2nd Year Research Paper Working Draft 1

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August 15, 2020

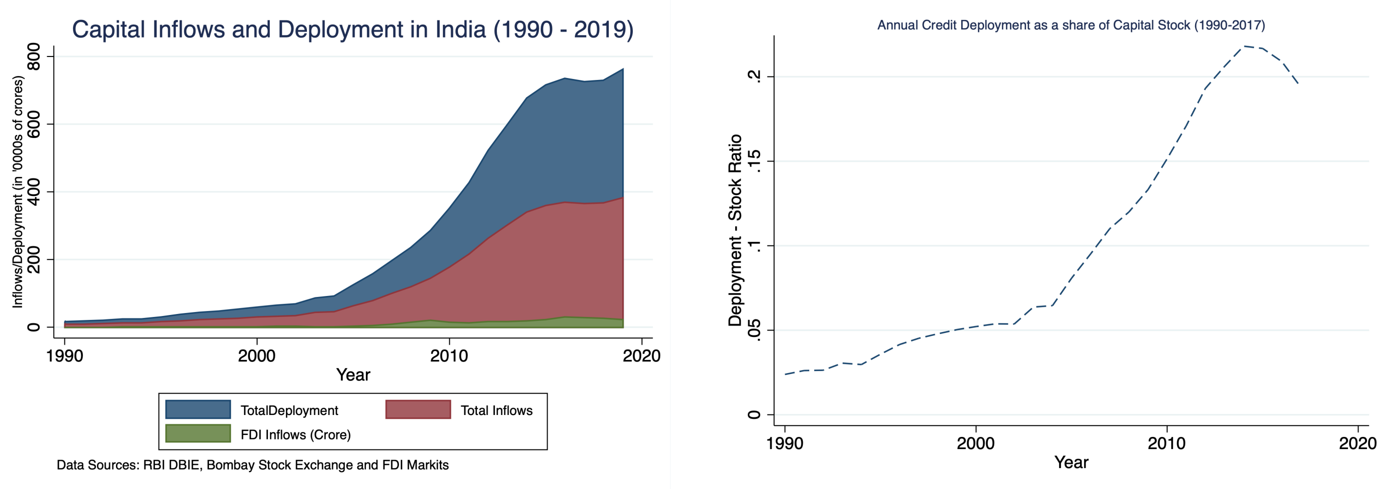
India has not only been one of the fastest growing economies in the world in the past two decades, but has also been a major growth engine for the world economy through a series of crises and prolonged business cycle fluctuations. During this period, India has also graduated to becoming one of the biggest economies, emerging market and otherwise, and has been touted as one of the "vibrant spots" in the faltering global economy since the onset of the 2007-08 Financial Crisis, accounting for almost 15 per-cent of the global growth as recently as 2018.

One of the principal sources for this transformation of India's economic story has been a massive policy transformation, pushing towards integrating growth with trade and increased economic liberalization, as an exit strategy from its Balance of Payments crisis in 1991. The 1980s and 1990s marked a period of widespread economic reforms consisting of industrial de-licensing, along with trade and investment liberalization in 1991[1].

While a lot of India's recent growth has been at the convergence of manufacturing and services, with liberalization of India's markets and industries, th economy has also witnessed a rise in foreign capital complimenting the role played by domestic capital as a source of economic growth. Since India's original push towards liberalization, it has steadily risen to become of the most prominent destinations of FDI investments across the globe, and the stock markets in India have also experienced growing turnovers in the volumes of FPIs that have been entering the Indian economy not just due to the financial liberalization in the country but also because of global investors wanting to take a share in India's growth story.

While there has been a rising clamour to attract greater volumes of capital flows into the economy so as to leverage India's generally phenomenal growth rates, the Indian economy has not been isolated from the declining global growth slowdown, showing signs of faltering notably over the past couple of years. India's organized manufacturing sector output experienced high rates of growth between 2003 and 2009, with an average growth rate of around 15% largely made possible by rising private investments and exports. This phase however began to come to a halt with the onset of the Financial crisis in 2008. India's export growth plummeted drastically and never gained momentum due to sporadic episodes of slowdown in different parts of the global economy. Domestic economic growth also plummeted due to a

[1] While the twin process of de-licensing and deregulation began much in the 80s, the structural adjustment policy of the IMF became a turning point in the pace and scale of these policy changes across the economy in ushering in trade and investment liberalization in the '90s onwards



(a) Composition of total credit to Indian firms

(b) Credit Deployed as a share of Capital Stock

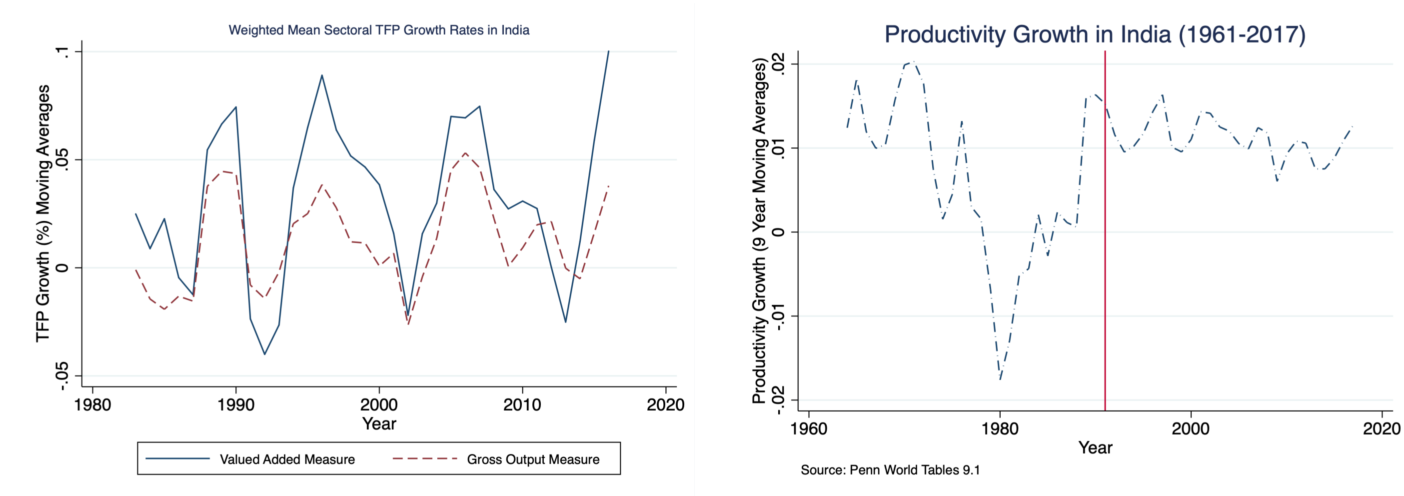
Figure 1

rise in unemployment among a number of other institutional reasons. All of this resulted in the decline of output, employment and productivity in India's manufacturing sectors for almost the entirety of the last decade, since 2009-10.

Notwithstanding these developments over the past decade, India's overall impressive growth record has prompted a number of papers to shed light on the sources of rapid increase output among developing economies (for example Bosworth and Collins, 2008). One natural question in this regard has been as to whether the observed growth in such emerging markets are driven by their ability to infuse larger amounts of inputs into the production process or their ability to enhance the efficiency in using their inputs (reflecting in a higher Total Factor Productivity), or a combination of both. A number of papers have looked at the role of distortion in the allocation of factors of production across industries, firms and sectors to explain sources of potentially lower output (Restuccia and Rogerson, 2007; Hsieh and Klenow, 2009). In explaining the role of TFP in the growth of emerging market economies, these papers open up a key relatively unexplored linkage between productivity growth slowdown (Figure 1 [2] and India's overall manufacturing stagnation for the last few years).

Examining the effects of "distortion" or misallocation in an Indian context is particularly crucial from a policy perspective as the country aims for higher growth. Regulatory policies in this regard often alter the relative prices of resources across producers, thereby influencing the distribution of resources at various levels. In India, a majority of the credit to producers is extended by a mix of public and private sector banking institutions where any underutilization of credit alters the availability of capital to other producers through interest rate channels, fiscal balances etc. Between 2000 and 2019, gross deployment of domestic bank credit to the has grown by roughly 12.1% (on average) since 1990. Similarly foreign investment and foreign capital flows (both direct and portfolio investments) have grown significantly during this period as well, with total foreign inflows growing from INR 16,000 crores in 1999 to over INR 9.4 lakh crores in 2019, with much of this rapid rise being accounted for by portfolio inflows into

[2] Figure 1 shows that post the 1991 reforms, India's productivity growth rate has been stagnant for almost the past 3 decades



(a) Sector Weighted TFP Growth rate (5 Year Moving Averages)

(b) National TFP Growth Rates (5 year Moving Averages)

Figure 2

India.

Hence the research project deals with the principal question of the misallocation arising from foreign capital inflows and the potential losses to total factor productivity that might have accrued as a result of the inefficient allocation of these foreign capital inflows in the Indian economy. Principally, the primary aim of the research project would be to identify a causal link between foreign capital inflows into a sector and differential firm level distortions that might be in play, and whether liberalization policies had an impact on these distortions. The current draft is a descriptive analysis piece of the outcome variables, along with trends at different levels and potential sources of variations that might arise from these differing trends.

