Polarisation and Reversion under Competition:

Profitability of Indian Firms

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Abstract

We analyse profitability dynamics in a large emerging economy, India, over the two-and-a-half decades since economic liberalisation began in earnest. We find that the average rate at which Indian firms reverted to normal profitability increased significantly, particularly for firms earning supernormal profits. In contrast, firms earning below normal profitability have been marked by little reversion to normal. Inducing underperforming firms to improve their profitability is of great policy importance. The pattern in profitability dynamics of Indian firms in the early years was consistent with a polarised long run profitability distribution. The polarisation tendency was reversed in later years, but the projected long run profitability distribution has a substantial underperforming tail.

Classification codes and keywords: M21, P27, P52. Intensity of Competition; Profitability dynamics; Reversion; Volatility; India; Liberalisation.

1. Introduction

Competition shapes corporate strategies and drives firm performance. Companies protected from competition tend to lag in innovation, efficiency, and in ability to export (Porter 1990).[1] Surveys of firm management across many countries show that product market competition induces firms to improve competitiveness and performance through internal restructuring and investment in better management practices (Bloom and Van Reenen 2007, 2010). Competition also trims the tail of poorly managed firms through market selection, or external restructuring. For these reasons, competition is an avowed economic objective of governments. Assessing the working of the competitive environment is a useful project. This paper reports on such an assessment for India, for the two and a half decades since economic liberalisation began.

The view that competition induces both internal and external restructuring goes back at least to Schumpeter (1943). Firms with their higher rates of return, founded on various sources of competitive advantage, will attract imitators who attempt to target their niches. Thus, the profitability of these firms can be expected to erode over time, to varying extents, depending on the strengths of their competitive defences. At the other end, companies with below-average rates of return face the risks of failure and/or takeover, and for this reason might be motivated to restructure to increase their efficiency and performance. Market selection tends to eliminate underperforming firms and provide footholds for entrants. Exit and entry, and growth and contraction, redirect resources and market shares towards those who utilise them more efficiently. These restructuring processes take time. Even in textbook models, competition does not instantly equalise profitability across firms. The rate at which firms revert to normal profitability, from above- and below-normal levels depends partly on the intensity of competition. In this sense the 'intensity of competition' can be considered an attribute of the market.

The dominant view about the dynamic competitive environment is founded on the precept that each firm can have its own sustainable rate of profitability (Mueller, 1986). This rate will depend on its command over "rare, valuable, difficult to imitate, non-substitutable and non-transferable" resources and capabilities (Barney 1991). The performance premium afforded by such advantages due to knowledge, organisation,

and human capital among others, tend to persist (Rumelt 1984). There is no reason to suppose that firm-specific normal rates of profitability are time-invariant.[2] Firms engage in continuous renewal and reconfiguration to enhance their competitive advantages. Differentials between firms in their dynamic capabilities, and the effectiveness with which they manage shocks from technologies, globalisation, deregulation, etc. can change the trajectories of sustainable profitability in different ways.

At the same time, changes in the sets of technologies, inputs and practices available for firms to choose from, changes in demand they face, and changes in the macro-economic environment, can affect firm performance idiosyncratically. In the firm growth context this has been named Gibrat's legacy (Sutton, 1997). Increased exposure of firms to external events that accompany deregulation and trade-liberalisation can be expected to have increased the variance of the shock process. The shocks from the business environment will continuously jolt realised profitability and generate a transient component to it. The forces of competition work to evaporate this transient element away – the more intense the competition, the greater the rate at which firms approach their normal profitability levels. The focus of the first part of this paper is on measuring the rate of reversion to normal profitability as a diagnostic measure for competition intensity for the post liberalisation period in India.

In the second part, we present a different but complementing analysis of firm profitability dynamics. In many countries, the cross sectional dispersion of corporate performance has increased over time. This is true for firm profitability (Nakano, 2010), and for firm growth rates (Comin and Mulani, 2006). There are obvious reasons why the cross sectional distribution of profitability may vary over time.[3] At a proximate level, the global shape of the cross sectional distribution is driven by patterns in intra-distribution dynamics of firm level profitability – in how firms transit from one part of the profitability distribution to another. If the competitive market works well, it will reallocate resources to rub out extremes in profitability at both ends of the spectrum. If the pattern in intra-distribution dynamics generates a profitability distribution that is polarised, with separated mass points, the implication is that the market mechanism is not reallocating resources efficiently. Standard regression approaches to the study of mean reversion is unable to throw light on tendencies towards polarisation (Quah 1993a,

1993b). In the second part of this paper, we characterise the intra-distribution profitability dynamics of Indian firms, in terms of the polarised (or otherwise) nature of the projected ergodic distributions.

To summarise results, we find that in the period till 1999 - the initial phase of reform, as liberalisation, deregulation and greater integration into the world economy increased competition - there was a significant tendency for firms to revert to their normal profitability, but the intra-distributional profitability movements was such that the projected ergodic distribution was polarised, with mass points at the two extreme ends of the profitability range. In the years that followed, spanning 2000-2015, the tendency for firms to revert to their normal profitability increased substantially, and at the same time the intra-distributional profitability dynamics has been such that the resulting ergodic distributions is no longer polarised.

The paper is organised as follows: In section 2 we review the literature on the behaviour of profitability; section 3 recounts how liberalisation policy evolved; and section 4 describes the data. In section 4 we estimate the rate of reversion to firm specific normal profitability, and in section 5 we project the ergodic profitability distribution that is from the profitability dynamics observed in the early and later phases of liberalisation. Section 6 concludes.

2. Literature Review

Competition in emerging economies has often been conjectured to be less intense, *prima facie*, due to their underdeveloped and segmented product and capital markets, as well as poor infrastructure of market information. However, Hermelo and Vassolo (2010) found evidence for the increasingly intense competition in Latin America. They found that superior economic performance was sustained less and less over the 1990-2006 period, and attributed this to competition-enhancing institutional development. Even earlier, comparative studies (e.g. Glen *et al.* 2001, Yurtoglu 2004) found emerging market business environments to be highly competitive. Jiang and Kattuman (2012) found that WTO related reforms of 2001 represented a significant shift in the competitive environment faced by Chinese firms. Chacar and Vissa (2005) found that while superior firm performance did not persist long in India, poor performance did.

In the industrial economics literature, studies of profitability dynamics and competition intensity have characterised the degree of persistence in corporate rates of return (Mueller 1986, Geroski 1990, Mueller 1990). Mueller (1986) formulated a model for profitability with the additive components: the competitive return on capital; the firm-specific sustainable or normal profitability (which includes the quasi-rent component); and the transient component which can vary quickly due to shocks, internal or external. Competitive forces work upon the transient component so that observed profitability follows a reverting process. Profitability above the normal, attracts and is disciplined by "entry" targeting it. The feedback between entry and above "normal" profitability reduces to a linear auto-regression (Geroski 1990), in which less intense competition is suggested by a high persistence coefficient. The early literature on time series analysis of profitability presented evidence of high persistence in profitability (e.g. Mueller 1977, Geroski and Jacquemin 1988, Mueller 1990, Kambhampati 1995 for India, Goddard and Wilson 1999).[4] Later studies, including Cuaresma and Gschwandtner (2006), Cable and Jackson (2008), and Gschwandtner (2012), find lower persistence, suggesting greater intensity of competition.

There are acknowledged limitations to the traditional time series approach. Time series analysis is generally based on the premise that the dynamics of profitability is in a steady state; that observed values do not stray too far from the limiting distribution of profitability, and the sample moments are representative of population moments (Bernard and Durlauf 1996). Further, time series analysis requires companies to have long earnings histories to gain statistical power, but this induces survivor bias: few companies have over 30 consecutive observations of annual profitability. The longer the time series, more likely is it that the data generating process has changed. The restrictive structure (e.g. AR) that ignores cyclical components is not suitable for the analysis of transitioning economies. The structural time series (STS) approach, which generates time-varying maximum-likelihood estimates with greater weight attached to more recent observations, offers a better solution in cases where the profit dynamics are not in steady state (Cable and Jackson 2008). The primary use of the STS approach has been to examine the long run level component of excess profitability, in particular whether it is significantly different from zero in the final state (Cable and Gschwandtner 2008). It is however a limitation that the estimation method requires long time series.

