma < \bar{\sigma}$), firms find it more productive to compete than to form an export cartel, regardless of the level of the exclusion coefficient. Therefore, in such a case, we only need to consider the

sharing coefficient threshold. If the within-firm multiplier exceeds the between-firm multiplier ($\mu_{between} < \mu_{within}$), it always holds that the product of the within-firm multiplier and the net effect of the exclusion coefficient exceeds the between-firm multiplier, as discussed in Proposition 6, i.e., $\mu_{within}(1 + \chi) > \mu_{between}$. Therefore, the accumulation of exclusive resources always pushes up the sharing coefficient threshold and makes it more likely that the sharing coefficient falls below the threshold and, thus, it is more likely that competition is the only Nash equilibrium.

5.7.2 The changes in the levels of the multipliers (the between- and the within-firm multipliers)

5.7.2.1 The change in the level of the between-firm multiplier ($\mu_{between}$)

Proposition 9 *If the level of the between-firm multiplier rises, the sharing coefficient threshold ($\bar{\sigma}$) is always decreased.*

Proposition 10 *If the level of the between-firm multiplier rises, the exclusion coefficient critical level ($\chi*$) is always increased.*

Proposition 11 *If the level of the between-firm multiplier rises, the critical value for the cost of cartel ($\gamma*$) is always increased.*

5.7.2.2 The change in the level of the within-firm multiplier (μ_{within})

Proposition 12 *If the level of the within-firm multiplier (μ_{within}) rises, the sharing coefficient threshold ($\bar{\sigma}$) is always increased.*

Proposition 13 *If the level of the within-firm multiplier (μ_{within}) rises, the exclusion coefficient critical level ($\chi*$) is always decreased.*

Proposition 14 *If the level of the within-firm multiplier (μ_{within}) rises, the critical value for the cost of cartel ($\gamma*$) is always decreased.*

When an economy becomes productively more capable, the government usually makes further investments in public infrastructure, such as R&D institutes and the trade-supporting organisations (e.g., the Japanese External Trade Organisation (JETRO) of Japan, in the case of Japan). In this model, these investments increase the within-firm multiplier (μ_{within}). In this section, we analyse how such an increase affects the propositions of the model.

From below to above: When the within-firm multiplier becomes higher than the between-firm multiplier

Suppose a situation in which the within-firm multiplier is initially below the between-firm multiplier ($\mu_{within} < \mu_{between}$), but rises above the between-firm multiplier ($\mu_{within} > \mu_{between}$). From Propositions 1 and 2, we showed that whenever the within-firm multiplier exceeds the between-firm multiplier (e.g., the pro-competition environment), the value of the sharing coefficient (σ) alone determines whether export cartel formation is a Nash equilibrium. When the environment is pro-competition, if the sharing coefficient is above the threshold ($\sigma > \bar{\sigma}$), export cartel formation is a Nash equilibrium. Therefore, in a certain situation, in which firms are unable to realise sufficient benefits from sharing the shared resources across firms ($\sigma < \bar{\sigma}$), if the government has made investments on public infrastructure supporting the use of resources within firms to a certain extent, competition becomes a clear choice for the government to support in terms of economic development. Therefore, in order to promote competition, this analysis has shown that some infrastructure may be needed beforehand, to promote the use of resources within firms.

Impacts of an increase in the within-firm multiplier on other thresholds and on propositions

However, according to Proposition 13 and 12, an increase in the within-firm multiplier always pushes up the sharing coefficient threshold ($\frac{\partial \bar{\sigma}}{\partial \mu_{within}} > 0$) and pushes down the critical values of the exclusion coefficient and the cost of the cartel ($\frac{\partial \chi*}{\partial \mu_{within}} < 0$ and $\frac{\partial \gamma*}{\partial \mu_{within}} < 0$).

Whether or not the within-firm multiplier is below the between-firm multiplier, an increase in the sharing coefficient threshold decreases the likelihood that the sharing coefficient is above the threshold. Therefore, an increase in the within-firm multiplier tends to decrease the likelihood that export cartel formation delivers a greater value than competition does (and is a Nash equilibrium of the model).

A symmetry of the multipliers

The analysis on the within-firm multiplier above could be almost instantly translated into the case of the between-firm multiplier. This is because the relationships between a change in these two multipliers and other thresholds are symmetric and opposite in terms of the direction (the magnitudes of changes are different though). Therefore, overall, an increase in the between-firm multiplier tends to increase the likelihood that export cartel formation is a Nash equilibrium.

5.7.3 The change in the level of the coefficients

5.7.3.1 The change in the level of the exclusion coefficient (χ)

Proposition 15 *If the level of the exclusion coefficient (χ) rises, the sharing coefficient threshold ($\bar{\sigma}$) is always increased.*

Proposition 16 *If the level of the exclusion coefficient (χ) rises, the critical value for the cost of the cartel ($\gamma*$) is always decreased.*

The impact of change in the level of the coefficients on the threshold and critical value is rather straightforward compared to the previous subsections.

For the change in the level of the exclusion coefficient, according to Propositions 15 and 16, if the benefit of using exclusive resources rises (maybe due to an improvement in terms of quality), i.e., the level of the exclusion coefficient (χ) rises, the sharing coefficient threshold is increased and the threshold for the cost of the cartel is decreased. An increase in the sharing coefficient threshold makes it more difficult for the sharing coefficient to exceed its threshold. If an increase of the level of the exclusion coefficient is substantial enough such that it exceeds its threshold, the low level of the sharing coefficient ($\sigma < \bar{\sigma}$) makes competition the only Nash equilibrium. When competition is the only Nash equilibrium, the threshold for the cost of the cartel is no longer relevant.

5.7.4 The change in the condition for a cartel in different forms

After we have conducted the comparative static analysis of the sharing coefficient threshold in Propositions 1 and 2, we turn to consider how the change in the sharing coefficient, the exclusion coefficient, and the cost of cartel may affect the likelihood that a cartel is a Nash equilibrium. Therefore, we turn to consider the following equivalent forms of the condition on page 167.

We then consider how a change in one parameter affects the others' thresholds.

Proposition 17 *If the level of the exclusion coefficient (χ) rises, the threshold for the sharing coefficient ($\widetilde{\sigma}$) is always increased.*

Proposition 18 *If the level of the cost of cartel (γ) rises, the threshold for the sharing coefficient ($\widetilde{\sigma}$) is always increased.*

Proposition 19 *If the level of the sharing coefficient (χ) rises, the threshold for the exclusion coefficient ($\widetilde{\chi}$) is always increased.*

Proposition 20 *If the level of the cost of cartel (γ) rises, the threshold for the exclusion coefficient ($\widetilde{\chi}$) is always decreased.*

Proposition 21 *If the level of the sharing coefficient (σ) rises, the threshold for the cost of cartel ($\widetilde{\gamma}$) is always increased.*

Proposition 22 *If the level of the exclusion coefficient (χ) rises, the threshold for the cost of cartel ($\widetilde{\gamma}$) is always decreased.*

Propositions 17 to 22 collectively have the following implications:

1) The increase of the sharing coefficient pulls up the thresholds for both the exclusion coefficient and the cost of cartel. Therefore, the likelihood that a cartel is a Nash equilibrium is increased.