Section 2 deals with some of the related literature in the paper; section 3 is a brief discussion of the background and policy environment in question; Section 4 deals with a broad sectoral level view of the relationship between productivity and foreign capital inflows; Section 5 deals with a detailed discussion of our two principal outcome variables at the firm level analysis and their trends; while section 6 has some preliminary panel data simulations on the relationship between foreign capital inflows and firm level distortions.

Related Literature

As an emerging market that has been exposed to an increasingly large number of capital flows, examining issues around productivity in India, stands at a unique juncture with regards to the existing literature. India's experience with de-regulation, de-licensing and increasing capital inflows through financial liberalization all happened simultaneously since the Structural Adjustment Reforms of 1991. The question of productivity changes in India has been driven by a gamut of theoretical standpoints such as the impact of de-licensing policy on firm size; questions around the existence of distortions in factor markets driving misallocation across firms and sectors in the economy; India's manufacturing performance in the backdrop of ** insert text here ** ; and the impact of FDI liberalization policy on misallocation.

While the existent literature has looked at a lot of these questions largely in isolation, it is imperative to tap into these different questions in order to accurately tease out a relationship between the nature of foreign capital inflows into India and their impact on issues centered around productivity and misallocation in the economy.

This paper contributes to two existing broad strands of literature that are currently available - misallocation and the impacts of capital flows on recipient economies. Having existed largely separately, the intersection of these two strands has received some growing attention in the past couple of years, as economists have begun to be interested in how rising capital flows are allocated across different sectors of the economy, and if this allocation process is efficient (in terms of higher productivity sectors attracting higher capital flows).

The first branch of existing literature that the paper draws on is that connecting capital account liberalization and economic growth. Larrain and Stumpner (2017) connect capital account openness and aggregate TFP through the chanel of efficiency in firm capital allocation. Prior to their work, Harrison et al. (2004) and Forbes (2007a) have examined the restrictions on capital account flows and whether such transactions have an adverse impact on the financial constraints for firms in the economy. Subsequent to that, Gopinath et. al (2017) have looked at increased capital flows and their ability to explain the productivity slowdown in countries around Southern Europe. Their principal hypothesis is that a reduction in real interest rates due to the advent of the Eurozone led to a decline in the sectoral TFP as capital inflows, they argue, were misallocated toward firms with a higher net worth but not necessarily more productive.

The paper also draws evidently draws upon the literature regarding resource misallocation and aggregate productivity. The two cornerstone papers in this area are Hsieh and Klenow (2009) and Restuccia and Rodgerson (2008). A lot of the empirical studies around this literature has decomposed productivity growth at the aggregate level into effects reallocation across plants/firms and effects of productivity growth from with plants/firms[3]More recently, some work has been done to analyse the links between finance, misallocation and aggregate productivity in papers such as Buera et. al (2011), Midrigan and Xu (2014) and Moll (2014). This paper looks at the case of how increased capital flows from capital account liberalization policies might explain changes to firm/plant and industry capital allocation, along with aggregate productivity impacts.

Often times, credit market imperfections in developing economies like India can become significant channels of misallocation (Banerjee and Duflo, 2005; Allen et. al 2007). In the case of FDI and other capital flows for example, capital misallocation can often be attributed to policy preferences or sectoral priorities. Hence in a rapidly growing economy like India, it is therefore important to identify distortions in the capital allocation, in order to be addressed in the broader policy framework.

[3]Some of these papers include Griliches and Regev (1995), Foster et al (2001), Bartelsman et al (2005) and Aggarwal et al (2011).

The paper finally draws upon the literature of financial markets and resource allocation. Rajan and Zingales (1998) show that sectors that have a higher dependency on external finance grow much faster in economies with better-developed financial markets. Wurgler (2000) argues that financially developed economies increase investment in their growing sectors and decrease investment more in their declining sectors. Gupta and Yuan (2009) and Levchenko et al. (2009) show that financial liberalization increases output, particularly in financially dependent sectors. Because these papers use sectoral data, they can only analyze resource allocation across sectors.

Background and Policy Reforms

The Balance of Payments crisis of 1991 proved to be a watershed moment for Indian economic policy. Not only did India adopt a new industrial policy that dismantled the system of licensing for most industries, allowing private firms to enter previously state-reserved sectors and industries, it also liberalized its current account, opened up to FDI for domestic and foreigners, while opening up to portfolio flows for foreigners and restricting debt flows. It changed its currency regime from a quasi-fixed exchange rate regime to a "market determined" one[4]. These broad-based reforms also included other reforms that might have impacted entry of firms into industries, such as tariff reductions (as import competition measures in product markets).

India's push toward de-licensing and de-reservation of industries began in the late 1980s where a series of government policies outlined these liberalization measures, which went on to be only accelerated in India's Industrial Policy Resolution of 1991.

Compulsory Industrial licensing was abolished for almost all industries in the economy, except for a roster of 18 industries which continued to be subject to compulsory licensing due to reasons connected to security and strategic concerns, manufacture of hazardous products' among other reasons. The Industrial Policy resolution of 1991 iterated that the exemption from licensing was expected to make the manufacturing sector more competitive and efficient, and in order to help entrepreneurs in smaller firms who had been unnecessarily hampered by the licensing system.

The 1991 FDI reforms reduced barriers to foreign entry in a subset of these industries. Automatic approval was granted for FDIs of up to 51 percent in 46 of these 93 NIC 3 categories. In addition, there were trade liberalization measures that led to a reduction in the level and dispersion of tariffs, a removal of quantitative restrictions on imported inputs and capital goods for export production, along with the elimination of public sector monopolies on imports of almost all items.

Data

The data used in this paper has been compiled from a variety of sources. Compiling data for any empirical investigation into an issue around emerging markets is rarely not fraught with challenges -

[4]The Indian Rupee was now pegged to the USD through extensive trading on the currency market through the Central Bank

both in terms of availability of the data along with the treatment of the data that is available. This section will engage in a brief description of the various data used in this paper along with some issues encountered in the while crafting the dataset.

Data regarding sectoral estimates of Total Factor Factor Productivity have been extracted from the *Reserve Bank of India - KLEMS*[5] *India Database* which has been a joint undertaking between the Reserve Bank of India and the World KLEMS Survey to estimate productivity aggregates at the industrial and sectoral level for India. The coverage of the data ranges from 1980-81 to 2016-17, across 27 sectors, created in concordance with the National Industrial Classification (NIC) rounds of 2008, 2004, 1998, 1987 and 1970, in order to create a continuous time series for each of the sectors during the coverage period. The data available can be split into estimates for three different blocks - Gross Output Series which provides measures Employment Share, Labour Income Share, Capital Income Share , Total Factor Productivity have been extracted from the dataset which has been originally constructed using the National Accounts Statistics (NAS), Annual Survey of Industries (ASI), NSSO rounds and Input-Output Tables (IO); Gross Value Added Series (which are measured such that the value added is the differential between the industry output and industry inputs) which reflect an industry/sector's capacity to contribute to economy wide income and demand; and time series on total output measured in constant prices with 2010 as the base year.

Data on sectoral FDI inflows has been extracted from FDI Markits, which covers a universe of all cross-border greenfield investments across all countries and sectors. The data for India includes Total Capital Expenditure into FDI projects across different parts of the country, post the capital account liberalization by the Indian Government. The data for India consists of a list of all projects along with current status as well the investment origin, basic firm level details of the recipient, along with jobs created[6].

The Reserve Bank of India Database on the Indian Economy has been one of the most comprehensive and definitive sources of data available with regards to different aspects of the Indian economy. The DBIE was used for economy wide aggregates pertaining to Capital Inflows and overall Balance of Payments data[7]. It contains an economy-wide time series of capital flows by broad categories (which have been used in the database), along with Gross Domestic Product Data and Gross Bank Credit Deployment data at the industrial level which allows us to sense the domestic flow of credit into the different sectors for the time period where we are capturing capital inflows data.

Firm level data for India has been extracted from the CMIE Prowess database, compiled and maintained by the Centre for Monitoring the Indian Economy (CMIE) and includes not only all publicly traded firms in the country, but also a large number of private firms. The Prowess database is a firm-level panel dataset, and is different in a couple of important ways from the other major source of unique

[5]KLEMS is an international initiative to study growth and productivity patterns around the world. KLEMS datasets usually comprise annual data on Capital (K), Labour (L), Energy (E), Materials (M) and Services (S)

[6]To verify the data at the aggregate industrial level, this was cross-verified with the CEIC databse on FDI inflows into India at the industrial level, and the data has matched at the industrial level thereby verifying the veracity of the quality of the data incorporated in this dataset

[7]This was tracked back from the IMF Balance of Payments Analytical Presentation Database using the available metadata

unit-level data in India - the Annual Survey of Industries (ASI). The Annual Survey of Industries provides a massive repeated cross sectional coverage of the Indian manufacturing sector at the factory level but remains unsuited for any panel analysis of the responses of factories to policy changes over time. The sampling design of the ASI implies that a factory appears only once in 5 years, thereby making it unsuitable to any panel analysis, along with no disseminated data on the ownership of the factory[8]. The Prowess dataset additionally not just covers manufacturing firms but firms across all sectors of the economy, thereby providing for a wider analysis of the policy changes across the different industries and sectors.

The advantages of this dataset are aplenty. The NIC classification applies for the firms in the dataset which makes reconciliation with policy documents much easier. The data allows us to examine a number of useful aspects of not just firm ownership patterns, but also of asset and liability structures along with other relevant variables useful for studying questions of firm dynamics.