The panel / cross section approach has advantages. It does not rely on restrictive assumptions about the nature of data generating process. It offers greater power in statistical testing due to larger sample sizes, with reduced survivor bias. The cross sectional model specification is based on the partial adjustment model, and has a long history of application in the study of corporate earnings and profitability (Whittington 1980, Collins and Kothari 1989, Easton and Zmijewski 1989, Ou and Penman 1989, Freeman *et al.* 1982, Elgers and Lo 1994, Fairfield *et al.* 1996, Basu 1997). [5] We follow the more recent version of this approach as used by Fama and French (2000, henceforth FF). For the single cross section, the sample is restricted to firms in the time interval $[t, t+1]$, and the change in profitability $\Delta\pi_{it+1} = (\pi_{it+1} - \pi_{it})$ is regressed on $(\pi_{it} - \widehat{\pi_{it}^*})$, the deviation of profitability from the firm's (estimated) normal profitability in year *t,* and the lagged change in profitability from year *t-1* to *t*. A negative coefficient $(\hat{\beta}_t)$ on the deviation indicates conditional reversion as per the competitive environment hypothesis.

FF run a series of cross sectional regressions, one for each (overlapping) pair of years and base the inference on the time series average of the estimated reversion coefficients $(\bar{\hat{\beta}})$. Recent work by Ibragimov and Müller (2010) clarify the econometric theory that underpins this Fama and MacBeth (1973) method. The validity of estimating the regression separately for each year and testing hypotheses about the reversion coefficient (β) with a t-test for the average over yearly estimates, lies in that, as long as yearly coefficient estimators are approximately normal and independent (over time), the method results in a valid t-test, even for a short panel that is heterogeneous over time. Even when the $\hat{\beta}_t$ have different variances in different years, the t-test is valid for a significance level of five percent or lower. The standard error of $\bar{\hat{\beta}}$ is obtained under the assumption that $\hat{\beta}_t$ are approximately independent of each other.

FF estimated that the average rate of reversion was around 0.40 per annum in the profitability of US firms. The reversion process was found to be non-linear as well as asymmetric - The convergence rate was higher when profitability was below-average, and also when profitability was at an extreme. [6]

3. Liberalisation Policy

The process of deregulation began in India with the industrial policy statements of 1985. The pace of the policy trend accelerated with the New Industrial Policy enunciated in the Industrial Policy Resolution of 1991 whereby industrial licensing was abolished for all except 18 industries. Large companies no longer needed Monopoly & Restrictive Trade Practices (the MRTP) approval for capacity expansions. Tariffs were reduced for a wide range of industries from an (unweighted) average of about 85 percent in 1990 to about 60 percent in 1992; Import licensing was also abolished for capital goods and intermediates which became freely importable in 1993, simultaneously with the switch to a flexible exchange rate regime. Limits on foreign equity holdings were raised from 40 to 51 percent (for industries listed in Annexure III of the Statement of Industrial Policy in 1991) under the "automatic approval route", and from 1993 foreign institutional investors (FIIs) were allowed to invest in the equities within stipulated limits, opening a window for portfolio investment in existing companies; this was accompanied by foreign direct investment policy that actively encouraged investment. Services reforms stepped up in the 1990s across all sectors: See Kambhampati and Parikh (2005); Topalova (2013); and Alfaro and Chari (2009) for discussion.

While the economy grew at an impressive 6.7 percent in the first five years after the reforms, it slowed down to 5.4 percent in the next five years. The economic environment in the mid-1990s was not favourable to industry. The short slowdown in 1996 has been attributed to external instability which soured the external economic environment. Poor implementation of reforms has also been faulted (Ahluwalia 2002). For example, progress in reducing tariff protection slowed down or possibly even reversed after 1996: the average tariff rate increased by more than 10 percentage points from 1996 to 2001.

After this period of stagnation, the reforms picked up again with the removal of quantitative restrictions on imports of manufactured consumer goods and agricultural products in 2001. In February 2002, the government signalled a return to reducing tariff protection. Other reforms in industrial and trade policy followed: the list of industries reserved solely for the public sector was drastically reduced to contain only defence aircrafts and warships, atomic energy generation, and railway transport; 711 items were removed from the reserved list for small-scale industries between 2002 and 2007, compared to 39 items between 1997 and 2001; 100 per cent FDI was permitted in 2005

under the automatic route for most activities except those in a small list, including banks, insurance companies, telecommunications and airlines. Another important move that engendered a more competitive environment for India's industry was the enactment of the Competition Act 2002. The new act, replacing the MRTP Act 1969, aimed to generate fair competition, competition advocacy and awareness regarding competition issues (Bhavani and Bhanumurthy 2007). The implementation of the Competition Act 2002 was entrusted to the Competition Commission of India - an autonomous body.

India was hit hard by the global financial crisis. In addition, a spate of high-profile corruption scandals after 2009 created a sense of caution among civil servants and slowed decision making, resulting in a slackening in the pace of reforms[7]. The corporate climate was further soured by a hawkish interest rate regime with the prime lending rate rising as much as 375 basis points between early 2010 and late 2011[8]. Notwithstanding these challenges, the government managed to carry through limited reforms with the aim of reviving investment and growth. These comprised setting up Cabinet Committee on Investment (CCI) as well as a Project Monitoring Group (PMG) to expedite the diagnosis and resolution of regulatory bottlenecks; a scheme for restructuring the debts of state power distribution companies; movement towards a land acquisition bill that would clarify and make the process of land acquisition fairer; permitting FDI in a number of areas including multi-brand retail, power exchanges, and civil aviation; increasing investment in irrigation, storage and cold storage networks (see Economic Surveys 2011-12 to 2013-14 for details). However, many of the structural reforms, such as the goods and services tax (GST), insurance reforms, and reforms to increase the ease of doing business had to wait till a new government was elected following general elections in 2014.

Consistent with the phases of liberalisation and the global financial crisis, the three periods we study are: 1990-1999 (Phase I); 2000-2007 (Phase II); and the post crisis period 2008-2015 (Phase III).

4. Data and Summary Statistics

Our sample is drawn from the corporate database "Prowess", compiled by the Centre for Monitoring the Indian Economy (CMIE) from company balance sheets and income statements. Prowess includes all public limited companies, both listed and

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unlisted, across all sectors. The coverage accounts for more than 70 percent of industrial output, 75 percent of corporate taxes, and more than 95 percent of excise taxes collected by the Government of India. Prowess contains detailed balance sheet and income statement data for Indian firms and has been used in the analysis of responses of Indian firms to policy changes (Alfaro and Chari 2009, 2014).

We exclude financial and utility sectors and are left with an unbalanced panel consisting of 15,743 firms, yielding 163,612 observations over the years 1990 to 2015[9], equivalent to 6,544 observations per year. Financial data of financial firms is not comparable to financial data of non-financial firms, and utility sector is highly regulated. The companies fall into 140 industrial sectors according to the industry categories at the three-digit level of National Industrial Classification 1998[10].

A visual representation of the evolution of the profitability distribution in India is presented in Figure 1, in terms of the annual cross sectional means and variances over the period from 1990 to 2015. Figure 2A presents selected percentiles of the annual cross sectional distribution of profitability. The plotted lines represent the time series of various percentiles of annual cross sections - not of specific firms; individual firms may move up or down the distribution from one year to the next. The same data is rearranged in Figure 2B in terms of differences between percentiles: the 5th and the 95th; the 10th and the 90th; and so on.