2) The increases of the exclusion coefficient or the cost of cartel or both push down the threshold for the sharing coefficient. Therefore, the likelihood that a cartel is a Nash equilibrium is decreased.

Moreover, since these three conditions are simply the equivalent forms of the same condition, the changes of other parameters (i.e., the amount of resources and the level of the multipliers) will have the same effects on the thresholds for the exclusion coefficient and the cost of cartel as they have on the threshold for the sharing coefficient as discussed in the earlier section.

5.8   Historical evidence through the lens of the model

To draw implications from the model, we have to refer back to the fundamental structure of the game: **a stag-hunt game**. A game's structure resembles a stag-hunt game whenever each individual (exporting firm) finds it hard to hunt a stag (i.e. succeed in exporting) on its own.

This model has elaborated how exactly firms may find it hard to be successful abroad on their own. It could be the case where each firm does not possess sufficient exclusive

resources relative to shared resources. Even though they both possess a considerable amount of exclusive resources, the benefit of using shared resources across firms (cartelisation) may be high enough for the firms to find it to their advantage to form an export cartel. In some locations, the facilities whereby the use of shared resources across firms (cartelisation) are well-supported might have come into being due to socioeconomic factors or government policies. In this case, the between-firm multiplier may become sufficiently high that giving up the use of shared resources across firms (cartelisation) is too costly, in terms of an opportunity cost. In Chapter 3, it was shown how export cartels were used in different countries, notably, Japan, Germany and the United States. Those cases will be reprised through the lens of this model.

5.8.1   Japan

Similar to those approaches of the United States and Germany, Japan's approach to export cartels had been quite supportive until the late twentieth century. By 1962, approximately 42 per cent of Japanese exports were cartelised (Fear, 2008). An implicit exemption from the Japanese Antitrust Law and the supports from the government, such as the enactment of the Export Trade Act, meant that the cost of the cartel was relatively low ($\gamma < \gamma*$) and the between-firm multiplier was relatively high ($\mu_{between} > \mu_{within}$). The latter condition has been particularly likely in industries in which the political power of industry is relatively strong, such as in the construction industry and industries related to it, like the cement industry. These two characteristics (low cost of the cartel and high between-firm multiplier) provided incentives for firms to form export cartels in order to "make joint investments in foreign marketing services and thus stimulates competition in product quality and reputation" (Dick et al., 1992).

Given these two conditions, the first thing we should consider is the level of the sharing coefficient (σ). In the analysis in subsection 5.6.1 in which the high level of sharing

coefficient ($\sigma > \bar{\sigma}$) leads to the absolute dominance of export cartels over competition in terms of value creation (productive capability), it was shown that export cartels are more likely to be a Nash equilibrium in a situation in which the shared factor is substantial. This turns out to be the case in Japan during the twentieth century.

The empirical analysis by Dick (1992) shows that firms in the cement, glassware and silk textiles industries (industries with noticeably homogenous products) formed export cartels in order to reduce their foreign selling costs. Export cartels allowed firms to exploit economies of scale (i.e., the use of supplementary resources) and avoid wasteful duplication of activities, such as marketing research and development, common warehouse and distribution facilities, advertisement and sales (i.e., the use of complementary resources). Moreover, the sharing coefficient (σ) was also magnified by the fact that export cartels allow firms to jointly make a *reputational investment*, such as setting product design and quality standards, establishing joint brand names, guaranteeing delivery schedules, and mediating disputes between individual exporters and buyers. It was evident that these functions of export cartels enhanced the quantity of exports in these industries by between 52 and 92 per cent during the late twentieth century (Dick, 1992). By allowing joint reputational investments, a cartel may substitute the environmental support from the government ($\mu_{between}$), such as product standards and dispute mediation.

The enhancement of exclusive resources after cartelisation

Even though competition could be mitigated in some respects, rivalry among cartel members may remain intense. A firm, after acquiring more foreign (hard) currency through an export cartel, may make further investments in exclusive resources, which it can use in order to differentiate itself from the other firms. As was discussed in the comparative static analysis section, Propositions 6, 7, and 8 on page 178 shared how different thresholds are affected by a change in the level of exclusive resources (β).

Suppose we consider the case of Japan, in which, due to the collectivism culture and the fact that different business conglomerations were ubiquitous (Hofstede, 1984), the between-firm multiplier often exceeds the within-firm multiplier ($\mu_{between} > \mu_{within}$). Even though Japan evidently supported export cartels in the past, its current view on export cartels has been shifted to be in favour of competition. We try to understand why Japan needed to support export cartels in the past and has shifted to be more in favour of competition recently. From our model, if the between-firm multiplier exceeds the within-firm multiplier, two notable cases in which competition becomes more likely are when the sharing coefficient threshold ($\bar{\sigma}$) is increased and the exclusion coefficient threshold ($\chi*$) is decreased. These two thresholds are the functions of the other parameters; the between-firm multiplier ($\mu_{between}$), the within-firm multiplier (μ_{within}), the sharing coefficient (σ) and the exclusion coefficient (χ) in particular.

According the Proposition 6 on page 177, the sharing coefficient threshold increases by the amount of exclusive resources ($\frac{\partial \bar{\sigma}}{\partial \beta} > 0$), when the value of the between-firm multiplier is not sufficiently high ($\mu_{between} < \mu_{within}(1+\chi)$). Otherwise, the sharing coefficient threshold decreases by the amount of exclusive resources ($\frac{\partial \bar{\sigma}}{\partial \beta} < 0$). As was stated above in the case of Japan, the between-firm multiplier often exceeds the within-firm multiplier ($\mu_{between} > \mu_{within}$). Therefore, one should expect that the accumulation of exclusive resources by Japanese firms should push the sharing coefficient threshold down and, thus, cartelisation is more likely to be more productive than competition *ceteris paribus*.

However, if the value of the exclusion coefficient (χ) is considerably high, the condition that the between-firm multiplier is not sufficiently high ($\mu_{between} < \mu_{within}(1+\chi)$) could be satisfied even when the between-firm multiplier exceeds the within-firm multiplier ($\mu_{between} > \mu_{within}$). The implication is that if the environmental support for the use of resources across firms is not good enough (i.e., $\mu_{between} < \mu_{within}(1+\chi)$), firms tend to be greatly affected by an increase in the opportunity cost (i.e., when the exclusion coefficient (χ) is high) from not using the increased stock of exclusive resources (β) within a firm.

In reality, an investment in exclusive resources usually goes hand-in-hand with an increase in the exclusion coefficient. It was noted that the exclusion coefficient (χ) measures the degree to which each unit of exclusive resources (β) creates more value when being kept within a firm. In other words, it captures the *quality* of resources when they are being used exclusively within a firm and protected from the other firms, i.e., an *upgrade* in productive capability of an individual firm. An investment in exclusive resources (β), therefore, does not only increase the amount of exclusive resources (an increase in β) but also increases the value of the exclusion coefficient (an increase in χ). Therefore, once firms obtain a higher value of the exclusion coefficient (due to an upgrade in the productivity of exclusive resources such as improvement in the quality of exclusive resources), the accumulation of exclusive resources increases the sharing coefficient threshold and competition is more likely to be the only Nash equilibrium.