Data on Foreign Portfolio/Institutional Inflows (FPI/FII) has been sourced from the National Securities Depository Limited (NDSL) which provides a universe of FPI transactions for both Equity and Debt across Indian Stock Markets, beginning from the year 2003. The data provides for granularity not just at the firm level but also at the Firm x Day level for all the years of coverage. The principal variables of concern here are the quantity of equities traded and the value of the trades when they were carried out which provide information pertaining to the capital inflows into the firm at a daily level.

Sectoral Analysis

India's Total Factor Productivity growth has undergone a period of stagnancy with no discernible upward trends (as seen in Figure 2b). Here we link this back to the sectoral data extracted from India KLEMS to compare sectoral TFP across the economy. This section looks at the sectoral aggregrates of the covariates that might potentially be impacting productivity and tries to draw out a relationship between foreign capital inflows and sectoral TFP.

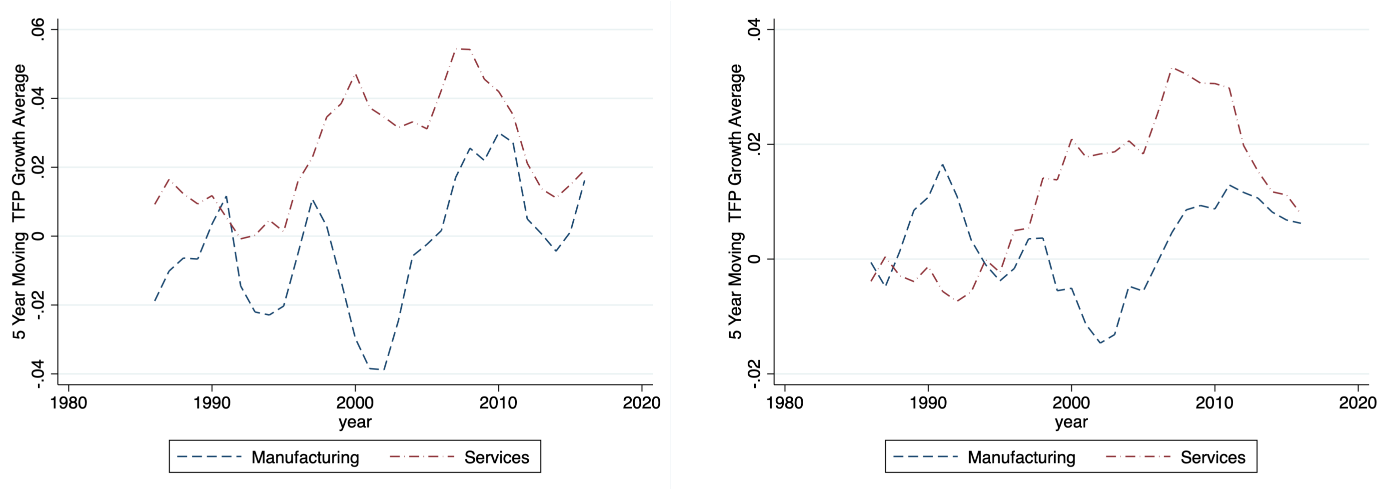
The section starts off with very broad trends of productivity heterogeneities at the sectoral level, before moving to a simple panel data estimation strategy of identifying the key relationships between sectoral productivity and foreign capital inflows, in the presence of other sectoral level controls and time fixed effects. The section is just meant to be a bedrock of the entire project in trying to prove the absence of an unequivocally positive linkage between increasing foreign capital inflows and firm level productivity in an emerging market economy like India.

Broad Trends

Looking at India's overall manufacturing and services sectors (Figure 3a) we see that both manufacturing and services sectors experienced a sharp drop in Value Added TFP Growth at the beginning of the last decade having shown very impressive growth in the decade before. Figure 3a reveals that while services

[8] Thereby treating each factory as a seperate unit irrespective of whether it may have the same potential ownership

have a generally upward trend in terms of manufacturing growth barring a phase of constant/slightly downward trends towards the first part of the 200s, manufacturing has been much more variant in output growth with large scale upswings in the second half of the 1990s and from the mid 200s to around 2010. The downturn in growth of value added was drastic in the first half of 2000 and since 2010 onwards which have coincided with an overall level of slowdown in India's manufacturing sector.



(a) Value Added TFP Growth Rates

(b) Gross Output TFP Growth Rates

Note: All figures on the Y-axes are expressed in terms of log changes. All Data has been sourced from the RBI-KLEMS India Database

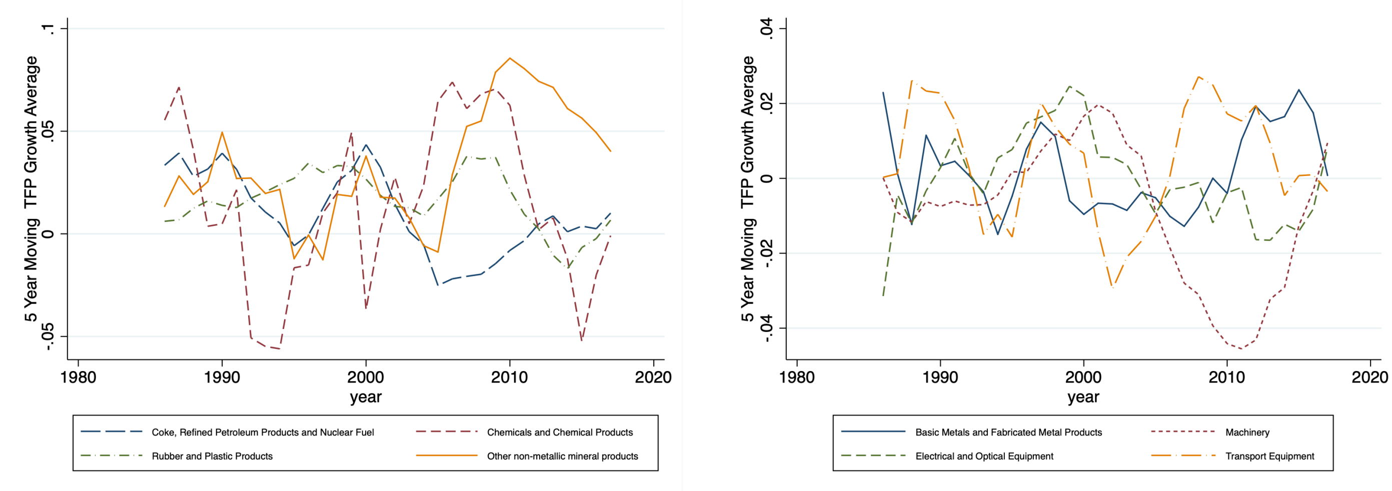
Figure 3

Figure 3b reveals two interesting insights - i) The services sector in India experienced its most impressive growth performance across the latter half of the 1990s to the initial parts of the 2000s, following which there was a slight downward trend in growth rates and then a sharp drop from 2010 ii) Manufacturing in India saw it's most remarkable performance across a majority of 2000s where the sector hit a highest of approximately 11% growth rate (in 2010-11) which was followed by a sharp downturn in growth prospects of the sector.

A closer look at manufacturing industries in India over the past three decades indicate that most of them show signs of slowdown in productivity growth (as well as drops in productivity) from around the mid-2000s. Figure 4(a) reveals a bleaker narrative - While there are industries like Rubber and plastic which have seen some periods of very impressive growth rates since the turn of the milennium, no industry has been isolated from a drop in productivity rates right around 2010 with three out of four industries experiencing zero/negative TFP growth during that period. Coke and petroleum products in this regard have shown much more cyclical changes compared to the rest but have experienced significant periods of negative TFP growth.

Figure 4(b) shows a similar narrative with electrical equioment and machinery showung a sharp downward turn around the end of last decade, while industries related to basic metals show negative TFP growth for a majority of the past two decades.

Figures 5(a) and 5(b) capture very similar patterns in productivity growth across the services sector



(a) TFP Growth in select Manufacturing Industries (b) TFP Growth in select Manufacturing Industries

Note: All figures on the Y-axes are expressed in terms of log changes. All Data has been sourced from the RBI-KLEMS India Database

Figure 4

in India as well. Figure 5(a) shows a major drop for the telecommunications industry at the turn of the decade along with a downward turn for hotels and hospitality (which showed a very impressive rise in TFP growth rates in the second half of the previous decade) and transport. Figure 5(b) captures financial intermediation and business services demonstrate some degrees of cyclicality in these two industries but with some of the same trends as seen by all previous industries such as a downturn post 2010 (following which business services did however show a massive turnaround. The TFP story for these two industries is quite similar - downward trends into the negative growth territory in the early 1990s, with a decadal upswing till 2000, followed by another sharp drop in trends till the mid 2000s, followed again by recovery (massive upswing in the case of financial intermediation however) till around 2010 before replicating the economy wide sharp drop.

Sectoral Misallocation and Foreign Capital Inflows

The summary evidence provided in the previous sub-section on the degree of industrial heterogeneity across different time periods in terms of productivity growth provides some basis for going a little further and looking at the trends in capitalization across these different industries. In Hsieh and Klenow (2009) the existence of distortions results in differing TFP levels in India and China as compared to the USA, but following Das & Nath (2019) one can look at distortions at the sectoral level as the deviation in observed elasticity of output to capital usage, from that of the 'optimum level'. The authors use a Cobb-Douglas function framework with a Constant Returns to Scale assumption to demonstrate that using KLEMS data for India, a portion of cross-sectional variation in capital[9] can be due to the existence of distortions, even after taking into account changes in technology.