Median profitability declined steadily over time: from 13.7 percent in 1990 to 7.8 percent in 2015. There was a marked and steady rise in the dispersion of profitability through the pre-crisis period. The percentiles distribution suggests the increase in dispersion was particularly pronounced in the late 1990s and early 2000 and seems to be driven by the right (top) tail of the distribution, as the profitability of the best performers soared till the global financial crisis hit. Subsequently, there has been a tempering of profitability at the top end. As seen in Figure 3, the pattern holds true at the disaggregated level for many important individual sectors.
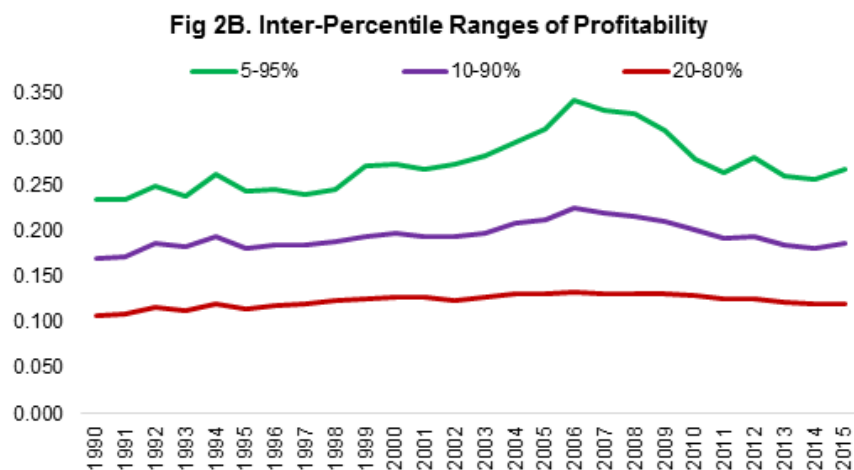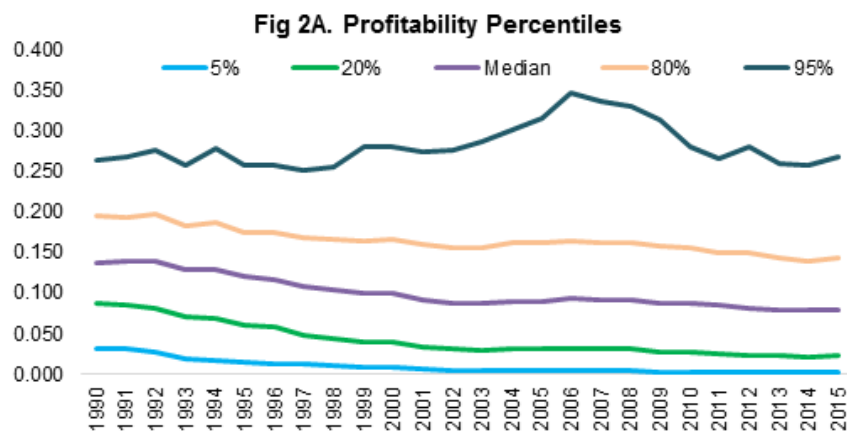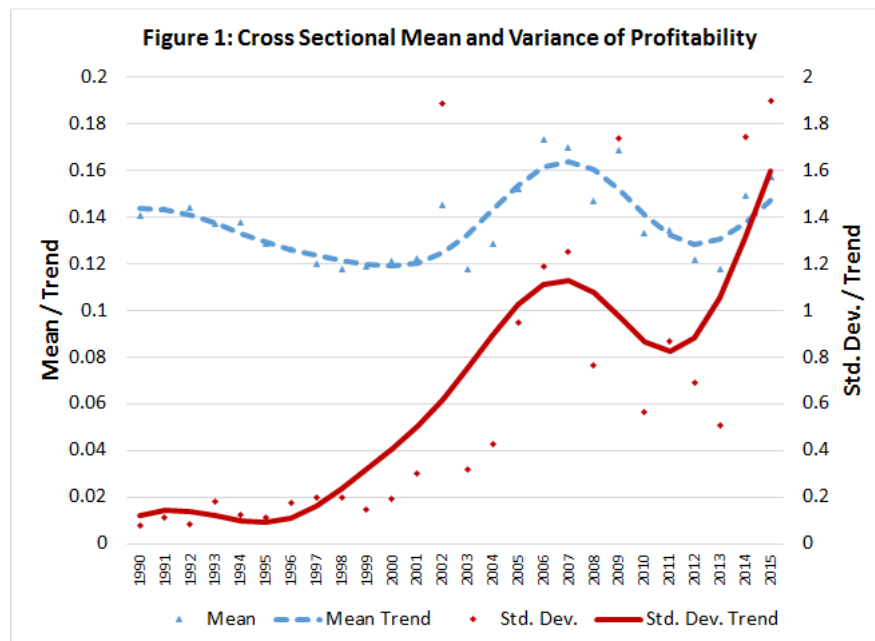
Figure 1: Cross Sectional Mean and Variance of Profitability

Fig 2A. Profitability Percentiles

Fig 2B. Inter-Percentile Ranges of Profitability

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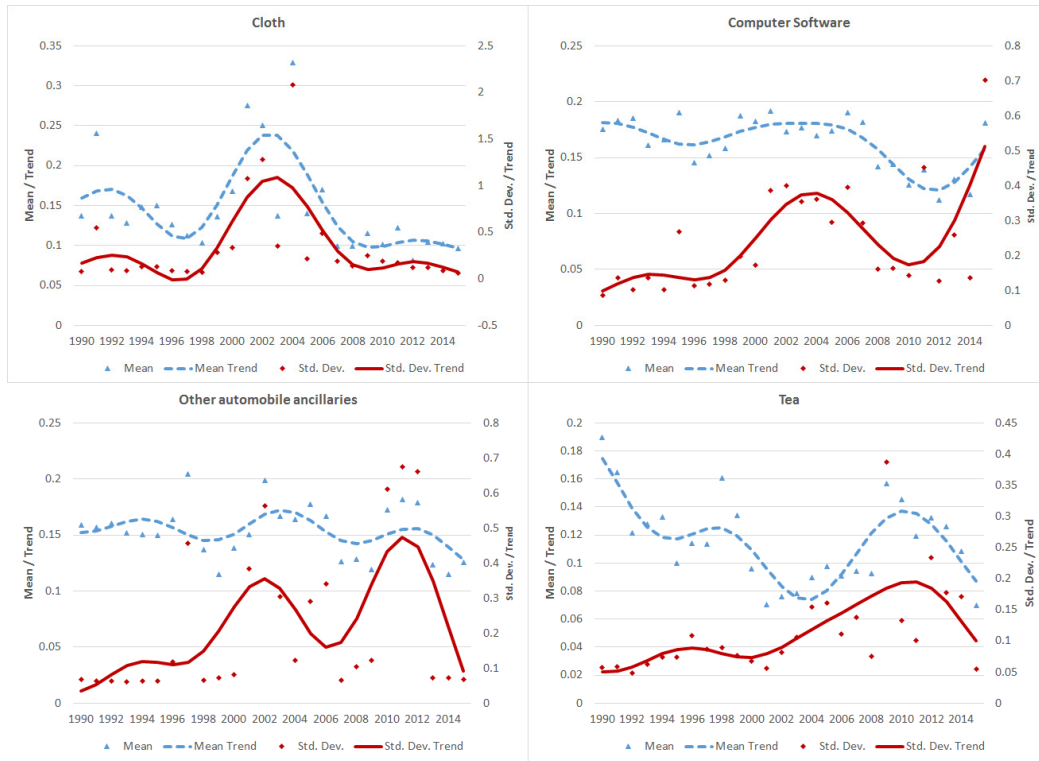**Figure 3: Moments of the Profitability Distribution: Selected Sectors**

Table 1 presents the means and standard deviations of the profitability for the full sample and for the top and bottom quintiles for three periods we study: 1990-1999 (Phase I); 2000-2007 (Phase II); and the post crisis period 2008-2015 (Phase III). The average profitability of the poorest performing 20% of firms drifted closer to zero over the period till 2015, as did the overall mean, but the average profitability of the best performing 20% of firms rose till 2007, before dipping slightly in the final phase. The standard deviation within the top performer group, as well as over the full annual sample, increased (till 2007) and then levelled off.

Table 1
Mean and Dispersion of Profitability (π)

	Mean			Std. Dev.		
	Top Quintile	Bottom Quintile	Full sample	Top Quintile	Bottom Quintile	Full sample
Avg. Phase I (90-99)	0.265	0.028	0.129	0.189	0.016	0.117
Avg. Phase II (00-07)	0.326	0.013	0.123	0.385	0.012	0.204
Avg. Phase III (08-15)	0.310	0.008	0.115	0.367	0.015	0.195

Notes: Outliers ($\pi_{it} > 5$ or $\pi_{it} < -5$) are excluded for the calculation.

5. Mean Reversion in Profitability

5.1. Method

We adopt a variation of the partial adjustment model in order to characterise the degree of reversion to normal profitability. This choice is based on the following considerations:

i)   there are bound to be variations in the degree of reversion over time and therefore the traditional time series approach is not suitable;

ii)   there may be non-linearities in the degree of reversion, i.e., firms far removed from normal profitability may be under greater pressure to revert than those closer to normal profitability;

iii)   there may be asymmetry in reversion, between positive and negative deviations from normal profitability;

iv)   it is helpful to be able to use large samples, and at the same time avoid sample selection bias inherent in limiting attention to long lived firms;

v)   it is helpful to exploit the panel dimension of the data.

The focus in our analysis is on the movement, between one period and the next, in the firm's deviation in profitability from its normal level. Profitability is measured by post-tax return on assets (ROA), in conformity with previous studies and accepted practice. It is well known that ROA does not capture "true" economic returns (Benston 1985, Mueller 1990), but it is informative about management efficiency and resource allocation (Charcar and Vissa 2005).