According to Proposition 7 on page 178, the exclusion coefficient threshold ($\chi*$) decreases by the amount of exclusive resources ($\frac{\partial \chi*}{\partial \beta} < 0$), when the between-firm multiplier exceeds the within-firm multiplier ($\mu_{between} > \mu_{within}$). Otherwise, the exclusion coefficient threshold increases by the amount of exclusive resources ($\frac{\partial \chi*}{\partial \beta} > 0$). According to Proposition 2, it is straightforward to see that the accumulation of exclusive resources should increase the likelihood that firms may compete (by pushing the exclusion coefficient threshold down), especially if the sharing coefficient is lower than the threshold ($\sigma < \bar{\sigma}$). However, the argument holds true only if the between-firm multiplier is greater than the within-firm multiplier ($\mu_{between} > \mu_{within}$), i.e., the environment is pro-cooperation.

Combining these two propositions, we can see that, even when firms increase only their exclusive resources (β), competition is likely to be the *more productive* choice when the exclusion coefficient is sufficiently high, such that the conditions that $\mu_{between} < \mu_{within}(1+\chi)$ and that $\mu_{between} > \mu_{within}$ are satisfied. If the between-firm multiplier is higher than the within-firm multiplier, as was often the case in Japan, the determining factor becomes the

level of the exclusion coefficient (χ), which has to satisfy the condition that $\chi > \frac{\mu_{between} - \mu_{within}}{\mu_{within}}$. Therefore, the greater the difference between the between-firm and within-firm multipliers is, the higher the value of the exclusion coefficient is needed for the accumulation of exclusive resources to increase the likelihood of competition (by pushing up the sharing coefficient threshold (σ)).

Therefore, it could be concluded that, as Japanese firms accumulated more exclusive resources (β) and increased their exclusion coefficients (χ)) with the help of the additional value they acquired from cartelisation, it became more likely that they would compete. Some empirical studies on Japanese firms in the late twentieth century jumped to the conclusion that competition promoted Japanese exporting firms' competitiveness (Sakakibara and Porter, 2001). This wrong conclusion seems to be due to the confusion between competition and competitiveness. Competitiveness is the ability of a firm or a country to compete with other firms or other countries in the same market; the concept which is totally different from competition. A firm's competitiveness is not necessarily enhanced by competition. It is quite the opposite, as it has been argued throughout this study, competitiveness is often enhanced by limiting competition. However, the degree of competition may increase while firm's capability to compete in the global market is being enhanced. This research argues that high degrees of competition are more as a consequence, instead of the cause, of Japanese firms' competitiveness abroad. In other words, the Japanese firms competed with each other more vigorously exactly because they used to work together in cartels in the earlier period.

5.8.2 Germany

As was discussed earlier, German economic development between the late nineteenth and early twentieth centuries was facilitated greatly by tight inter-corporate linkages, particularly with the helps of banks (Esser et al., 1983). These banks were, for example, the Bank for Reconstruction (Kreditanstalt fur Wiederaufbau or KfW), the German Bank for Settlements

(Deutsche Ausgleichsbank or DtA) and the Industrial Credit Bank (Industriekreditbank or IKB). This help lasted until the mid-1950s when these banks stopped lending directly to groups of industrial firms or cartels and started lending to individual firms instead. However, the coordinating role of the banks persisted for a few decades afterwards (Haucap et al., 2010).

Moreover, there were industry associations facilitating technology transfers and providing technical advice to their members. In the late 20th century, 43 per cent of German manufacturing firms were reported to have formed industry associations in R&D. These environmental characteristics imply that the level of the between-firm multiplier ($\mu_{between}$) was substantial in (West) Germany. Essentially, it was an attempt by the German government to help exporters to respond to pressure from international competition and to get ready to pursue *quality-based competitive strategies* (Vitols, 1997). Naturally, export cartels in Germany were especially important for the SMEs, which had scale disadvantages. SME-cartels were also one of the most common types of cartels in Germany throughout the twentieth century (Haucap et al., 2010). Put in the language of the model, we would say that the sharing coefficient (σ) is particularly high in industries that have a high proportion of SMEs.

Before the 1970s, the German federal government involvement in industrial R&D and the resulting innovations were largely directed towards a select group of high-tech industries, such as nuclear power, aerospace and data processing (Grande and Häusler, 1994). Even though the local governments were helping other industries, these industries were not particularly different from those being supported by the German federal government. As most of the industries supporting the internal use of resources by the government mostly comprised larger firms, this fact implies that SMEs were exposed to a low level of the within-firm multiplier (μ_{within}) (Häusler, 1989).

After the mid-1970s, there was a major shift towards the innovative capacity of smaller firms (Reinhard and Schmalholz, 1996). By doing that, the German government promoted

public and quasi-public R&D infrastructure so that the smaller firms without internal R&D capacity gained new technologies and had their internal innovative capacity boosted through both financial and non-financial subsidies which allowed them to conduct their own R&D (Vitols, 1997). The public R&D infrastructure was mainly driven by societies such as the Fraunhofer Society and the Max-Planck Society, under which over 100 research institutes were organised (Beise and Stahl, 1999). These institutes were particularly crucial for sectors that had high proportions of SMEs (for example, almost a third of R&D in the leather, textile and clothing industries in the mid-1980s was provided by these industries) (Häusler, 1989). In this way, the within-firm multiplier (μ_{within}) was increased substantially after the 1970s.

Thus, we can understand the evolution of German export cartels through the lens of the model in the following way. In the early twentieth century, when the between-firm multiplier ($\mu_{between}$) was substantial and the within-firm multiplier (μ_{within}) was still low, cartel formation was more productive than competition especially in the industries that had a high proportion of SMEs and thus had a high sharing coefficient (σ). However, once the within-firm multiplier increased due to government policies of the post-1970s period and the sharing coefficient decreased (because SMEs became larger and productively more capable), most industries found it no longer beneficial to combine shared resources as it once was. We learnt from Proposition 12 that an increase in the within-firm multiplier (μ_{within}) will always push up the sharing coefficient threshold. The implication is that it makes it less likely for the sharing coefficient to exceed the threshold. Given that the sharing coefficient in German industries became lower once the industries became more developed and the firms became more self-sufficient in terms of technological innovation, the only possibility that export cartels are more productive than competition is when the between-firm multiplier still exceeds the within-firm multiplier and the exclusion coefficient is still below the threshold (see Proposition 2), such a situation became unlikely, once the public R&D infrastructure had

been promoted and German firms themselves became more capable of investing in increasing their individual capabilities.

Therefore, more aggressive promotion of competition law in Germany these days makes sense. However, similar to the case of Japan, it does not mean that competition was the reason why German industries become more productive in the first place.

5.8.3   United States of America

Probably the most explicit case of exemption from the Antitrust law of export cartels to date is the US. As discussed earlier in Chapter 3, there were mainly three laws effectively exempting export cartels from Antitrust law in the United States during the past century, two of which are still in effect. These laws are the 1918 WPA, the 1982 ETCA, and the 1933 NIRA.