[9] Their concept of measuring distortions at the sectoral level is broadly similar to Dollar & Wei (2007) and Bai et. al (2006) who look at distortions through the lens of cross-sectoral variations in capital returns.

(a) TFP Growth Rates in select services industries (b) TFP Growth Rates in Select Services Industries

Note: All figures on the Y-axes are expressed in terms of log changes.All Data has been sourced from the RBI-KLEMS India Database

Figure 5

This part of the paper now uses some simple panel data estimation techniques to try and estimate the relationship between foreign capital inflows into the different sectors in the economy and the sectoral TFP and measures of distortion as the outcome variables. The key objective of these estimations is to examine the direction and significance relationship between the foreign capital inflows and the two sectoral outcome variables i.e TFP Growth and Distortion. The existence of such an allocation problem at the sectoral level would be established if one did not see statistically significant positive coefficient on the foreign capital inflows for the different sectors over the panel coverage.

The basic equation being used for this panel estimation is the following -

$$Y_{it} = \alpha + \beta_1(FDI\ Inflows)_{it-1} + \beta_2(FPI\ Inflows)_{it-1} + \boldsymbol{X}_{it} + \mu_t + \delta_i + \epsilon_{it} \tag{1}$$

where $\boldsymbol{X_{it}}$ is a vector of industry-specific characteristics serving as additional controls. we are interested in examining the relationship between the productivity of growth in sector i at time t, with relation to the inflow of Foreign Direct Investment in the sector in the previous period (i.e. at time t-1) in order to give some leeway to the fact that Foreign Direct Investment inflows into India may not be showing their impacts in their respective sectors straight away, and due to the nature of investments, do end up taking some time before generating any form of growth benefits in the recipient sector. Similarly we look at Foreign Portfolio inflows in the previous period as a covariate not just to provide parity in terms of inflows estimations, but also in that increased equity inflows might take at least one period to begin materializing in terms of sectoral level capital capital variation outcomes. All estimations are carried out with the presence of time and industry fixed effects with the standard errors being clustered at the industry level in order to account for the impact of autocorrelation of observations within each industry over time.

Table 1 looks at the panel specification with Value Added Total Factor Productivity growth as the dependent variable. The estimations are all controlled for sector and time fixed effects with standard errors clustered at the sectoral level. With the outcome variable, we look at three sets of specifications here - one with Lagged FDI and FII inflows, the second with Log of FDI and FII inflows and finally lagged log FDI and FII inflows. We see that the coefficient on FDI inflows is always statistically insignificant in whichever form we incorporate the variable thereby implying that in the case of India, the gradual increase in FDI inflows has not been associated with statistically significant increases in TFP in the recipient sector. In the case of Portfolio inflows at the sectoral level, we observe that the coefficient is negative in all specifications which is indicative of the non-positive impact of the inflows on sectoral productivity changes. However in Models 3 and 9, we see that lagged inflows (both in log and absolute terms) are associated with a drop in the TFP growth rates at the sectoral level which indicates that a rise in inflows into a given sector during time period t is associated with a drop in the observed TFP growth in that sector during time period $t + 1$. This would be indicative of the potentially negative relationship between overall productivity and foreign portfolio inflows thereby providing some basis for going deeper into firm level dynamics of why such a relationship may hold.

Before turning to the other set of estimates in Table 2, it is indicative to look at some of the other covariates considered in the specifications in Table 1. We see that employment in the sector has a negative but statistically insignificant coefficient in most iterations of the specification except in the case of Model 3 where it is negative and significant only at the 10 % level. Capital Income Share coefficients are always positive and strongly statistically significant implying that greater adoption of capital intensive techniques in the sectoral production processes have led to discernible increases in sectoral productivity. Labour income share coefficients are mostly positive but statistically insignificant except for in the case of Model 6, thereby implying the limited role played by labour as a factor of production in sectoral productivity.

External Dependence here is the variable taken from Rajan & Zingales (1999) which looks at the mean dependence of firms across industries to external finance. Greater dependence on external finance at the sectoral level leads to a drop in productivity [**how would this matter? ** Add in]. Domestic credit deployment here looks at the amount of bank credit deployed internally in India across different sectors and we observe broadly statistically significant relationships (in 5 out of 6 models where the variable is included) which are positive in three cases and negative in two. Share of total economic output always has positive coefficients which are statistically significant, thereby indicating (as conventionally expected) that increase in sectoral share of total economic output will be associated with greater productivity growth,

We now turn to Table 2 which looks at the same specification but now with sectoral distortions as the dependent variable for the first three models, and log distortions for the remainder of the tables. Here we are looking only at Under-Capitalized sectors in the panel. We see that FDI inflows have no statistically significant relation with distortions in the under-capitalized sectors thereby implying that FDI inflows in absolute or log terms are not significantly associated with increasing capitalization in the under-capitalized sectors of the economy. FII inflow coefficients however are insignificant in 7 out of 9 models but in models 3 and 9, the coefficients would indicate that under-capitalized sectors have been associated with increased capitalization from lagged foreign investment inflows.

Coefficients for employment indicate negative association with capitalization in models 2, 6 and 9, but with a positive association with capitalization in models 3, 5 and 8. Capital Income Shares are associated with greater capitalization in models 2 and 3, but in the remaining models are associated with a lower degree of change in capitalization in the concerned sectors. Domestic Credit Deployment has negative coefficients in models 3, 5 and 8 which imply that greater credit deployment leads to a reduction in the scale of under-capitalization that a sector faces, but in models 6 and 9 the signs flip which imply that greater domestic credit deployment leads to a worsening of the under-capitalization situation in these sectors. While external dependence has no significant coefficient here, in the case of a sector's share in the economy's output we see that if an under-capitalized sector increases it's contribution the economy, then it only magnifies the problem of under-capitalization.

Table 3 looks at the same estimation but now with the over-capitalized sectors in the economy. In these sectors we see that FDI inflows don't have any discernible statistically significant coefficient thereby implying that they don't have much of an association with the level of capitalization in most of our simulations except for Model 6 where the log of FDI inflows has a negative and statistically significant Coefficient - implying that the increase in FDI inflows during a period leads to a decrease in the rate of over-capitalizaton during the same period. With regards to FII inflows, Models 2 and 3 have statistically significant coefficients but with different signs which implies that depending on the nature of the covariates, lagged inflows can lead to either an increase or a drop in the rate of capitalization in the economy. All other coefficients with respect to FII inflows are statistically insignificant, implying a very limited role played by the FII inflows in influencing capital distortions across these sectors.

Employment Coefficients range from being positively significant and negatively signifiant across different models, where positive significance would imply increased contribution to capital distortions and vice versa. Greater Capital Income shares almost always have positive coefficients that are statistically significant (with the obvious implication of a positive contribution to distortions). Domestic Credit Deployment coefficients are mostly insignificant except in models 5 and 8 where they imply that access to greater credit among the over-capitalized industries is only associated with an increase in over-capitalization, while the coefficients on the share of total economic output indicate that if overcapitalized sectors contribute more to the total output during a given year, it only magnifies the extent of capital distortions that these sectors might end up facing.

Firm Level Analysis

Having looked at broad sectoral level trends, the weak relationship between sectoral productivity and foreign capital inflows, along the existence of distortions and how these distortions might be associated with these capital inflows, it becomes imperative to analyze the implications of the sectoral trends at the level of firms and how an enhanced level of granularity beyond the sectoral level might lead us to unpack some of the more nuanced associations between productivity and exposure to foreign capital inflows.

This section a descriptive analysis of the two main outcome variables that will be used in the firm level analysis - Marginal Revenue Product of Capital and firm level revenue productivity, The section looks at the sectoral trends of these two variables, the economic interpretation behind the variations in the levels of these variables, and the variations of these two variables by select firm characteristics. The section also looks at the association between the firm size and distortions faced by the firm through some simple quantile regressions to look at the potential non-linearities and the decadal changes in this relationship across firms facing a different levels of distortions.

Estimating a Firm Level Production Function

In order to estimate the impacts of liberalization and foreign investment inflows on firm level distortions and misallocation, one needs to follow a conceptual framework of testing how reforms and inflows impacted firms facing different levels of distortions. In order to begin with such an exercise, I adopt the standard production function estimation techniques to assume that firms in the economy face a standard Cobb-Douglas Production Function -

$$Y_{ijt} = A_{ijt}{K_{ijt}}^{{\alpha_j}^k}{L_{ijt}}^{{\alpha_j}^l}{M_{ijt}}^{{\alpha_j}^m} \tag{2}$$

where i denotes the firm, j denotes the 3-digit industry and t denotes the year. Y_{ijt}, K_{ijt},L_{ijt} and M_{ijt} denote the output, assets, labour and intermediate materials consumed by the firm, and A_{ijt} here denotes the unobserved firm specific productivity component. All of these parameters are measures in USD Millions. In constructing these variables, the paper follows closely the variable construction methods followed by Hsieh & Klenow (2009)[10].