The first step in our analysis is determining the firm specific "normal" profitability – the value that anchors profitability in its dynamics under competition. The generally accepted view, captured in Mueller's unobserved components model of profitability is that each firm will have its own normal profitability - incorporating the competitive return on capital in the market, and the firm specific (unobservable) quasi rents attributable to its resource base. Variation between one firm and another in normal profitability can be due to enduring resource and capability differences, systematic differences in risk, as well as accounting procedures. The transient component of profitability can be expected to be driven to zero by competitive forces, and also jolted by shocks from the firm specific business environment.

To estimate rate of convergence to normal profitability, we need estimates of firm specific normal profitability for each firm. In other words, from the observed profitability series for each firm, we need to extract the trend component, allowing for time-variation in trend. There are a number of ways of extracting the trend. The structural time series approach has been used most often in the literature (Cable and Jackson 2008; Cable and Gschwendeter 2008) to separate the trend from other short run dynamics including cyclical and autoregressive processes and seasonal and irregular movements. The estimation method does however require long time series. The longest duration firms we have in our sample has observations for 26 years. About 70% of our sample has observations spanning no more than 10 years.

We estimated the trend component using several time-series filters that have been commonly used to separate out the trend from cyclical and irregular components in a time series. The results we report in this paper are for trend component estimated using the Christiano-Fitzgerald (CF) filter (Christiano and Fitzgerald 2003). [11] The CF filter is capable of processing the entire time series, handling short and long durations and is neither symmetric nor time-constant. It suppresses both low and high frequency components in the series and has been found to be a good approximation to the 'ideal' band-pass filter for time series which approximate random walk processes. Corporate profitability can be represented by a random walk process to an approximation (Mueller 1986).[12]

With these estimates of firm and year specific normal profitability (denoted (π_i)), the second step in the analysis involves forecasting profitability change. As mentioned earlier, this was based on the FF version of a partial adjustment model. [13] The change in profitability from year t to $t+1$ is explained by the deviation of profitability from its expected value in year t and the lagged change in profitability from year $t-1$ to t:

$$\pi_{it+1} - \pi_{it} = \Delta\pi_{it+1} = \alpha_{1,t} + \gamma_{1,t}\cdot[\pi_{it} - \mathbb{E}(\pi_i)] + \gamma_{2,t}\cdot(\pi_{it} - \pi_{i,t-1}) + \varepsilon_{it+1} \tag{1}$$

$$\Delta\pi_{it+1} = \alpha_{1,t} + \gamma_{1,t}\cdot DFE_{it} + \gamma_{2,t}\cdot\Delta\pi_{it} + \varepsilon_{i,t+1} \tag{2}$$

where $\mathbb{E}(\pi_{it})$ is the CF trend estimate of normal profitability of firm i at time t; $\Delta\pi_{it} = \pi_{it} - \pi_{i,t-1}$ is the change in profitability from year $t-1$ to t; DFE_{it} ($= \pi_{it} - \mathbb{E}(\pi_i)$) is the deviation of profitability from normal; $\alpha_{1,t}$, $\gamma_{1,t}$ and $\gamma_{2,t}$ are the parameters to be estimated, and in

particular $\gamma_{1,t}$ is the rate of reversion to normal profitability and $\gamma_{2,t}$ measures the first-order autoregressive coefficient for change in profitability; ε_{it+1} is a standard error term.

In this specification, reversion of profitability is restrained to be linear. Brooks and Buckmaster (1976) reveal that reversals in earnings are stronger for extreme changes of either direction, and strongest for extreme negative changes. And these results are confirmed by Elgers and Lo (1994) and more recently by Cuaresma and Gschwandtner (2006). Chacar and Vissa (2005) has reported evidence of asymmetry for India. We modify the simple partial adjustment model to accommodate non-linear behaviour as follows:

$$\Delta\pi_{it+1} = \alpha_{2,t} + \beta_{1,t} \cdot NDFE_{it} + \beta_{2,t} \cdot PDFE_{it} + \beta_{3,t} \cdot SNDFE_{it} + \beta_{4,t} \cdot SPDFE_{it} + \varepsilon_{it+1} \qquad (3)$$

where $NDFE_{it}$ ($PDFE_{it}$) equals to deviation from the mean profitability for firm i at time t (i.e. $DFE_{it} = \pi_{it} - (\pi_i)$) when the deviation is negative (positive), and zero otherwise; $SNDFE_{it}$ ($SPDFE_{it}$) equals to square of deviation from the normal when the deviation is negative (positive), and zero otherwise; the autoregression term ($\Delta\pi_{it}$) are not included in *this* specification due to severe collinearity with the reversion terms above. The coefficients $\beta_{1,t}$ and $\beta_{2,t}$ are designed to capture the asymmetry in reversion, while the coefficients $\beta_{3,t}$ and $\beta_{4,t}$ capture the non-linearity in reversion

When independent variable(s) are correlated with the residual across the cross sectional sample, the coefficient (OLS) is biased due to neglect of cross-sectional residual dependence. The assumption that there is no correlation across companies in changes of profitability apart from what is captured by explanatory variables is clearly untenable when there are shocks at macroeconomic, industry level, and policy shocks that are common to firms. For correct inference, the standard errors need to be adjusted for the cross-section dependence in the residuals. The Fama-Macbeth approach (1973), derived from Zeller's Seemingly Unrelated Regression (1962), proposes that under these circumstances, a solution is running time T cross sectional regressions, and taking the average of the T estimates as the coefficient estimate. [14] Ibragimov and Müller (2010) showed that the FM method results in valid inference even for a short panel that is heterogeneous over time

5.2. Results

Equation 1 and 2 were estimated using two ways of expressing the deviation from normal profitability (one, as a single deviation variable, and second, with the two component variables - observed profitability, and normal profitability - entering separately). The Fama-Macbeth estimates of the degrees of reversion to normal profitability are presented in Table 2. Over the full sample period, the rate at which deviations from normal profitability were reversed was 55%, after controlling for autocorrelation in the change in profitability.

Table 2
Regressions for Reversion in Probability

		α	π_{it}	$\mathbb{E}(\pi_{it})$	DFE_{it}	CP_{it}	R^2	N
Panel A: Reversion in Profitability $(CP_{it} = \pi_{i,t+1} - \pi_{it})$								
Overall	Mean	0.05***	-0.66***	0.19**		-0.21***	0.58	143367
	(SE)	(0.01)	(0.07)	(0.08)		(0.05)		
(1990-2015)	Mean	-0.01***			-0.55***	-0.27***	0.47	143367
	(SE)	(0.00)			(0.09)	(0.06)		
Phase 1	Mean	0.04***	-0.45***	0.12***		-0.23***	0.41	25021
	(SE)	(0.01)	(0.08)	(0.03)		(0.05)		
(1990-1999)	Mean	-0.00***			-0.32***	-0.25***	0.32	25021
	(SE)	(0.00)			(0.07)	(0.05)		
Phase 2	Mean	0.04**	-0.82***	0.41*		-0.24	0.69	50548
	(SE)	(0.01)	(0.15)	(0.21)		(0.14)		
(2000-2007)	Mean	-0.01**			-0.71***	-0.28*	0.62	50548
	(SE)	(0.00)			(0.18)	(0.14)		
Phase 3	Mean	0.07***	-0.74***	0.04		-0.17**	0.66	67798
	(SE)	(0.01)	(0.13)	(0.08)		(0.06)		
(2008-2015)	Mean	-0.02***			-0.66***	-0.15	0.50	67798
	(SE)	(0.00)			(0.16)	(0.10)		
Panel B: Mean and Standard Deviation of the Variables (1990-2015)								
		CP_{it}	π_{it}	$E(\pi_{it})$	DFE_{it}	CP_{it}		
	Mean	.0092	.1355	.1374	.0006	.0092		
	SD	1.9432	.8687	.4564	.7215	1.9432		

Notes: Outliers and leverage points are excluded. Panel A reports the means (across years) of the intercept (α) and coefficients relating to Equation (1) and (2). For each phase, the first two rows show the results where π_{it} and (π_{it}) are treated as separate variables, each having its own coefficient. The next two rows show the results where π_{it} - (π_{it}) is treated as a single variable with one coefficient. Standard errors for these coefficient means (SE), are also reported. Panel A variables are as follows: $CP_{it} = \pi_{it} - \pi_{i,t-1}$ is change in profitability from year t-1 to t; $\mathbb{E}(\pi_{it})$ is the expected value of profitability; $DFE_{it} = \pi_{it} - \mathbb{E}(\pi_{it})$ is the deviation of profitability from its expected value; Panel B reports averages (across years) of the means and standard deviations (SD) of these regression variables.