In the light of this model, we can say that these three laws all pushed down the cost of the cartels (γ) to a low level ($\gamma < \gamma*$). Moreover, there were auxiliary organisations founded and assigned to execute or operate the provisions under these laws, particularly the 1933 NIRA. These organisations sometimes accommodated the formation of export cartels by acting as a coordination unit, which meant that the level of the between-firm multiplier ($\mu_{between}$) was raised. If the between-firm multiplier was sufficiently raised to exceed the within-firm multiplier ($\mu_{between} > \mu_{within}$), at least, during the period in which the law was still effective, provide that the exclusion coefficient is not particularly high ($\chi < \chi*$), firms would find it more productive to form an export cartel.

However, the US government has actively been involved in the provision of support in terms of R&D–either by subsidising private sector R&D or cheaply supplying technologies developed (e.g., the internet was initially the government-led military project) and there were a number of large public research institutes and universities (public universities or private universities receiving research grants from the government) to support the use of resources

within firms. In the light of this model, these supports enhanced the value of the within-firm multiplier (μ_{within}).

Given that the within-firm multiplier increased, it was more likely that the within-firm multiplier would exceed the between-firm multiplier ($\mu_{within} > \mu_{between}$). According to Proposition 1, we know that, if the within-firm multiplier exceeds the between-firm multiplier ($\mu_{within} > \mu_{between}$), the decisive factor in determining the attractiveness of export cartels is the sharing coefficient (σ). As we can see from the previous discussion, the sharing coefficient is particularly high when an export cartel is formed by SMEs. This explains why SMEs were the main target of the exemption from the Antitrust law of export cartels. This argument supports the claim by Stocking and Watkins (1948) which stated that the WPA was legitimate as long as it mainly served the SMEs not the larger firms.

If the firms' products are very diverse, the level of the sharing coefficient will become low ($\sigma < \bar{\sigma}$). As a consequence, firms will find it difficult to agree on activities such as pricing, sharing of shipments, or marketing through a single agency. For example, the NAMUSA Corp., an association formed in 1919 by members of the National Association of Manufacturers, was proven to be too broad, such that no meaningful agreement could be made among the members (Federal Trade Commission, 1968). Moreover, under such a circumstance, the between-firm multiplier could be particularly low. This is because it is hard to find such *generic* environment in which sharing diverse (but not complementary) resources among firms would be sufficiently supported by the government. Therefore, under these circumstances, the sharing coefficient is likely to fall below the threshold ($\sigma < \bar{\sigma}$) and the within-firm multiplier is likely to exceed the between-firm multiplier ($\mu_{between} < \mu_{within}$), it is more likely that firms will tend to compete and export cartels are unlikely to be successful.

5.9   Conclusion of the model

This chapter is intended to serve as a guide for policy-makers who want to decide whether export cartels should be supported or prohibited in order to promote economic development.

At the very beginning, this chapter defined a set of factors by which the productive capability of export cartel formation and competition are determined. These parameters include the resources that firms possess (α and β), the degree to which these resources are more valuable in different modes of use (χ and σ), the environmental multipliers affecting the use of resources in a particular environment (μ_{within} and $\mu_{between}$), and the cost of the cartel (γ).

Export cartels promote productive capability (hence, economic development) more than competition does, if the situation is such that it can be modelled as a stag-hunt game, in which export cartel formation, as well as competition, is a Nash equilibrium. Two propositions in this chapter show the conditions under which export cartel formation is also a Nash equilibrium of the game. These conditions are determined by the levels of different parameters relative to the thresholds.

We then drew some notable policy implications from the chapter. We learnt that a high level of the sharing coefficient ($\sigma > \bar{\sigma}$) always makes export cartel formation a superior and robust (in the sense of being a Nash equilibrium) option, compared to open competition. Furthermore, we also analysed how changes in various parameters affect the sharing coefficient threshold ($\bar{\sigma}$) in the comparative static analyses section. Another implication is that maximum competition is not optimal competition when it comes to economic development (Amsden and Singh, 1994). In the light of this model, maximum competition means that competition should be promoted regardless of the situation (i.e., regardless of the values of the parameters in our model). However, this model shows that there are (many) situations

where competition is less productive than export cartels. In such situations, it is up to the government to encourage firms to form export cartels.

Moreover, we also learnt that the cost of the cartel has a decisive impact on whether export cartel formation will be a Nash equilibrium or not. Essentially, the threshold for the cost of the cartel (γ) is the difference between the value of cartel formation and the value of competition. It is clear that, if the value produced by competition is initially greater than that by an export cartel, increasing the cost of the cartel (a reduction of the net value of export cartels) will not change the outcome of the model, namely that competition is a sole Nash equilibrium. On the contrary, if an export cartel initially produces a higher value than competition, increasing the cost of the cartel may cause the value of export cartel formation to fall below that of competition, making competition preferable to export cartel formation. Thus, when competition is actually less productive than forming an export cartel, the government should not raise the cost of the cartels through the competition law.

In the last section, we also learnt how the propositions of the model can help us explain export cartels in different countries. In this chapter, we provided some notable examples including the cases of Japan, Germany, and the United States. We have seen how different characteristics of the parameters, including (i) the levels of the exclusion and the sharing coefficients, and (ii) the relative sizes of the multipliers affects export cartel formation. We have also seen how the changes of different parameters influence the process of economic development in these countries.

All in all, propositions of the model could be adopted to provide guidelines for the economic development process in developing countries nowadays, provided that we are capable of estimating the levels of parameters specific industries. The difficulty in terms of evaluation is actually a strength of the model in this chapter. As most conditions were addressed in relative terms, e.g., the relative sizes between the within- and between-firm multipliers, the absolute values of these parameters are not necessary, as long as we can tell

if one is greater than the other. In other words, it is sufficient for these parameters to be on an ordinal scale.

Chapter 6

Conclusion

6.1   Conclusion

The research aims to answer the question posed by developing countries whether they should be allowed to use export cartels to promote their economic development (especially, in relation to the Doha Round) (see Chapters 1 and 2). After we thoroughly considered the empirical evidence (the history of export cartels in the rich countries in the past) in Chapter 3, we learnt that export cartels did not destroy competition altogether. On the contrary, export cartels could intensify overall competition across firms by *relocating* competition from one activity to another (see Chapter 4). Moreover, there were some important cases in which export cartels were found to be particularly successful in promoting the development of the industries in different countries, including Germany, the US, and Japan. These cases were used to inform the model in Chapter 5, which revealed the various conditions under which export cartels may promote economic development.

6.1.1   Looking at an export cartel from a slightly different angle

This research has shown how asking a slightly different question and looking from a slightly different perspective could significantly change the way we understand the world. We proposed that cartelisation (a formation of cartels) could be seen as a process of competition relocation, by which competition, instead of being eliminated, is relocated across activities.

The argument is based on two facts. The first is that, despite an agreement to regulate competition, rivalry among firms remains. As rivalry remains, each firm realises the fact that, as long as they are still independent firms, they will have to compete with each other. The second fact is that firms do not compete with each other in just one activity, but in various activities simultaneously. For example, Apple and Samsung compete in both the prices and quality (which includes a number of different profiles, such as camera, CPU, and so on) of their flagship phones. In reality, cartel agreements are agreed to regulate not all but only a subset of all activities, while the other activities left out of the agreements could still be freely conducted by each firm. These two facts together imply that competition is likely to be relocated into other activities instead of being totally eradicated by cartel formation.