The principal way of looking at firm level distortions here would be to look at the Marginal Revenue Product of the factor for which we are considering a case of misallocation. In our case, since it is capital that we are looking, we look at the Marginal Revenue Product of Capital as a marker of distortions faced by the firm[11]. Under the revenue Cobb-Douglas production function that we have considered, we can simply define the MRPK in the following way -

$$MRPK_{it} = {\alpha_j}^k \frac{Y_{it}}{K_{it}} \tag{3}$$

where $MRPK$ here provides a measure of the firm's MRPK within an industry under the assumption that all firms in the industry share the same ${\alpha_j}^k$. Under the same model if we introduce wedges τ to the capital inputs used by the firm and compute the profit functions of the firm one can compute a simple first order condition where

$$\pi_{ijt} = Y_{ijt} - wL_{ijt} - r(1+\tau_{ijt})K_{ijt} \tag{4}$$

[10]More on Variable Construction to be incorporated later

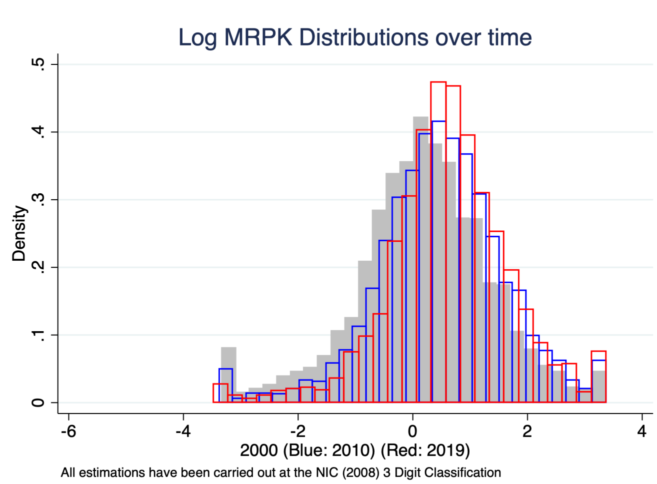
[11]This is based on the idea that if their is dispersion of the Marginal Revenue Products of inputs across firms, the economy can achieve gains by reallocating capital from firms with low MRPK to firms with high MRPK

which gives us the first order condition where

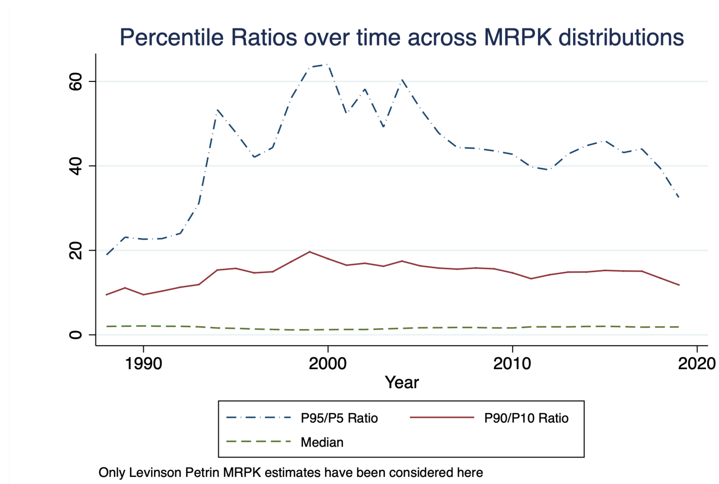
$$MRPK_{ijt} = r(1 + \tau_{ijt}) \tag{5}$$

and this allows us to link the $MRPK$ faced by the firm to the level of capital distortions that the firm might be facing. An alternative way to estimate the production function, rather than a simple Cobb-Douglas estimation would be to use the Levinsohn - Petrin (2003) method via the GMM estimation procedure, to estimate the parameter coefficients of the function at the 3 Digit NIC Level. This method allows the estimation of two estimations of two sets of $MRPK$ estimates at the firm level which allows us to identify the capital constraints and the distortions faced by the firms.

To look at the extent of misallocation across Indian industries across different years, one can look at the cross-section distribution of log MRPK across different years for the coverage of the data. Figure 6(a) reports the distribution of log MRPKs select years in India to present a picture of the comparative extents of misallocation that existed across Indian industries through these years. From the mildly rightward shift in the distributions that we can see in Panel (a) one might be able to speculate that overall there has been a slight increase in the level of distortions that firms in India have been experiencing over time which tells us a comparatively different picture from that painted in Figure 6(b) which reports that the ratios of MRPKs at the top and bottom end of the distribution have been on the downward trajectory since around 2000 (with a more marked drop in the P95/P5 ratio as compared to the P90/P10 ratios[12]). However we see that the Median level of MRPK has largely remained unchanged across time. This tells us that the potential of differential impacts across different parts of the MRPK distribution cannot be ignored in the case of India when it comes to liberalization and foreign capital inflows.



(a) Histogram of Log MRPK Distributions



(b) Evolution of Percentile MRPK Ratios across Indian Firms over time

Figure 6

[12]The drop can either be due to a rise in the denominator i.e. a rise in the level of distortions faced by the firms at the bottom, or a fall in the numerator i.e. a fall in the level of distortions faced by the firms at the top end of the distribution, or a combination of both factors.There is some discussion of the potential source of this reduction in the ratios later on in the next subsection

Firm and Sector Level Trends in MRPKs

It is essential to look at sectoral and firm level variations in Marginal Revenue Product of Capital in order to identify what might be potential sources of variation in the levels of distortions that firms of different kinds might be facing across the economy.

If we look at the evolution of Log MRPKs across different sectors in the economy, one can identify sectors where the average levels of distortions faced by the firms are increasing and those where the average levels of distortions might be decreasing over time. Key sectors such as Manufacturing, Mining and Quarrying, wholesale and retail trade, transport and transport equipment have all shown tendencies to gradually experience higher Marginal Revenue Products of Capital, and hence by extension, increasing levels of distortions faced by the firms on average belonging to these sectors.

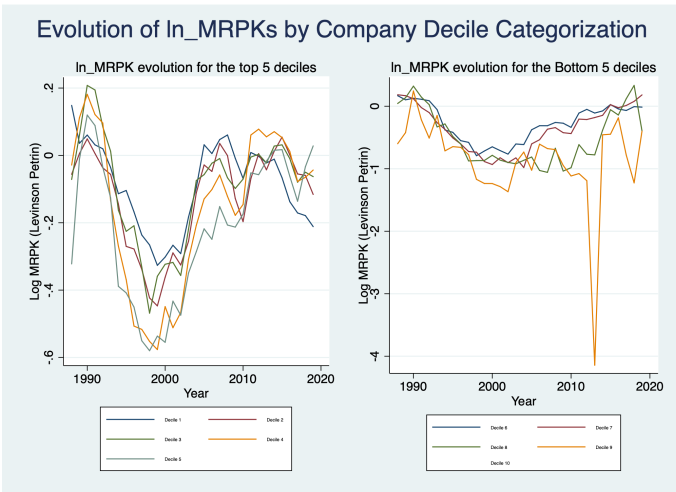
Most sectors on average have shown a downward blip just around the year 2000 followed by an upward trajectory as is visible from the figures. It is important to note that for a lot of the sectors showing somewhat of a U-shaped trend, one can witness a rising trend in distortions since the mid 2000s (specially around 2005) which was a period that not only led to the onset of the financial crisis but also a period of manufacturing slowdown in the Indian economy since the beginning of the last decade. Financial Services, along with Post and telecommunications have the rare sectors which experienced a considerable and consistent decline in it's MRPKs over time considering the increased dominance of banking and other financial services across the country during it's high growth phase.

Sectoral heterogeneity becomes a key factor when one looks at the trends in distortions considering that a lot of the industrial policies in India pertaining to deregulation and liberalization have been constructed at the sectoral and 3 digit industrial levels which comprise these broad sectoral definitions, but while one looks at sectoral trends it is also important to look at firm level variations across the years as well.

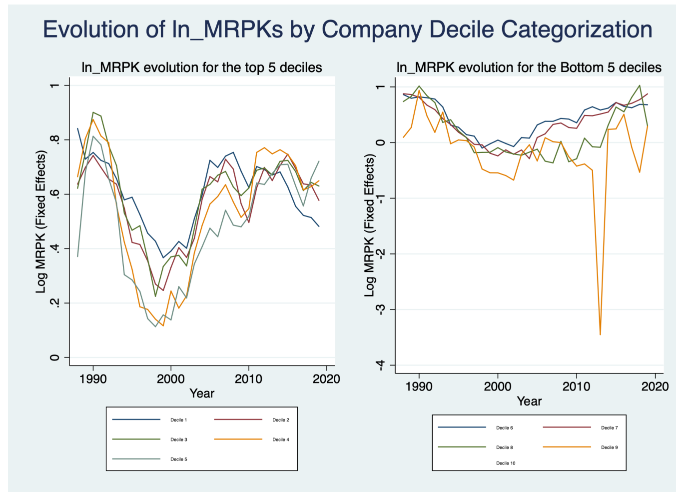
In looking at firm level variations, it is not just important to look at firm size but also variations on grounds of access to equity or more specifically foreign equity for these firms. Access to adequate credit and external source of capital in many countries might depend on factors such as firm size and age, since firms of larger size and older firms in the economy do tend to have an inordinate advantage over younger firms due to a multitude of factors.