Considering the three phases, the rate at which profitability reverted to the normal, increased from 32% in phase I, when the "comprehensive" reforms of 1991 were beginning to filter through, though the barriers and monopolies were still in the process of being dismantled. The reversion rate went up to 71% in phase II with the policy processes picking up, and stabilised at 66% in the final post-crisis phase. The fit of the model also improved over the three phases.

Table 3
Regressions for Asymmetry and Nonlinearity in Reversion
Panel A: Asymmetric and Nonlinear Reversion in Profitability, $CP_{i,t+1} = \pi_{i,t+1} - \pi_{it}$

		α	$NDFE_{it}$	$PDFE_{it}$	$SNDFE_{it}$	$SPDFE_{it}$	R^2	N
Overall (1990-2015)	Mean	0.02***	-0.19**	-1.22***	-0.04	-0.06	0.57	167972
	(SE)	(0.00)	(0.07)	(0.07)	(0.06)	(0.06)		
Phase I (1990-1999)	Mean	0.01***	-0.23***	-1.00***	-0.22**	-0.10	0.47	31756
	(SE)	(0.00)	(0.03)	(0.09)	(0.09)	(0.16)		
Phase II (2000-2007)	Mean	0.02***	-0.18*	-1.40***	0.12	-0.00	0.62	61918
	(SE)	(0.00)	(0.09)	(0.10)	(0.13)	(0.02)		
Phase III (2008-2015)	Mean	0.02**	-0.16	-1.31***	-0.01	-0.06	0.63	74298
	(SE)	(0.01)	(0.20)	(0.14)	(0.02)	(0.06)		
Panel B: Mean and Standard Deviation of the Variables (1990-2015)								

	$CP_{i,t+1}$	$NDFE_{it}$	$PDFE_{it}$	$SNDFE_{it}$	$SPDFE_{it}$
Mean	-.0141	-.0292	.0274	.0375	.0573
Std.	.4508	.1916	.2378	1.990	4.519

Notes: Outliers and leverage points are excluded. Panel A reports the means (across years) of the intercept (α) and coefficients relating to Model (3). Standard errors for these coefficient means (SE), are also reported. Panel A variables are as follows: $NDFE_{it}$ ($PDFE_{it}$) equals to deviation from the mean profitability for firm i at time t (i.e. $DFE_{it} = \pi_{it} - (\pi_{it})$ when the deviation is negative (positive), and zero otherwise; $SNDFE_{it}$ ($SPDFE_{it}$) equals to square of deviation from the mean profitability when the deviation is negative (positive), and zero otherwise; Panel B reports averages (across years) of the means and standard deviations (SD) of these regression variables.

Table 3 presents the evidence on asymmetry and nonlinearity in reversion based on Equation (3). The results suggest considerable asymmetry, in that firms with above normal and below normal profitability were characterised by very different reversion behaviours. Over the entire period (1990 – 2015), the mean rate of reversion for firms with above normal profitability was 122%, driving down the normal profitability of firms in this class over time. At the other end, firms with below normal profitability reverted back up only 19%.

Phase I reversion coefficient for firms with below normal profitability was 23%, while above normal firms reverted 100%. In terms of non-linearity in reversion, firms farthest below normal diverged even further – note the significant negative coefficient (-22%) on the square of profitability deviation from normal. There was no significant non-linearity in reversion from the top end.

In phases II and III, the rate of reversion among firms with above normal profitability grew larger, to 140%. The normal profitability levels was driven downwards for this class of firms. At the other end, the rate of reversion for firms with below normal profitability was statistically insignificant. There was no significant non-linearity in the rate of reversion from either end.

5.3. Conclusions on Reversion

Since liberalisation India has seen increasing competitive intensity, which appear to have stabilised in recent years, at an overall rate of reversion averaging at 66%. While these results corroborate previous findings (Goddard and Wilson 1999, Glen *et al.* 2001, 2003, Chacar and Vissa 2005), and support the claim that the intensity of competition in India is higher, and certainly not less, than that observed in advanced economies. Strikingly, competition does not affect all firms the same. We find evidence that supernormal profits are being contested fiercely in India, with greater than 100% rate of reversion from the positive end of deviation from normal profitability. The normal profitability of the most profitable firms have been driven down over the years. But at the other end of the profitability range, there is no evidence of strong reversion. A plausible reason is that even in an environment that is generally more competitive, the relatively fast growth of the economy accommodates poor performers who do not restructure. The findings are notably different from the results for China (Jiang and Kattuman 2010), where there was no evidence of asymmetry or non-linearity in reversion to firm-specific expected profitability from either end of the profitability spectrum, and call for more research.

6. Intra-distribution dynamics and the global shape of the ergodic distribution

The changes in the global shape of the cross-sectional distribution of profitability is the result of patterns in the intra-distributional movement of firms. We turn to a characterisation of the patterns in intra-distribution dynamics and what it portends for the global shape of the profitability distribution in the long run.

As background, we note that mean profitability fell from the initial high levels characteristic of a sheltered economy. This is followed by a phase of rising average profitability as well as profitability variance, which was interrupted by the global financial crisis (Figure 1). Both the mean and dispersion fell in the post-crisis period but appear to have resumed their upward trends. However, the mean and standard deviation are not robust to outliers, and so it is useful to note the patterns in the profitability percentiles (Figure 2). These reveal that a steady rise in the dispersion of profitability through the 1990s and early 2000s and the subsequent fall in dispersion

from about 2007, was chiefly on account of the movement at the high profitability end (95th percentile).

6.1. **Intra-distributional Mobility**

We use non-parametric estimates of Markov transition matrices to characterise intra-distributional movements in firm level profitability. These methods originated in the analysis of cross-section dynamics in economic growth (Quah 1993a, 1993b), and have been applied in the study of financial ratios in Europe (Konings and Roodhooft 1997).

Transition matrices for profitability dynamics map the cross sectional distribution of profitability at one point in time into the distribution at another point in time. In a transition matrix, the states are defined by the quintiles of the sample: state 1 in the transition matrix always contains the bottom 20% of the distribution, and state 5 always contains the top 20%, etc. The transition probabilities among the five states are the proportion of firms that stay at the same state or move to the other state from one year to the next. These are collected in the transition probability matrices presented in Table 4.

Table 4
Fractile Transition Matrices of Probability

	Quintiles	1	2	3	4	5
	1	**0.56**	0.23	0.09	0.05	0.07
Overall	2	0.20	**0.41**	0.22	0.10	0.07
(1990-	3	0.08	0.20	**0.40**	0.23	0.09
2015)	4	0.04	0.09	0.23	**0.43**	0.21
	5	0.05	0.07	0.10	0.22	**0.56**
	Quintiles	1	2	3	4	5
	1	**0.52**	0.25	0.09	0.07	0.08
Phase I	2	0.19	**0.39**	0.24	0.11	0.07
(1990-	3	0.09	0.21	**0.37**	0.23	0.10
1999)	4	0.05	0.10	0.23	**0.40**	0.23
	5	0.05	0.07	0.10	0.24	**0.54**
	Quintiles	1	2	3	4	5
	1	**0.57**	0.22	0.08	0.05	0.08
	2	0.21	**0.42**	0.20	0.09	0.08

		1	2	3	4	5
Phase II (2000-2007)	3	0.08	0.20	**0.41**	0.22	0.10
	4	0.04	0.08	0.23	**0.44**	0.20
	5	0.06	0.07	0.09	0.22	**0.55**
Quintiles		1	2	3	4	5
	1	**0.62**	0.21	0.07	0.04	0.06
Phase III (2008-2015)	2	0.20	**0.44**	0.21	0.08	0.07
	3	0.07	0.20	**0.42**	0.23	0.08
	4	0.04	0.09	0.22	**0.45**	0.20
	5	0.05	0.07	0.09	0.20	**0.58**

In Table 4, the entries on the main diagonal represent the probability of staying in the same state. Obviously firms in the bottom and top states are limited in the direction of mobility. Given this, note that firms were increasingly likely over time to remain in the bottom 20% of the profitability distribution (state 1) than in the top 20% (state 5) – this is consistent with our results on reversion, and with Chacar and Vissa's (2005) findings. Firms in state 3 (the middle 20%) are most likely to move to another state; their chances of upward and downward transition are nearly the same. Firms in the three intermediate states are more likely to move out than stay; their likelihood of moving to their neighbouring states (one state up or down) is above 40%. We characterise the long run, as projected from these observed short run dynamics of profitability.