Once the view on export cartels has been changed by introducing the concept of competition relocation, we pinned down the scope of our analysis further by considering the effects of export cartels on economic development, which is defined as "a process of economic growth that is based on the increase in an economy's productive capabilities: its capabilities to organise and, more importantly, transform its production activities" (Chang, 2014). Therefore, given that economic development is the objective, what really matters is whether competition or cartelisation is better at enhancing productive capabilities. If competition promotes productive capabilities in a given activity more than cartelisation, competition should be promoted in that activity. Otherwise, cartels, including export cartels, should be formed to regulate that activity, by which competition is relocated away from that activity.

We captured how competition and cartelisation affect productive capabilities by proposing the model in Chapter 5. The model is based on the hypotheses that the value of productive capabilities of a firm is determined by two factors: (internal) resources and the (external) environment. We argued further that each of these factors could be categorised into two types. The first type of resources is more valuable when kept inside each firm and used to compete against other firms and the other type is more valuable when shared across firms within a cartel. Similarly, the first type of environment supports the use of resources within a single firm and the other type supports the use of resources across firms within a cartel.

After the payoff functions are specified, we analyse the conditions under which the payoff of cartelisation is greater than that of competition. Under such conditions, there are two Nash equilibria of the simultaneous-move game: competition and cartelisation. In the language of game theory, the game is set up as the stag-hunt game, which arguably represents how firms (especially, SMEs) from developing countries encounter fierce competitive forces in the global market and, thus, sometimes, export cartels are necessary for their survival. The stag-hunt game is the game in which a group of hunters aim to hunt a large stag along its path. If all of the hunters remain patient and, once found, hunt the stag together, they will be successful and a stag will be more than enough to share. Each hunter knows that, even though it is quite likely that the stag will follow the same path, it may never show up, in which case no hunter will have food. Likewise, member firms of export cartels may or may not be successful in the global market. However, if a hare happened to pass within easy reach, the group may be easily dissolved by one of the hunters attempting to catch a hare for themselves and withdrawing from the group hunting, even though all of the hunters know that stags are more valuable than hares, the same way in which exporting firms decide to compete with each other instead of forming an export cartel.

In this section, drawing on the practices of export cartels in different countries discussed in Chapter 3 and the theoretical model discussed in Chapter 5, we draw some implications.

These implications both enhance our understandings regarding export cartels and provide policymakers in developing countries with guidelines according to which they could make policies regarding export cartels.

6.1.2   History of export cartels

Even though the view on cartels including export cartels was changed from a neutral or positive one into a negative one after the Second World War, we saw in Chapter 3 that export cartels have been ubiquitous throughout the twentieth century. Moreover, some notable cases of export cartels were found nowadays in most advanced economies including the US, Germany, and Japan. Here is a summary of lessons that we have drawn from the review of this history.

6.1.2.1   Export cartels were once an important tool in developed countries

In Chapter 1, we claimed that export cartels were influential and ubiquitous in developed countries in the past–between the late nineteenth century and the twentieth century in particular. In other words, developed countries, such as Germany, the US, and Japan, once had export cartels governing a large portion of their exports in various industries. However, during the Doha Round, these developed countries ironically did not agree with a proposal by developing countries requesting for consent to use export cartels on a non-reciprocal basis.

Chapter 3 reviewed both historical evidence and the relevant academic literature to show that the request from developing countries was based on what actually happened in various countries including, notably, Japan, Germany and the US and had very solid theoretical justifications. According to the experiences of these three countries, we found that cartels were formed mainly due to two factors: the firms' capabilities in regulating their interaction or competing with each other and the role of the environmental factors including the government (whether the government supports each firm to be standalone or promote cooperation among

firms) and the nature of the relationship among firms (whether they had previously formed cartels or other types of cooperation or not). Certainly, not all export cartels were successful in enhancing productive capabilities. We tried to analyse how different factors eventually lead to success or failure in terms of productive capability enhancement in Chapter 5.

6.1.2.2   The government has to be proactive

Another crucial lesson that we learnt is that *the government has to be proactive*. This is because, once the situation is a stag hunt , both competition and cartelisation are Nash equilibria. Among these two Nash equilibria, cartelisation is the more productive outcome and, thus, more desirable in terms of economic development. The simplest way by which one of the multiple Nash equilibria could be made more likely than the other is a government policy directed towards specific cases (industries). In other words, the government has to be proactive in deciding whether or not to allow the firms in a specific industry to form an export cartels.

In Japan and Germany, the governments did not simply let firms arbitrarily form export cartels, but were actively involved in the cartelisation process by recommending or even coercing firms in particular industries to form cartels, including export cartels. The government may do that by enacting a specific law aimed at specific industries–for example, the Coal Act of 1919, which established the National Coal Federation to control the German coal outputs. Alternatively, the government may directly command a particular industry to form a cartel such as the case of MITI in Japan.

The fact that the government needs to be proactive in terms of its support for cartelisation process is coherent with the structure of the stag-hunt game proposed in Chapter 5. In the stag-hunt game, there are two Nash equilibria, that is, cooperation and competition, or cartelisation and competition in the context of export cartels. Moreover, given the structure of payoffs in the model in Chapter 5, cartelisation is a Nash equilibrium only if it is more

productive than competition. Therefore, government intervention is needed to induce firms to choose the more productive solution (cartelisation).

Another way by which the government could support cartelisation is to manage the setup coordinating units, such as financial institutions. This approach was particularly popular in Germany and Japan during the twentieth century. As cartel agreements normally require the transfer of money across firms for different organisational purposes, e.g, side payments and profit pooling, financial institutions, as a mediator, can easily work with cartel members to coordinate and enforce their agreements. In terms of the model in Chapter 5, the establishment of financial institutions to support the use of export cartels may influence both the between-firm multiplier and the sharing coefficient ($\mu_{between}$ and σ), both representing the degree to which using resources across firms (through export cartels) contribute to the productive capabilities of firms.

Having said that, the current situation regarding the policy on export cartels does not support the government to be proactive in the process of cartelisation. In some countries, domestic competition law covers only the practices affecting the domestic market, thus, export cartels could be arbitrarily formed by firms in any industries, i.e., an implicit exemption. In some countries, there have been particular laws enacted to explicitly exempt export cartels from domestic competition law, i.e., an explicit exemption. However, in both cases, governments are rarely able to become informed about the industries in which export cartels have been formed. Even though some countries with explicit exemption also demand that firms, having agreed to form export cartels, are required to register with the government, firms are left to initiate the formation of the export cartel themselves. Such a situation is not much better than the situation in which export cartels are strictly prohibited in terms of economic development. The lesson we learned from the history of export cartels is that, often, firms are well equipped with the resources to form an export cartel and become more productively capable, but they end up choosing competition instead because of environmental factors,

which is mainly due to a lack of government support. This is why developing countries need policies to permit their governments to be proactive when it comes to export cartels.

6.1.3 From history to the model

The main results of Chapter 5 represent how different factors interplay in determining the value of cartelisation and competition in developing countries. As we discussed in subsection 6.1.1 above, historical evidence tells us that export cartels were needed the most when individual exporters are unable to export on their own. In the language of our model, export cartels benefit firms in terms of productive capabilities the most when the benefit of sharing the shared resources across firms is substantial. In other words, the sharing coefficient is sufficiently high ($\sigma > \bar{\sigma}$).