The Prowess database provides a decile size grouping for its sample of firms which allows us to bin firms on the basis of size (by deciles) and track the comparative trajectories of firms across different decile categories. Figures 7(a) and (b) look at the evolution of firms across different size deciles. Panel (a) plots the estimates from the Levinson Petrin estimation technique while panel (b) plots the estimates from the normal Cobb Douglas Function estimation with time fixed effects.

Broadly once can see that barring the magnitude of variation among these two estimates, the basic patterns of variation remain the same which can allow a more or less explanation of the patterns of variation across top and bottom half of the firms. For the firms in the bottom half of the size distribution (Deciles 1 to 5), we see that there is a precipitous drop in their MRPKs across a majority of the 1990s which coincide with an acceleration in the deregulation and liberalization policies instituted by the government of India. However since the advent of the new millennium there has been an almost equally massive rise in their MRPKs (and equivalently the level of distortions faced by them). One must remember that these were the years where India recorded not just highest GDP growth rates consistently but also an increasing inflow of foreign capital (both direct and portfolio investments) into the economy. The begining of the last decade however saw a halt in this increase with some stabilization in the rate of change which saw a sharp drop around 2010 followed by a rise in MRPKs and then a downward trend again in the mid 2010s.



(a) Histogram of Log MRPK Distributions



(b) Evolution of Percentile MRPK Ratios across Indian Firms over time

Figure 7

The process has been a little more gradual for the firms in the top half of the distribution which have largely followed a u-shaped trajectory since the advent of the structural reforms till the till the end of the last decade. On a comparative note one can see that the gradual decline in MRPKs across the 1990s till the early 2000s for the firms in the top half of the size categories were greater in magnitude than that of the bottom half firms. However the equally greater magnitude of the rebound in MRPKs, which has remained consistently on an upward trajectory since the mid 2000s.

The rising MRPKs for firms in the top half of the distribution needs to be contextualized in the context of them being more exposed to credit, equity and foreign capital by virtue of capital markets, which might point us to the efficacy of increasing inflows of foreign capital or financial liberalization in reducing the distortions of these firms. Like the firms in bottom half, these firms also faced increasing distortions during India's phase of rapid economic growth. Despite the temporary economic slowdown that began in the early 2010s , followed by a recovery in growth rates with the regime change in 2014, they did not see much of an variation from beyond the broadly upward trajectory of their MRPKs.

Access to equity markets play a very critical role for firms in terms of not just their borrowing capacity but also their access to a bulk of their foreign capital inflows. Figure 8 looks at the evolution of firms' MRPKs on the basis of their exposure to equity markets with firms having exposure having lower MRPKs than those that have no access. From the workhorse definition of MRPKs, we know that firms with higher distortions face higher MRPKs. It is only natural that access to equity markets would reduce the level of distortions for the exposed firms as compared to that of unexposed firms, but the allocation paradigm would suggest that greater capital must be diverted to firms with higher MRPKs which might not hold here considering the volume of trades (not just domestically but also in terms of foreign inflows) that might be carried out among these firms with lower MRPKs thereby giving them greater access to capital and credit than those firms with higher MRPKs.

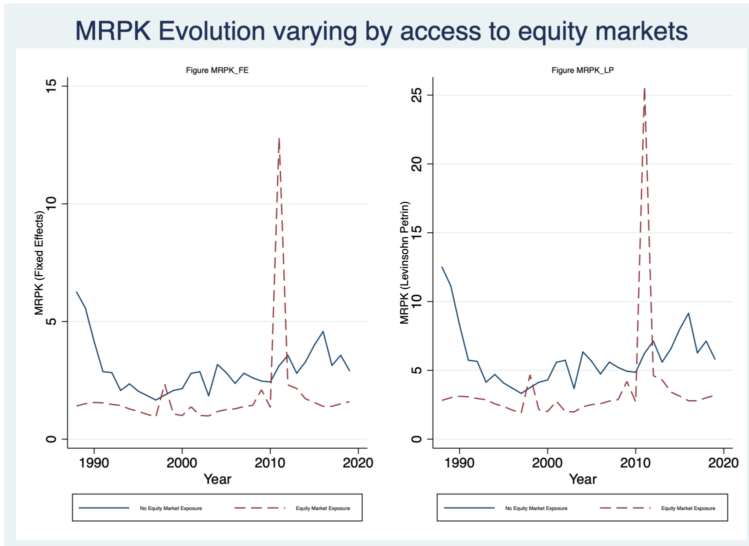
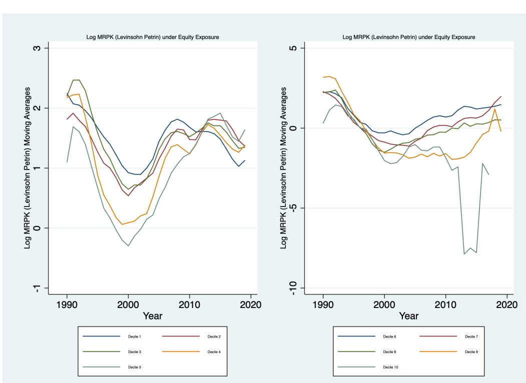


Figure 8

If one compares the evolution of MRPK by differential equity access and firm size, one finds a rather interesting extension of this picture. While the common trends in terms of the basic evolutions of distortion by size bins still continue, we see that firms exposed to equity markets in the bottom decile largely show similar trends to the broader pattern that we had seen in Figure 7(a) while the firms in the top deciles show broadly similar patterns consistent with the top deciles reported in Figure 7(b). One would not expect firms with access to equity markets, either at the bottom or top half of the distribution to be showing largely similar patterns in change which reflect that these firms face distortions even in the presence of access to equity markets with these distortions only gradually increasing over time.



(a) Histogram of Log MRPK Distributions

(b) Evolution of Percentile MRPK Ratios across Indian Firms over time

Figure 9

Firm level trends with equity access are not (in many cases) very different in many cases from those without equity access, thereby hinting towards the commonality of many of the distortions, which little more divorced from access to equity and firm level outcomes. Firms with no access to equity definitely have higher levels of log (MRPK) than those with equity access and we see that barring the sharp drop in the distortions faced by the bottom-most decile that we see in panel (b). Noticing the levels of magnitude one can see some slight convergence towards the latter half of the time coverage not just among the individual deciles with and without access to equity markets, but also broadly between the top and bottom halves across each decile with a broadly upward trajectory across three out of the four panels (from the 2000s onwards) with only some semblance of stabilization and a slightly reductionary trend amongst the bottom half of the firms having equity access, for the period beginning from 2010.

Firm and Sector Level analysis of TFPR

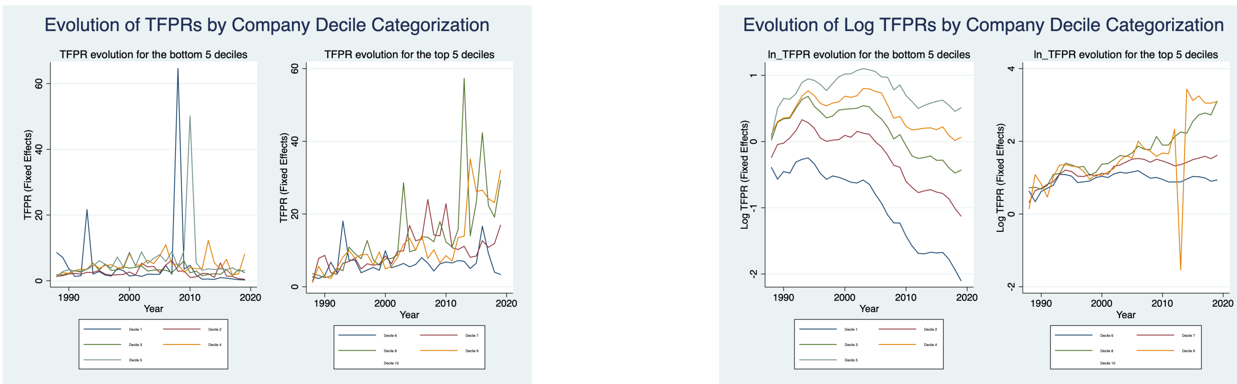
Having evaluated the trends and variations in firm level distortions, it is important to look at the firm trends and variations in the firm level revenue productivity to track the changes in how measures of firm level productivity have changed over time across industries in India. Evaluating productivity at the industry level requires some insights in to the firm specific distortions that can be measured by the revenue productivity of the firm. Following Hsieh and Klenow (2009), we can define the revenue productivity of the firm as:

$$TFPR_{ij} = P_{ij}A_{ij} = \frac{P_{ij}Y_{ij}}{{K_{ij}}^{\alpha_j}(wL_{ij})^{1-\alpha_j}} \tag{6}$$

TFPR in this calculation would not vary across firms within an industry unless the firms face capital or output distortions. In the absence of these distortions, more capital and labour should theoretically be allocated to plants with higher TFPQ, to the point where their higher output, and thereby lower price and hence the exact same TFPR as in smaller firms. High firm TFPR is an indication that firms confront barriers which raise their marginal products of capital and labour, rendering the firms smaller than optimal.