6.2. Ergodic Distributions

Let F_t denote the distribution of profitability across firms at time t, and let the markovian evolution of F_t be described by the 'law of motion': $F_{t+1} = M \cdot F_t$, where the operator M records where the points in F_t end up in F_{t+1}. The transition matrix M reveals the dynamics of firms at various levels of profitability. The simple first-order transition above can be generalised and provides an informative way to understand the dynamics in F_t (Quah 1993b, Konings and Roodhooft 1997). Distinctive patterns of behaviour such as convergence or divergence in the global shape of the distribution are implied by characteristics of M. Iterating the first order process yields a "forecast" for future cross-sectional distribution: $F_{t+s} = (M \cdot M \cdot ... M) \times F_t = M^s \cdot F_t$. When s approaches infinity, the result is the long-run (ergodic) distribution of profitability.

To estimate *M*, we remove common shocks by normalising (subtracting) observed profitability with the annual cross sectional mean. This controls for co-movement in profitability. The range of normalised profitability is discretised into the five equal-sized (in number of firms) states at each starting period. Thus starting with a uniform distribution across the five profitability states at the starting period, the distribution is allowed to evolve over time across these states[15]. *M* is represented by a 5×5 transition probability matrix whose (*j, k*) entry is the probability that firms in state *j* will transit to state *k* in the next period, computed by the relative rate: $m_{jk} = n_{jk}/n_j$, where n_{jk} describes the number of firms that transit from state *j* at time *t* to state *k* at time *t+1*, and n_j stands for the number of firms in state *j* at time *t*.

Taking into account the unbalanced nature of the panel data available, we repeat this procedure for all different starting points (i.e. 1989, 1990, 1991, …) to arrive at multiple estimates of the operator *M*. For each starting point, we produce a set of transition matrices corresponding to year-by-year transitions. We then take the average of these transition matrices as the estimate of *M*. Figure 4 presents the ergodic distributions that result from the above analysis. For the overall sample period and each phase, the transition matrix is the average of all the year-by-year transition matrices till the end period.

It is revealing that in Phase I, the short run intra-distribution profitability dynamics was such that the resulting projected long run distribution was a polarised one with two mass points, one at the bottom (negative) end. In Phases II and III, this tendency reversed and the ergodic distributions are close to uniform. In Phase II, which ended in 2007, the larger proportion of firms are at the higher end of profitability. In the post-crisis Phase III, the central tendency of the ergodic distribution has shifted to lower profitability. The summary conclusion is that though the polarisation tendency has been reversed, there remains a substantial underperforming tail in the ergodic profitability distribution.

Figure 4: Ergodic Distribution of the Average Transition Matrices for Profitability

Ergodic Distribution

Legend: Overall, Phase I (1990-1999), Phase II (2000-2007), Phase III (2008-2015)
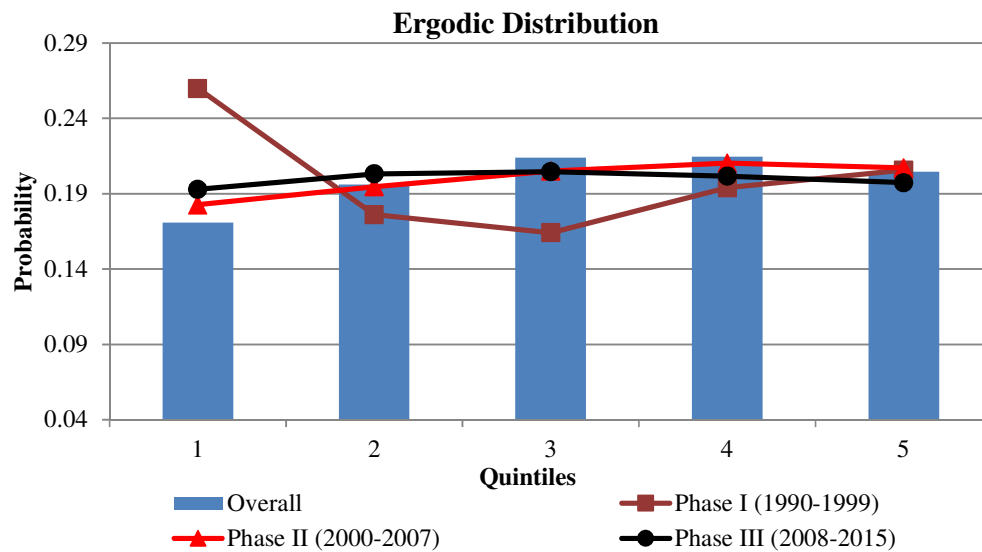
7. Conclusions

In emerging economies, competition is considered less intense due to underdeveloped and segmented product and capital markets, and weaknesses in market related institutions. In India, over the course of four decades, the licensing and permits system had fostered business units that were small relative to internationally efficient scales. At the time of policy changes, Indian industry was characterised by sub-scale activity. In addition, restrictions and the tortuous processes for gaining approval for technology transfer had also left Indian firms with relatively out of date technologies.

The defining element of the change in 1991 was the relaxation of constraints. It is not surprising that the simultaneous dismantling of tariff barriers and the removal of the cushion of the licensing regime, initially brought downward pressure to bear on the profitability of most firms. Effective firm level response to greater competition, in terms of improving efficiency through scaling up, or in terms of reducing costs, was not initially within reach for many firms. Most firms were harnessed with the legacy of the past investment decisions. Further, poor infrastructure, limited their expansion opportunities, and unchanged labour laws continued to hamper internal restructuring. Many firms could do little to resist the downward pressure on profitability. The ergodic profitability distribution projected from the intra-distributional dynamics in the initial phase up to 1999 suggest that the larger of the two mass points in the distribution would

be at the bottom end of profitability. This can be seen as caused by the sharp increase in competition confronting firms who were unable to free themselves immediately from the legacy of restrictions and inefficiencies of the past.

At the same time, there were firms that were better placed to respond to opportunities. Some industries (for example, polyester, oil refining) offered more opportunities for restructuring. The firms that were quicker to learn to cope with the new environment could both expand in scale and take advantage of the opportunities for transfer of technology and know-how, thanks to the relaxation of foreign investment, collaboration and importation of capital goods. In short order, new entrants emerged, and external restructuring accompanied internal restructuring. As firms learnt to cope with new environment, the more usual dynamics of competition came into play. Improvements in physical infrastructure have been gradual, but increasing access to markets and suppliers, increased mobility of labour, and freer FDI, all combined to increase competitive intensity.

Concomitantly the average rate at which firms reverted to "normal" profitability increased substantially between phase I (1989-1999) and phases II and III (2000-2015). However, strikingly, all the reversion has been from the above normal profitability end; reversion from the below normal end has been insignificant. This goes against the claim that competition induces firms to restructure and improve performance across the spectrum. It is reasonable to conjecture that the significantly higher growth rate of the economy over the period, abated the competitive (domestic) pressure on poor performing firms to some extent, even as liberalisation increased international competitive pressure on firms at the supernormal profitability end. This hypothesis is to be examined in detail in future work.

In terms of the evolution of the global shape of the profitability distribution, the intra-distributional profitability movements in phases II and III project long run distributions where the polarisation tendency of phase I is reversed. The ergodic distributions are close to uniform, suggesting a long underperforming tail in the ergodic distribution of profitability.

In summary, in the first flush of liberalisation the sharply increased competition intensity, coupled with the limited ability of Indian firms to cope, and appear to have

worked towards hollowing out the middle ranges of profitability. After the initial phase, competition continued to increase in intensity, but only for firms earning supernormal profits. Inducing underperforming firms at the opposite end to improve in competitiveness and performance remains an important policy concern for India.

References

Ahluwalia, Montek S. 2002. "Economic Reforms in India since 1991: Has Gradualism Worked?" *Journal of Economic Perspectives* 16 (3): 67-88.

Alfaro, Laura, and Anusha Chari. 2009. "*India transformed? Insights from the firm level 1988-2005.*" NBER Working Papers 15448, Cambridge, MA: National Bureau of Economic Research, Inc. doi: 10.3386/w15448.

Alfaro, Laura, and Anusha Chari. 2014. "Deregulation, Misallocation, and Size: Evidence from India." *Journal of Law and Economics* 57(4): 897-936.

Allen, David E., and Heazry M. Salim. 2005. "Forecasting profitability and earnings: a study of the UK market (1982-2000)." *Applied Economics* 37(17): 2009-2018.