6.1.3.1 The power of the sharing coefficient (σ)

So far, the key message of this research is that export cartels, despite not always being beneficial, could promote economic development under specific conditions. The conditions for this to be the case were proposed and discussed in Chapter 5, one of which occurs when the benefit of using shared resources across firms is sufficiently high. In Chapter 5, the sharing coefficient (σ) captured the degree to which the benefit from the use of shared resources across firms contributed to the enhancement of their productive capabilities and was greater than the benefit from the use of shared resources within a firm. Moreover, the sharing coefficient was high enough to favour sharing of the shared resources whenever it exceeded the threshold ($\sigma > \bar{\sigma}$).

This condition reflects the fact that most export cartels, including those in Japan and Germany, were encouraged to be formed among SMEs. SMEs usually lack the scale or individual capabilities with which they can compete in the global market. Moreover, the industries, in which these cartels were formed usually have relatively homogenous or

standardised products. The production process of these products is usually simple and is more likely to gain from economies of scale. Even though firms may not always be able to physically combine their machines and labour, a cartel agreement may still allow them to coordinate their production processes, at least to eliminate repetitive tasks. For example, one firm may invest in the machines to produce parts for products, while the other firm invests in the machines to assemble the final products, instead of conducting both functions independently. A similarity between the products of both firms allows them to share their production facilities in order to expand their scale.

Moreover, better utilisation of supplementary resources is not the sole purpose of export cartels when it comes to productive capabilities. We have discussed that, apart from supplementary resources, shared resources may gain a greater value when combined across firms, because of the synergic effect (complementary resources). One possibility is when different firms possess different pieces of knowledge, each of which alone is insufficient to make their export successful. However, a combination of these pieces of knowledge may allow firms to be sufficiently capable of exporting into the global market. Such a situation is also represented by a high value of the sharing coefficient (σ), if the sharing coefficient is sufficiently high ($\sigma > \bar{\sigma}$), export cartels should be encouraged by the government.

In contrast, when the sharing coefficient is low ($\sigma < \bar{\sigma}$), competition tends to be a preferred tool to promote economic development. In such a situation, firms do not sufficiently possess supplementary or complementary resources that could be enhanced in terms of values by being shared across firms. For example, most leading technological firms in developed countries have reached their most efficient scale and their resources become more firm-specific, i.e., their resources become more exclusive. If the sharing coefficient is low, the only situation in which export cartels still promote economic development is when the exclusion coefficient is low and the environment is pro-cooperation ($\chi < \bar{\chi}$ and $\mu_{between} > \mu_{within}$ respectively). This exceptional situation is quite unlikely. As we discussed earlier, firms

tend to invest in exclusive resources and also improve the exclusion coefficient in order to prepare themselves for potential intensification of competition in the future, especially after the cartel agreement has ended. Therefore, the level of exclusion coefficient is likely to increase. Whenever the level of the exclusion coefficient is high ($\chi > \bar{\chi}$), whether or not the environment is pro-cooperation, competition is still preferred to export cartels in terms of promoting economic development.

6.1.3.2   Optimal competition is not maximum competition

The doctrine that optimal competition is maximum competition (the doctrine) is rejected by this research, both empirically and theoretically. We have seen how export cartels were used to mitigate ruinous competition in various countries, including Japan, the US,France, and Germany.

Even though the concept of ruinous competition has long appeared in the literature, this research reinterprets the concept of ruinous competition in light of the concept of relocation of competition. Ruinous competition occurs when firms compete in a given interactive activity, such as pricing or quality setting, in which competition is less productive than cartelisation, given that ruinous competition is a situation where competition is less productive. Moreover, based on the fact that rivalry gives firms an incentive to keep improving their productive capabilities, if firms limit competition in one activity, they will relocate (spared) resources from that activity to other activities, in which competition is still active.

Propositions in Chapter 5 implied that there are conditions under which competition is less productive than cartelisation and, thus, should be limited. This conclusion defies the prevailing economic doctrine. This conclusion backs up the calls from developing countries during the Doha Round discussed in Chapter 1, this conclusion backs up the calls. However, Corollaries in Chapter 5 also serve as caveats that export cartels do not always enhance productive capabilities because, in some circumstances, competition is more productive

(especially, when the sharing coefficient is below its threshold ($\sigma < \bar{\sigma}$)). As a consequence, an unconstrained legitimisation of export cartel is not recommended either.

6.1.3.3 The consequence of economic development: Accumulation of exclusive resources

Economic development should affect the values of the parameters in the model. We argued that, as member firms of an export cartel predict that competition will resume at some point (because member firms are still separated and independent entities, rivalry still persists, and the cartel could be dissolved anytime), they have the incentives to invest in the resources, which will facilitate their ability to compete with the other firms. These resources are, by definition, exclusive resources (β). In Chapter 5, we analysed how a change in the amount of exclusive resources affected the value of the thresholds. The conclusion was that, given that the benefit of using exclusive resources in competition (the exclusion coefficient (χ)) is not tremendously low, accumulation of exclusive resources is likely to make competition more productive than cartelisation. As the investment in exclusive resources does not just increase the amount of resources, but also tends to enhance its exclusiveness, which is the level to which resources are firm-specific and is measured by the exclusion coefficient (χ), the exclusion coefficient rises and becomes unlikely at the low levels. The exclusiveness of resources is enhanced whenever the nature of resources becomes more complicated and highly technical, which requires more specific complementary resources from the firm. For example, a further investment in (more advanced) machines usually requires the firm to develop its technical knowledge embedded in its human resources. Therefore, we should expect to see intensified competition in the industries in which productive capabilities have been enhanced.

The implication of the above discussion is that the belief that competition leads to economic development could be just *cum hoc ergo propter hoc* (Latin for "with this, therefore

because of this,"). According to this research, competition becomes a more productive choice and should be promoted only after firms have accumulated necessary resources and the environment has been upgraded to a certain level. Conversely, accumulation of resources and the environmental upgrades are not necessarily promoted by competition. In some cases, this research has shown, competition is not desirable in the first place, i.e., when there is ruinous competition.

6.2   Limitations and further thoughts

This section discusses the limitations and further directions for this research. Even though the previous five chapters are sufficient to answer the research question, there are still some aspects whose exploration may enhance and enrich the knowledge of the topic of export cartels and its related topics.

6.2.1   Export cartels may lead to retaliation

One aspect of export cartels that was omitted from this research is the potential retaliation by the importing countries, e.g., buyers cartels. The *Daishowa International v North Coast Export Co Ltd* case was the case in which Japanese paper manufacturers formed a buyer's cartel in response to US wood chip manufacturers registered under the WPA (Waller, 1992). The verdict of the case is not as important as the fact that, in an absence of a specific agreement between trading countries, retaliation is likely to be the outcome of export cartels from developing countries. When import cartels are left alone, the importing governments may impose all sorts of tariffs and non-tariffs barriers as countermeasures. This is why this research began with the proposal by a group of developing countries, which proposed export cartels from developing countries should be permitted on a non-reciprocal basis.