At the sectoral level we see some discernible heterogeneity not just at the levels of absolute TFPR but also in terms of log trends in TFPR which indicate the direction of change in the sector level barriers that might be facing firms across these different sectors. Firms in some have higher TFPRs than others but the overall trends across these sectors has been broadly similar over time. At the sectoral level we don't see any marked increased in the levels of barriers that firms in the sector might be encountering. In most sectors, the trajectories of absolute revenue productivities along with the trends in log changes indicate that firms across sectors have not faced increasing levels of barriers to their operations. Revenue Productivity has largely fluctuated at a limited bandwidth of variability for most firms across sectors but some sectors have definitely had their firms face higher revenue productivity than others, as is visible from the graphs. However we can also definitely see a flattened trajectory in terms of the changes to revenue productivity, with decreases over time during the past decade for many sectors (as can be seen from the sub-graphs plotting log changes).

Looking at the decile decomposition of evolution of TFPRs across the firms in the economy, we see a very different picture than the one that we saw at the sectoral level. Looking at the figure on log changes in TFPR we see a noticeably different picture across firms in the top and bottom half of the size distribution. One can see that while the firms at the bottom half experience a considerable decline in revenue productivity (and hence barriers faced by them), while firms at the top half of the distribution either experience much less of a decline, stay almost constant or even show an upward trend in terms of log changes to revenue productivity. Hence even within the individual sectors and/or industries, one can see considerable heterogeneity in the behaviour of barriers that might be faced by the firms.



(a) Evolution of log TFPR Distributions

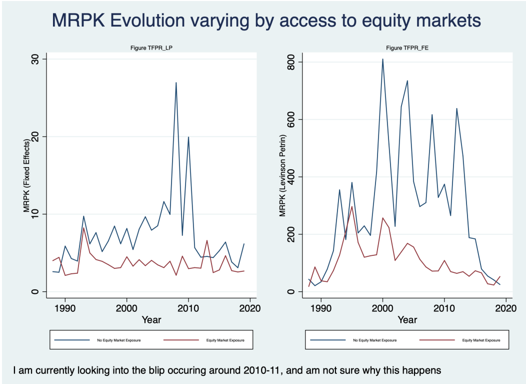
(b) Evolution of log TFPRs by Company Size Categories

Figure 10

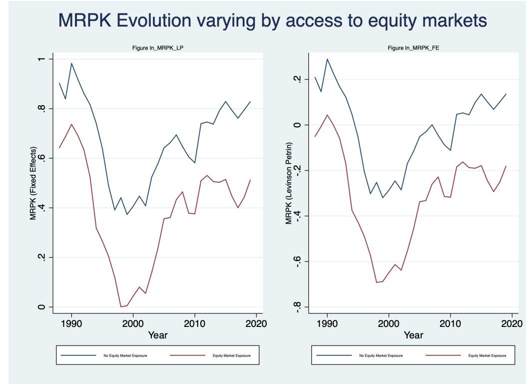
Firms classified according to their access to the equity markets show that those with access to the equity markets do have lower TFPRs (and hence comparatively lower barriers) than those without any access to equity markets, but the difference has not been much for a majority of time period. The major departure between the two trend lines came between the mid 90s till around 2010 where firms with no access to equity markets experienced much larger spikes in their average TFPR levels as can be seen from the graphs. Log changes in TFPR, differentiated by access to the TFPR, show very similar trends of evolution with firms having equity access always having a lower trend-line than those having no equity access. While firms with access to equity markets began a downward trajectory in terms of log changes from the mid 90s themselves, those that had no access to the equity markets plateaued with slightly upward trends from the mid 90s till the mid 2005s beyond which they began to mimic the downward trends in log changes that had already set in among the firms with access to equity markets.

Basic Quantile Estimations

Quantile regressions seek to extend the idea of the estimation of conditional quantile functions through models in which quantiles of the conditional distribution of the response variable being expressed as a function of the observed covariates. Considering that the earlier summary trends in the evolution of firm level distortions indicated that distortions facing the firm might be amplified or might vary depending on certain firm characteristics such as firm size or access to equity, one can potentially under that there are differing levels of impact that factor distortions may have at different ends of the firm size (or for that matter any other firm characteristic) distribution. Additionally we have also earlier seen the extent



(a) Firm level TFPR by Equity Access



(b) Firm level log TFPR by Equity Access

Figure 11

of the levels of misallocation in the economy through the massive gaps between the Marginal Revenue Products of Capital at the top end and the bottom end of the distribution, with the average distribution of Log (MRPKs) only shifting rightwards - thereby implying that there has been a gradual increase in the average levels of distortion that a firm in the economy faces.

Hence it would be useful to track the changes in key variables that we are considering important firm level covariates which might be useful in explaining the nature of the distortions that might be in effect with regards to different firms. Here I am firstly looking at firm size since we have seen the heterogeneous trends with regards to distortions only earlier. The two principal firm level outcomes that we are looking at here, are the Marginal Revenue Product of Capital and Total Factor Product (Revenue). The setup considered here is very simple - I am taking the Levinson Petrin production function estimates of MRPK and by extension of TFPR as the dependent variable here and using Firm size as a principal independent variable in the regressions to identify the conditional estimates of the behaviour of firm level distortions on firm size. I estimate the three types of specifications with three levels of additional controls.

Firm Level MRPK and Firm Size

In looking at the relationship between the levels of distortion faced by the firms and corresponding firm sizes i.e how would firm size be associated with distortions faced by the firms across different ends of the distribution. Starting at the bottom end of the distortion distribution, the downward nature of the coefficients curve indicates the increasingly negative nature of the distortion-size association i.e. the firms facing higher levels of distortion are bound to have a more adverse impact on their size[13]. The distinct downward trend in the 1990s gets massively eroded in the 2000s and 2010s which experience progressively flatter slopes showing that firm size has a very weak correlation with the levels of distortion that it faces. Both the time periods experience bumps in the curve (which is around the 60th percentile for the 2000s and the 80th percentiles for the 2010s). The bandwidth of the 95th confidence intervals

[13]The slight hump around the 75th to 90th percentiles might refer to firm specific regulations that might have still been in place, or other firm level variations that might not have been captured

show that while negligible, these effects are still significant, having controlled for time, state and sector fixed effects.

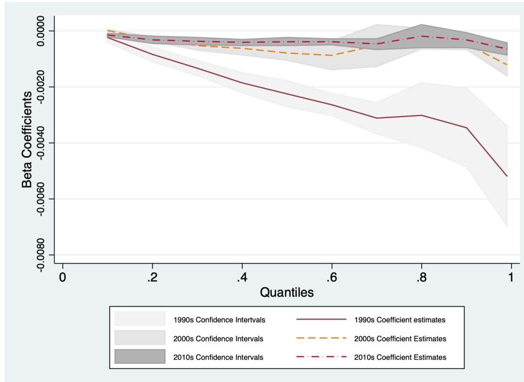


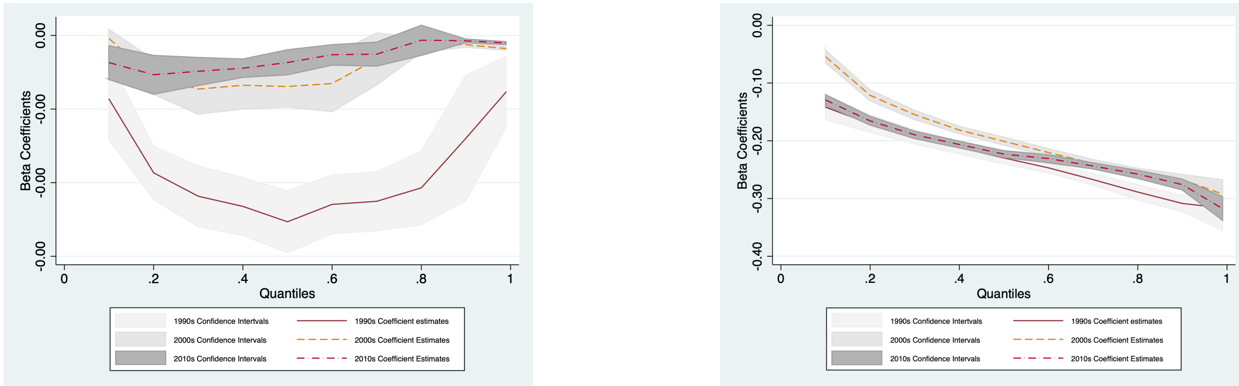
Figure 12: Relationship between Firm Size and MRPK across the MRPK distribution

Tracking log changes in MRPK with firm sizes gives us a very interesting insight on the relationship between changes firm level distortions and firm size. We see that the curve of beta coefficients on firm size takes on a U-shape, reaching a minimum point around the median of MRPK distribution. For firms facing less distortions (having less MRPK) than the median firm on this distribution, we see an increasing positive relationship between firm size and log changes in MRPK[14]. At the other end of the minimum point on the curve, we see a gradual weakening of this relationship where the higher we go on the MRPK distribution, the impact of the firm size progressively declines thereby showing that policies disconnected to firm size might have to play a role at this end of the distribution. This relationship between size and log changes in MRPK, changes drastically over the 2000s were we see that the curve shifts up and flattens towards a straight line much more with a increasingly negative and decreasingly negative rate at either ends of the distribution respectively, with a much more flattened portion around the mid portions of the distribution. This changes again in the 2010s, where the negative slope stops only around the 2nd decile with a flattened and slightly upward slope for a majority of the remainder of the distribution[15].