Anand, Rahul, and Volodymyr Tulin. 2014. "*Disentangling India's Investment Slowdown.*" IMF Working Paper No. 14/47. Available at SSRN: http://ssrn.com/abstract=2423263

Bakirov, Nail K., and Gabor J. Sźekely. 2006. "Student's t-test for gaussian scale mixtures." *Journal of Mathematical Sciences* 139 (3): 6497-6505.

Ball, Ray, and Ross L. Watts. 1972. "Some time-series properties of accounting income." *Journal of Finance* 27 (3): 663-682.

Barney, Jay B. 1991. "Firm resources and sustained competitive advantage." *Journal of Management* 17 (1): 99-120.

Barro, Robert J. 1991. "Economic growth in a cross-section of countries." *Quarterly Journal of Economics Letters* 106 (2): 407-443.

Barro, Robert J., and Xavier Sala-i-Martin. 1991. "Convergence across states and regions." *Brookings Papers on Economic Activity* 1991 (1): 107-182.

Barro, Robert J., and Xavier Sala-i-Martin. 1992. "Convergence." *Journal of Political Economy* 100 (2): 223-251.

Basu, Sudipta. 1997. "The conservatism principle and the asymmetric timeliness of earnings." *Journal of Accounting and Economics* 24 (1): 3-37.

Baumol, William J. 1986. "Productivity growth, convergence, and welfare." *American Economic Review* 76 (5): 1072-1085.

Beaver, William H. 1970. "The time series behavior of earnings." *Journal of Accounting Research* 8 (Empirical Research in Accounting: Selected Studies): 62-99.

Benston, George J. 1985. "The self-serving management hypothesis: Some evidence." *Journal of Accounting and Economics* 7 (1-3): 67-84.

Bernard, Andrew B., and Steven N. Durlauf. 1996. "Interpreting tests of the convergence hypothesis." *Journal of Econometrics* 71 (1-2): 161-173.

Bhavani, Adi T., and N.R. Bhanumurthy. 2007. "*The State of Competition in the Indian Manufacturing Sector*." Research project of the Competition Commission of India No.15. New Delhi: Institute of Economic Growth (IEG). http://www.cci.gov.in/sites/default/files/4indian_manu_20080508111330%20(1).pdf

Bloom, Nicholas, and John V. Reenen. 2007. "Measuring and Explaining Management Practices across Firms and Countries." *The Quarterly Journal of Economics* 122 (4): 1351-1408. doi: 10.1162/qjec.2007.122.4.1351.

Bloom, Nicholas, and John V. Reenen. 2010. "Why Do Management Practices Differ across Firms and Countries?" *Journal of Economic Perspectives* 24 (1): 203-224.

Brooks, LeRoy D., and Dale A. Buckmaster. 1976. "Further evidence of the time series properties of accounting income." *Journal of Finance* 31 (December): 1359-1373.

Cable, John R., and Adelina Gschwandtner. 2008. "On Modelling the Persistence of Profits in the Long Run: A Test of the Standard Model for 156 US Companies, 1950–99." *International Journal of the Economics of Business* 15 (2): 245–263.

Cable, John R., and Richard H.G. Jackson. 2008. "The persistence of profits in the long run: A new approach." *International Journal of the Economics of Business* 15 (2): 229 - 244.

Comin Diego, and Sunil Mulani. 2006. "Diverging Trends in Aggregate and Firm Volatility." *The Review of Economics and Statistics* 88 (2): 374-383.

Chacar, Aya, and Balagopal Vissa. 2005. "Are emerging economies less efficient? Performance persistence and the impact of business group affiliation." *Strategic Management Journal* 26 (10): 933-946.

Christiano, Lawrence J., and Terry J. Fitzgerald. 2003. "The band pass filter." *International Economic Review* 44 (2): 435–465.

Collins, Daniel W., and S.P. Kothari. 1989. "An analysis of intertemporal and cross-sectional determinants of earnings response coefficients." *Journal of Accounting and Economics* 11 (2-3): 143-181.

Cuaresma, Jesus C., and Adelina Gschwandtner. 2006. "The competitive environment hypothesis revisited: Non-linearity, nonstationarity and profit persistence." *Applied Economics* 38 (4): 465-472.

Easton, Peter D., and Mark E. Zmijewski. 1989. "Cross-sectional variation in the stock market response to accounting earnings announcements." *Journal of Accounting and Economics* 11(2-3): 117-141.

Elgers, Pieter T., and May H. Lo. 1994. "Reductions in analysts' annual earnings forecast errors using information in prior earnings and security returns." *Journal of Accounting Research* 32 (2): 290-303.

Fairfield, Patricia M., Richard J. Sweeney, and Teri L. Yohn. 1996. "Accounting classification and the predictive content of earnings." *Accounting Review* 71 (3): 337-355.

Fama, Eugene F., and Kenneth R. French. 2000. "Forecasting profitability and earnings." *The Journal of Business* 73 (2): 161-175.

Fama, Eugene F., and James D. Macbeth. 1973. "Risk, return and equilibrium: Empirical tests." *Journal of Political Economy* 81 (3): 607-636.

Freeman, Robert N., James A. Ohlson, and Stephen H. Penman. 1982. "Book rate-of-return and prediction of earnings changes: An empirical investigation." *Journal of Accounting Research* 20 (2): 639-653.

Geroski, Paul A. 1990. "Modelling persistent profitability." Chap. 2 In *The dynamics of company profits: An international comparison*, edited by Dennis Cary Mueller, 15-34. Cambridge, U.K.: Cambridge University Press.

Geroski, Paul A., and Alexis Jacquemin. 1988. "The persistence of profits: A European comparison." *Economic Journal* 98 (391): 375-389.

Ghemawat, Pankaj, and Tarun Khanna. 1998. "The nature of diversified business groups: A research design and two case studies." *Journal of Industrial Economics* 46 (1): 35-62.

Glen, Jack, Kevin Lee, and Ajit Singh. 2001. "Persistence of profitability and competition in emerging markets." *Economics Letters* 72 (2): 247-253.

Glen, Jack, Kevin Lee, and Ajit Singh. 2003. "Corporate profitability and the dynamics of competition in emerging markets: A time series analysis." *The Economic Journal* 113 (491): 465-484.

Goddard, John A., and John O.S. Wilson. 1999. "The persistence of profit: A new empirical interpretation." *International Journal of Industrial Organisation* 17 (5): 662-687.

Gschwandtner, Adelina, 2012. "Evolution of profit persistence in the US: Evidence from three periods." *The Manchester School* 80 (2): 172–209. doi: 10.1111/j.1467-9957.2011.02277.

Häggström, Olle, 2002. *Finite markov chains and algorithmic applications*. Cambridge, U.K.: Cambridge University Press.

Hermelo, Francisco D., and Roberto Vassolo. 2010. "Institutional development and hypercompetition in emerging economies." *Strategic Management Journal* 31 (13): 1457–1473.

Hoopes, David G., Tammy L. Madsen, and Gordon Walker. 2003. "Guest editors' introduction to the special issue: Why is there a resource-based view? Toward a theory of competitive heterogeneity." *Strategic Management Journal* 24 (10): 889-902.

Ibragimov, Rustam, and Ulrich K. Müller. 2010. "t-Statistic Based Correlation and Heterogeneity Robust Inference." *Journal of Business & Economic Statistics* 28 (4): 453-468. doi: 10.1198/jbes.2009.08046.

Jiang, Neng, and Paul A. Kattuman. 2010. "Intensity of competition in China: Profitability dynamics of Chinese listed companies." *Asia-Pacific Business Review* 16 (3): 461-481.

Jiang, Neng, and Paul A. Kattuman. 2012. "China's WTO Accession and Long-Term Profitability of Chinese Firms." *International Journal of the Economics of Business* 19 (1): 53-73.

Kambhampati, Uma S. 1995. "The persistence of profit differentials in Indian industry." *Applied Economics* 27 (4): 353-361.

Kambhampati, Uma S., and Ashok Parikh. 2005. "Has liberalization affected profit margins in Indian industry?" *Bulletin of Economic Research* 57 (3): 273-304.

Knack, Stephen, and Philip Keefer. 1997. "Does social capital have an economic pay-off: A cross-country investigation." *Quarterly Journal of Economics* 112 (4): 1251-1288.

Konings, Jozef, and Filip Roodhoof. 1997. "Financial ratio cross-section dynamics: A non-parametric approach." *Journal of Business Finance and Accounting* 24 (9/10): 1331-1342.