6.2.2   International cartels

The definition of export cartels is Chapter 2 excluded international cartels from the scope of this research. Even so, it by no means implied that export cartels and international cartels are mutually independent. Some studies claimed that export cartels may be developed into international cartels (Jenny, 2012). However, international cartels may be less stable in comparison with export cartels, especially if there is no support from the governments of the countries concerned (Immenga, 1995). Moreover, from the point of our model, a direct transition from export cartels from developing countries to international cartels is less likely. For example, in Sweden's and Finland's pulp and paper industry, after export cartels have achieved a dominant position in the global market, then export cartels become no longer useful for the firms and do not develop into international cartels (Jensen-Eriksen, 2013). We leave the debate about the relationship between export cartels and international cartels to future studies.

6.2.3   The limitation of the data

Export cartels, even to a lesser degree than cartels in general, still have been heavily condemned by governments, policymakers, and academics over the past few decades. Therefore, it is not surprising that the data of export cartels have been scarce (Sweeney, 2007). For example, the German government, after 1956, decided to keep the data of export cartels secret in order to protect member firms from the countermeasures of importing countries (Audretsch, 1989). Moreover, most of the existing data on cartels often do not distinguish export cartels from cartels in general (Gonta, 2010).

It is also difficult to contact any particular member of export cartels to acquire further information. They are reluctant to admit their participation or reveal information on various grounds. In the countries where export cartels are illegal or implicitly exempted from

competition law, member firms may find it risky that they may face legal sanctions (from both domestic and importing countries), if the government finds out about their participation. In the countries where export cartels are explicitly exempted, even though they could come forward and acquire an exemption, these firms may be exposed to other countermeasures from importing countries.

6.2.4   A more specific case study and policy recommendations

This research has shown that export cartels were once widely used in various industries. Certainly, the propositions in this research are generic enough to apply to any industry. However, the measure of the same parameter (e.g., the between-firm multiplier) in one industry may not necessarily be exactly the same as in other industries. Likewise, the same industry across different periods may also have different measures of the same parameter. For example, exclusive resources in one industry now could be totally different from those in the same industry a decade ago, especially if the industry is relatively dynamic. In order to acquire the measures of the parameters in the model, further analyses of country- and industry-specific measurements are needed.

6.2.4.1   The measurement of parameters

Even though this research could be used as a theoretical guide for policymakers, it would be more effective if we could come up with the numerical values for the parameters proposed in this research for a specific case. In other words, in order to empirically apply the propositions in this research, the accurate and comparable measurements of all parameters are needed. For example, if the Thai government had an idea to promote the exports of, say, the steel industry. Suppose further that there are three exporting firms in this industry. The government would like to know if they should allow these firms to form export cartels. If these firms are allowed to form an export cartel, the government may want to know in which activities they should

be allowed to cooperate on. In order to give a policy recommendation in such a very specific case, we need to be able to quantify the parameters in the propositions.

There are two possible approaches. On the one hand, one can use a sensible proxy variable to measure a parameter. For example, the ranking of public universities in terms of research quality could be used as a proxy for the degree to which the environment supports the use of resources within a firm, i.e., the within-firm multiplier. On the other hand, in some circumstances, it may be impossible to capture all dimensions of a parameter by just one proxy variable, and a set of many variables may need to be considered. A multivariate data technique, such as factor analysis, could be used to construct an index measuring the parameter. For example, the amount of intellectual property rights possessed by the firm, together with the measures of its brand royalty, could be used to construct an index measuring the amount of exclusive resources in the marketing activity.

6.2.4.2   The differentiated-firm models

Once the study is conducted in a more specific manner (e.g., case study), a trivial adjustment of the model will make a great contribution. Such an adjustment is made by allowing different firms be assigned different values of parameters. For example, firms may possess different amounts of each type of resource, may face different levels of multipliers, may have different degrees of coefficients, or may confront different sets of the cost of cartels. This allows us to consider the impact of export cartels on economic development at the firm level instead of the industry level.

6.2.4.3   Other potential extensions of the model

As this paper proposes a groundbreaking model of cartel formation, its potential extensions are rich. Instead of assuming that resources are exogenously given, we may build a model in which firms choose the composition and the amounts of resources first (endogenous

amount of resources) in a two-stage game. Furthermore, the game could be repeated to better capture the dynamic characteristic of cartels and allow us to investigate the stability of cartels (d'Aspremont and Jacquemin, 1988). Moreover, extensive comparative static analysis should also be conducted.

Despite having proved its robustness, an implicit function with a certain set of properties that reflect an asymmetry between types of resources may be adopted to further generalise the analysis. Taking into account the demand side of the model should also add rigor to the analysis. Furthermore, imperfect information, uncertainty, and the inequality of bargaining power between firms may also be discussed (see Osborne and Rubinstein (1994)).

6.2.5   Export cartels and some other forms of inter-firm cooperation

6.2.5.1   Export cartels and Mergers and Acquisitions (M&A)

The main difference between export cartels and M&A is the fact that, while firms are still separated entities and remain independent in export cartels, they become the same entity after M&A. This difference explains why M&A could be less desirable in comparison with cartel formation. There are some activities that, given the resources they possess, firms are more productive if they remain independent and compete against each other. By M&A, the authority of firms to decide whether to regulate or to compete in specific activities is stripped away. Instead of choosing to regulate all activities by M&A or compete in all activities in the market, an export cartel allows firms to selectively choose the optimal mode of interaction (compete or cooperate) in each activity, based on their possessing resources and the environment (see Chapter 5). This explains why, in order to understand the effect of an export cartel on economic development, the effect has to be considered on an activity-by-activity basis[1].

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[1]Certainly, there are also costs of identifying different activities and possessing resources by which the overall cost of cartelisation might be increased substantially. However, in the context of this study, we put more emphasis on the productivity side.

6.2.5.2   Export cartels and vertical integration

Even though the definition of an export cartel is limited to the horizontal interaction, the concept of competition relocation implies that an export cartel affects the degree to which firms integrate vertically as well. Empirically, an export cartel slows down M&A (horizontal integration) and encourages vertical integration because firms try to avoid distortion (i.e., the expense in controlling the activities outside of the agreement) (Fear, 2008). In the presence of export cartels, German export firms turned their attention to other firms along their value chain and vertically integrated instead. As a consequence, German export firms were highly vertically integrated, had highly diversified product lines, and specialised in small-batch production in capital-intensive industries. As shown by the example, an agreement to regulate the horizontal market interaction could affect the vertical activities of firms.

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Appendix A

Proofs of Propositions

Proof of Proposition 1

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$,

Consider the condition (1):

$$\sigma > \frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha \mu_{between}}.$$

As long as $\mu_{between} \leqslant \mu_{within}$, it is trivial to see that $\frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha \mu_{between}} > 0$.

QED.

Proof of Proposition 2

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$,

Consider the condition (1):

$$\sigma > \frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha \mu_{between}}.$$

Suppose $\mu_{between} > \mu_{within}$, what is interesting is a condition under which the terms of the right-hand side is no greater than zero.

$$\frac{\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma}{\alpha\mu_{between}} \leqslant 0$$

If and only if

$$\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between}) + \gamma \leqslant 0$$

Rearrange and get

$$\gamma \leqslant -(\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between})) \tag{A.1}$$

However, we need to make sure that it is possible for the exclusion coefficient (γ) to be positive. That is

$$-(\alpha(\mu_{within} - \mu_{between}) + \beta(\mu_{within}(1+\chi) - \mu_{between})) > 0$$

Rearrange and rewrite the condition in terms of the exclusion coefficient (χ)

$$\chi < \frac{\beta(\mu_{between} - \mu_{within}) - \alpha(\mu_{within} - \mu_{between})}{\beta\mu_{between}} \tag{A.2}$$

Therefore, a cartel is always a Nash equilibrium ($\bar{\sigma} \leqslant 0$) when $\mu_{between} > \mu_{within}$ and conditions A.1 and A.2 hold.

QED.

Proof of Proposition 3

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the amount of shared resources(α) on the sharing coefficient threshold ($\bar{\sigma}$) is $\frac{\partial\bar{\sigma}}{\partial\alpha} = \frac{\beta(\mu_{between} - \mu_{within}(\chi+1)) - \gamma}{\alpha^2\mu_{between}}$, which is positive if $\mu_{between} > \mu_{within}(1+\chi)$ and negative otherwise **QED**.

Proof of Proposition 4

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the amount of shared resources(α) on the exclusion coefficient critical value ($\chi*$) is $\frac{\partial \chi*}{\partial \alpha} = \frac{(1+\sigma)\mu_{between} - \mu_{within}}{\beta \mu_{within}}$, which is positive if $(1+\sigma)\mu_{between} > \mu_{within}$ and negative otherwise **QED**.

Proof of Proposition 5

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the amount of shared resources (α) on the critical value of the cost of cartel ($\gamma*$) is $\frac{\partial \gamma*}{\partial \alpha} = \mu_{between}\sigma + \mu_{between} - \mu_{within}$, which is positive if $\mu_{between}(1+\sigma) > \mu_{within}$ and negative otherwise **QED**.

Proof of Proposition 6

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the amount of exclusive resources (β) on the sharing coefficient threshold ($\bar{\sigma}$) is $\frac{\partial \bar{\sigma}}{\partial \beta} = \frac{-\mu_{between} + \mu_{within}\chi + \mu_{within}}{\alpha \mu_{between}}$, which is positive if $\mu_{between} < \mu_{within}(1+\chi)$ and negative otherwise **QED**.

Proof of Proposition 7

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the amount of exclusive resources (β) on the exclusion coefficient critical value ($\chi*$) is $\frac{\partial \chi*}{\partial \beta} = \frac{\alpha(\mu_{within} - \mu_{between})}{\beta^2 \mu_{within}}$, which is positive if $\mu_{between} < \mu_{within}$ and negative otherwise **QED**.

Proof of Proposition 8

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the amount of exclusive resources (β) on the critical value of the cost of cartel ($\gamma*$) is $\frac{\partial \gamma*}{\partial \beta} = \mu_{between} - \mu_{within}\chi - \mu_{within}$, which is positive if $\mu_{between} > \mu_{within}(1 + \chi)$ and negative otherwise **QED**.

Proof of Proposition 9

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the between-firm multiplier ($\mu_{between}$) on the sharing coefficient threshold ($\bar{\sigma}$) is $\frac{\partial \bar{\sigma}}{\partial \mu_{between}} = -\frac{\mu_{within}(\alpha + \beta(1+\chi)) + \gamma}{\alpha \mu_{between}^2}$, which is always negative **QED**.

Proof of Proposition 10

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the between-firm multiplier ($\mu_{between}$) on the exclusion coefficient critical value ($\chi*$) is $\frac{\partial \chi*}{\partial \mu_{between}} = -\frac{(\alpha + \beta)}{\beta \mu_{within}}$, which is always negative **QED**.

Proof of Proposition 11

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the between-firm multiplier ($\mu_{between}$) on the critical value of the cost of cartel ($\gamma*$) is $\frac{\partial \gamma*}{\partial \mu_{between}} = \alpha(1 + \sigma) + \beta$, which is always positive **QED**.

Proof of Proposition 12

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the within-firm multiplier (μ_{within}) on the sharing coefficient threshold ($\bar{\sigma}$) is $\frac{\partial \bar{\sigma}}{\partial \mu_{within}} = \frac{\alpha + \beta\chi + \beta}{\alpha \mu_{between}}$, which is always positive **QED**.

Proof of Proposition 13

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the within-firm multiplier (μ_{within}) on the exclusion coefficient critical value ($\chi*$) is $\frac{\partial \chi*}{\partial \mu_{within}} = \frac{(\alpha+\beta)\mu_{between}}{\beta \mu_{within}^2}$, which is always positive **QED**.

Proof of Proposition 14

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the within-firm multiplier (μ_{within}) on the critical value of the cost of cartel ($\gamma*$) is $\frac{\partial \gamma*}{\partial \mu_{within}} = -(\alpha + \beta(1 + \chi))$, which is always negative **QED**.

Proof of Proposition 15

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the exclusion coefficient (χ) on the sharing coefficient threshold ($\bar{\sigma}$) is $\frac{\partial \bar{\sigma}}{\partial \chi} = \frac{\beta \mu_{within}}{\alpha \mu_{between}}$, which is always positive **QED**.

Proof of Proposition 16

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the exclusion coefficient (χ) on the critical value of the cost of cartel ($\gamma*$) is $\frac{\partial \gamma*}{\partial \chi} = -\beta \mu_{within}$, which is always negative **QED**.

Proof of Proposition 17

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the exclusion coefficient (χ) on the threshold of the cost of cartel ($\bar{\sigma}$) is $\frac{\partial \bar{\sigma}}{\partial \chi} = \frac{\beta \mu_{within}}{\alpha \mu_{between}}$, which is always positive **QED**.

Proof of Proposition 18

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the cost of cartel (γ) on the threshold of the cost of cartel ($\bar{\sigma}$) is $\frac{\partial \bar{\sigma}}{\partial \gamma} = \frac{1}{\alpha \mu_{between}}$, which is always positive **QED**.

Proof of Proposition 19

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the sharing coefficient (σ) on the threshold of the cost of cartel ($\bar{\chi}$) is $\frac{\partial \bar{\chi}}{\partial \sigma} = \frac{\alpha \mu_{between}}{\beta \mu_{within}}$, which is always positive **QED**.

Proof of Proposition 20

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the cost of cartel (γ) on the threshold of the cost of cartel ($\bar{\chi}$) is $\frac{\partial \bar{\chi}}{\partial \gamma} = \frac{-1}{\beta \mu_{within}}$, which is always negative **QED**.

Proof of Proposition 21

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the sharing coefficient (σ) on the threshold of the cost of cartel ($\bar{\gamma}$) is $\frac{\partial \bar{\gamma}}{\partial \sigma} = \alpha \mu_{between}$, which is always positive **QED**.

Proof of Proposition 22

Given that $\alpha, \beta \in \mathbb{R}^+ - (0,1]$ and $\mu_{within}, \mu_{between}, \chi, \sigma, \gamma \in \mathbb{R}^+$, the marginal effect of a change in the exclusion coefficient (χ) on the threshold of the cost of cartel ($\bar{\gamma}$) is $\frac{\partial \bar{\gamma}}{\partial \chi} = -\beta \mu_{within}$, which is always negative **QED**.