Little, Ian M.D. 1962. "Higgledy piggledy growth." *Oxford Bulletin of Statistics* 24 (4): 387-412.

Little, Ian M.D., and Anthony C. Rayner. 1966. *Higgledy piggledy growth again: An investigation of the predictability of company earnings and dividends in the UK*. Oxford: Basil Blackwell.

Lookabill, Larry L. 1976. "Some additional evidence on the time series properties of accounting earnings." *The Accounting Review* 51 (4): 724-738.

Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. "A contribution to the empirics of economic growth." *The Quarterly Journal of Economics* 107 (2): 407-437.

Maskus, Keith E., and Mohamed Lahouel. 2000. "Competition policy and intellectual property rights in developing countries." *World Economy* 23 (4): 595-611.

Ministry of Finance, Government of India, 2013, 2014 and 2015. "*Economic Survey*."
http://indiabudget.nic.in/budget2012-2013/survey.asp
http://indiabudget.nic.in/budget2013-2014/survey.asp
http://indiabudget.nic.in/budget2014-2015/survey.asp

Mueller, Dennis C. 1977. "The persistence of profits above the norm." *Economica* 44 (176): 369-380.

Mueller, Dennis C. 1986. "*Profits in the long run*." Cambridge, U.K.: Cambridge University Press.

Mueller, Dennis C., ed. 1990. *The dynamics of company profits: An international comparison*. Cambridge, U.K.: Cambridge University Press.

Nakano, Makoto, and Yasuharu Aoki. 2010. "What Explains Widening Profitability Dispersion around the World?" *Hitotsubashi Journal of Commerce and Management* 50 (1):23-46.

Ou, Jane A., and Stephen H. Penman. 1989. "Accounting measurement, price-earnings ratio, and the information content of security prices." *Journal of Accounting Research* 27 (Current Studies on the Information Content of Accounting Earnings): 111-144.

Oulton, Nicholas. 1998. "Compitition and the dispersion of labour productivity amongst UK companies." *Oxford Economic Papers* 50 (1): 23-38.

Peteraf, Margaret A. 1993. "The cornerstones of competitive advantage: A resource-based view." *Strategic Management Journal* 14 (3): 179-191.

Porter, Michael E. 1990. *The Competitive Advantage of Nations*. New York: Free Press.

Quah, Danny. 1993a. "Empirical cross-section dynamics in economic growth." *European Economic Review* 37(2-3): 426-434.

Quah, Danny. 1993b. "Galton's fallacy and tests of the convergence hypothesis." *Scandinavian Journal of Economics* 94 (4): 427-443.

Reserve Bank of India. 2013. "*Real Interest Rate Impact on Investment and Growth – What the Empirical Evidence for India Suggests?*" An inter-departmental study of RBI.

https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/IDGSR08082013.pdf

Rumelt, Richard P. 1984. "Toward a strategic theory of the firm." In *Competitive strategic management*, edited by Robert Boyden Lamb, Englewood Cliffs, NJ: Prentice-Hall.

Schumpeter, Joseph A. 1943. *Capitalism, socialism and democracy*. London: Allen and Unwin.

Sutton, John. 1997. "Gibrat's Legacy." *Journal of Economic Literature* 35 (1): 40-59.

Topalova, Petia. 2013. "Trade liberalization, poverty and inequality: Evidence from indian districts." In *Globalization and Poverty*, edited by Ann Harrison, University of Chicago Press.

doi: http://dx.doi.org/10.7208/chicago/9780226318004.003.0008

Tybout, James. 2000. Manufacturing firms in developing countries: How well do they do, and why? *Journal of Economic Literature,* 38 (1), 11-44.

Whittington, Geoffrey. 1980. "The profitability and size of United Kingdom companies: 1960-74." *The Journal of Industrial Economics* 28 (4): 335-352.

Zaheer, Srilata, and Akbar Zaheer. 1997. "Country effects on information seeking in global electronic networks." *Journal of International Business Studies* 28 (1): 77-101.

[1] Syverson (2004) shows that average productivity is higher and productivity differences across firms smaller in the more competitive local markets (proxied by the density of spatial clustering) in the concrete industry.

[2] Competitive market environments can subject firms to shocks in demand, supply, technology, credit, information and institutions. When shocks occur more extensively and frequently, competitive advantages are less readily sustainable (Bettis and Hitt, 1995; Brown and Eisenhardt, 1998; D'Aveni, 1994, 1995; Hamel, 2000; Slywotzky, 1996). Ruefli and Wiggins (2003) hypothesised a shift towards less persistent competitive advantage under intense competition, such that superior performers sustain their performances for shorter durations (Wiggins and Ruefli, 2005). Thomas and D'Aveni (2009) found that the volatility in performance had increased over time.

[3] As stated, firm-level normal profitability, which includes a quasi-rent component, may vary slowly over time, differently for different firms. Thus normal profitability levels of firms may diverge or converge over time. Further, the incidence of shocks that impact the firm from its business environment and generate transient departures from normal profitability may change over time. If the variance of the shock process changes over time, the cross sectional distribution of profitability will also change. Finally, the intensity of competition in the market – which generate reversion towards normal profitability - may also vary over time. The firm growth literature reports that younger firms, smaller firms, firms in some industries have more variable profitability. It is possible that these categories of firms have more variable long run profitability levels, are affected more by business environment shocks, and at the same time revert faster to their long run profitability levels when subjected to competition. Thus varying proportions of younger firms, smaller firms, and firms in specific industries, can lead to variation in the cross sectional distribution of profitability.

[4] In finance, early time series research on profitability worked with the null hypothesis of random walk (Little 1962, Little and Rayner 1966, Ball and Watts 1972). Different forms of predictability incorporated - moving average models with an underlying pure mean reverting process (Beaver 1970), sub-martingale or similar processes (Lookabill 1976), and trend models with non-linear reversion conditioned on book rate of return (Brooks and Buckmaster 1976, Freeman *et al.* 1982).

[5] The empirical growth model analogies for the cross section / panel approach are the Barro regressions, where convergence is characterised using regressions of changes on initial levels (Barro 1991, Barro *et al.* 1991, Barro and Sala-i-Martin 1992, Mankiw *et al.* 1992). A negative coefficient on initial levels is taken to indicate convergence.

[6] Allen and Salim (2005) replicated FF's work on a sample of 987 UK listed companies from year 1982 to 2000. They observed similar results with the average rate of reversion around 0.25 per annum, but without significant non-linearity in either reversion of profitability or autocorrelation of changes in earnings.

[7] So widely accepted was this administrative stupor that it found mention in the Economic Survey 2011-12, published by the Ministry of Finance, Government of India in 2012.

[8] However, it must be noted that due to high inflation during much of the late 2000s, real interest rates remained low throughout this period. See Anand and Tulin (2014) and RBI (2013) for a nice discussion on this.

[9] In the regressions reported in Section 4.2, observations with studentised residuals greater than 1.96 in absolute value were excluded. Observations with leverage (the diagonal elements of the projection hat matrix) greater than $3(k + 1)/N$, where k is the number of predictor terms and N is the sample size, were also excluded.

[10] This industry classification system used in India shares the principles of the Standard Industrial Classification (SIC).

[11] A variety of partial adjustment models have been used in the study of corporate earnings and profitability (Whittington 1980, Freeman *et al.* 1982, Elgers and Lo 1994), and also in research into economic growth (Barro 1991), personal income growth (Barro *et al.* 1991, 1992) and productivity (Baumol 1986, Oulton 1998).

[12] Among the firms in our sample, 85% had no significant monotonic trend in observed profitability, 15% did.

[13] Among the firms in our sample, 85% had no significant monotonic trend in observed profitability, 15% did.

[14] $\widehat{\beta_{FM}} = \sum_{t=1}^{T} \frac{\widehat{\beta_t}}{T} = \beta + \frac{1}{T}\sum_{t=1}^{T}(\frac{\sum_{i=1}^{N} X_{it}\varepsilon_{it}}{\sum_{i=1}^{N} X_{it}^2})$. The estimated variance of the Fama-MacBeth estimate is: $S^2(\widehat{\beta_{FM}}) = \frac{1}{T}\sum_{t=1}^{T}\frac{(\widehat{\beta_t}-\widehat{\beta_{FM}})^2}{T-1}$. The assumption is that the yearly estimates of the

coefficient are independent of each other. Firm effects may lead to time dependence in the residuals, in which case the Fama-MacBeth standard error estimate is smaller than it should be.

[15] Sensitivity analysis has been conducted with different assumptions on initial distribution, number of states, and higher order of transitions, but they do not change the important features of dynamics.