We see a clean downward relation between the changes in firm size and the changes in the levels of distortion faced by the firm. The downward relation indicates that changes in the size (i.e increases) of the firm are associated with a drop in the levels of distortion faced. The close stacking together of the estimates and confidence intervals does point to no significant change in the pattern across the different time periods, and might reveal that policies largely kept this level of association intact. From the 1990s to the 2000s and 2010s, we however do see that there is a slight upward blip around the mid to mid-large sized firms while the shifting of the curve towards zero in 2010s might indicate an ever so slight weakening of the relationship that night have taken place during this time period.

[14] Here the relationship is positive because of the negative values on the distribution post the log transformation - which would imply that a rise in firm size would also lead to a drop in the level of distortions faced by the firm

[15] This curve flattens out and drops downward a little toward the top end of the log MRPK distribution - implying that firms with highest increases in log MRPK might tend to be associated again a little more with lower firm sizes



(a) Firm Size across the Log MRPK distribution (b) Log Firm Size across Log MRPK distribution

Figure 13

Firm Level TFPR and Firm Size

Here I track the relationship between firm size and the TFPR that the firms face across different parts of the size distribution. While the 1990s and the 2000s indicate largely upward trajectories for this relationship, we see that there is a downward trend at the bottom end of the distribution, which takes the form of a flattened U-shape for the 1990s, but largely becomes a marginally upward sloping curve in the 2000s. The 2000s have a very flattened curve indicating that there is not much of a change in the relationship between firm size and TFP across most of the TFPR distribution except for at the top end.

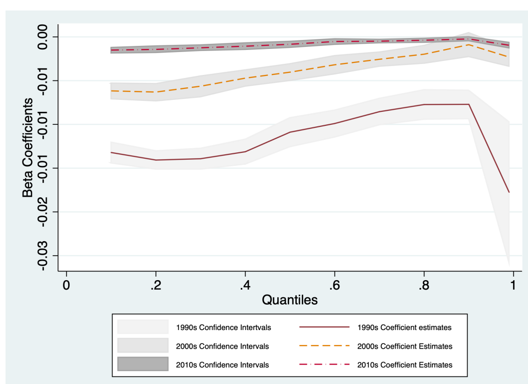
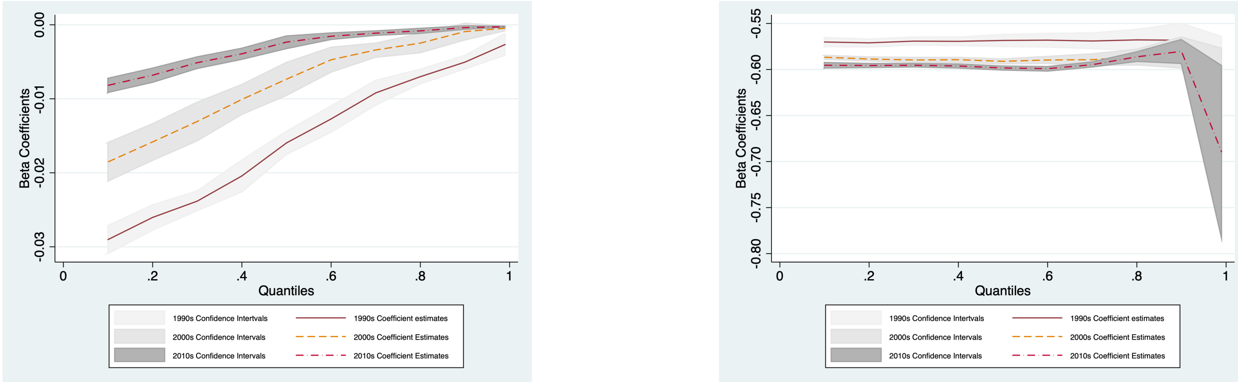


Figure 14: Relationship between Firm Size and TFPR across the TFPR distribution

One can see here the the negative relation between log TFPR and firm size remains largely the same for almost the entirety of the TFPR distributions across the years, except for a sharp drop in the end indicating an increase in the negative TFPR-size relationship among firms that are the top end of the TFPR distribution.

One can see here the the negative relation between log TFPR and log firm size remains largely the same for almost the entirety of the TFPR distributions across the years, except for a sharp drop in the end indicating an increase in the negative TFPR-size relationship among firms that are the top end of the TFPR distribution. This implies that the negative relationship between changes in TFPR and changes in firm sizes is almost constant throughout most of the distribution of the change in TFPR.



(a) Firm Size across the Log TFPR distribution

(b) Log Firm Size across Log TFPR distribution

Figure 15

Some Preliminary Estimations

Here I include some basic preliminary regressions that I have run without any policy variations to check for a broad firm level relationship between the outcome variables that I am currently looking at - Marginal Revenue Product of Capital (MRPK) and the Total Factor Productivity Revenue (TFPR) - and the variation in the level of foreign capital inflows into the firm. I am considering not just a linear relationship between the dependent and independent variable but also a log transformed equation to look at the elasticities of the independent variable with respect to the dependent variable. As an additional independent variable I also include firm size in the estimation specification to check for how the outcome variable might play out in the presence of the an additional covariates.

The estimation absorbs many levels of fixed effects including firm level fixed effects, state fixed effects, industry and year fixed effects thereby checking for variations in distortions faced by the firm and the association of firm size and it's foreign equity component in these variations in firm level distortions. Each of the estimations are carried out for five firm size bins and then for the entire sample. One round of estimations includes a specification with the entire time period, just with the post 2001 period (due to major foreign equity inflow relaxations during the period) and then a full sample estimation with a post-2001 dummy (which should ideally give very similar, if not the same, coefficients for the previous estimation). All standard errors in the estimations are clustered at the state industry level.

Estimation 1 across Tables 4a - 4c, looks at the MRPK (Levinson Petrin estimates) as the dependent variable. From Tables 4a and 4b, we see that foreign equity is associated with firms that have a higher MRPK in the economy across all time periods, but one cannot yet draw the direction of causality - whether foreign inflows are higher in firms that have a larger MRPK or vice versa. Only the latter would imply a more accurate allocation of foreign capital inflows into the economy. We see that for the full sample the coefficient is significant and negative which implies that in general, firms facing less distortions may be attracting more of the foreign capital inflows (which would explain why larger firms in the economy have significant coefficients). Table 4b repeats the same estimation for the post-2001 period only and we see that the only coefficient still statistically significant is that for the firms in the highest bin of size classifications. The coefficient on firm size is negative all throughout implying that larger firms experience lower distortions to capital.

Table 4c only adds an interaction between the post 2001 dummy and the firm size to check how firm size effects interact with the post 2001 dummy. We see that firm size largely has a statistically significant negative coefficient across most of the bottom half of the distribution. While we see FII having no significant coefficient except for at the top end of the distribution, we see that the interaction term of firm size and the 2001 dummy has a positive coefficient at the top end of the distribution - implying that post 2001, firms at the top end of the distribution experienced greater capital distortions as their size increased.

Tables 5a through 5c look at the same estimation setup as before but now with Revenue Productivity of the firm as a dependent variable. We see that for the individual size bins, foreign equity has no impact on revenue productivity for the firm, even though for the entire firm there is a statistically significant and negative relationship between TFPR and FII[16]. The relationship between firm size and TFPR is only significant for mid-sized firms in the economy. Table 5b, which looks at the same estimation for the 2001 period, finds similar results to Table 5a for FII as well for firm size, implying that a differing time period did not change this association too much. In table 5c, we only see that the full sample coefficient for FII is negative, in line with the previous two subtables that we have already seen.

In keeping with style of analysis conducted at the sectoral level, we look at lagged FII equity as a percentage of the firm's total equity composition, to look at the association between the FII equity composition in the previous period with the dependent variable in the current period. Firm size here is consistently negative across all sub-tables as previously seen with the coefficient on lagged FII being positive in both the aggregate time period as well as for the post 2000 phase for the firms at the top of the size distribution. The nature of causality is hard to figure out but here the coefficient would mean that an increase in the FII composition in the equity structure of the firm would increase the capital distortions faced by the firms in the current period. The full sample estimates of lagged FII composition are negative which in this would imply that an increase in the previous period inflows into FII lead to a drop in the distortion faced by the average firm in the full sample.

Tables 7a through 7c look at this with firm revenue productivity as the dependent variable. We see that while lagged FII has no impact on individual size bins, across the full sample it is associated with a drop in the revenue productivity of the average firm. Firm size has a negative impact on the revenue productivity at the middle of the size distribution meaning that these firms are associated with lower revenue productivity. The coefficients are largely similar in significance and sign for Table 7b as well, but this time firm size for the full sample post 2001 has a negative coefficient (implying that larger firms would have lower revenue productivity in the economy, and hence to a degree, lower levels of distortions). Table 7c, only reports that the full sample coefficient for lagged FII is negative and statistically significant, along with the firm size coefficient at the third bin being negative and significant.

Tables 8 through 11 deal with the same set of variables but with log-transformed now. Tables 8a, 8b and 8c all report positive and statistically significant coefficients for log of FII as a percentage of

[16]This implies that firms with higher revenue productivity attract lesser foreign equity inflows as a percentage of their equity

equity which would imply that firms at the top end of the size distribution have positive elasticity of their capital distortions with respect to the FII inflows. The positive coefficients hold for these firms at the top of the size distribution as well as for the full sample even in the case of lagged log changes in FII, as reported in tables 10a through 10c. Log of firm size is always negatively associated with log of MRPK with the interaction between the firm size and the dummy not yielding many significant values at either end of the distribution. The relationship between log FII inflows and log revenue productivity is much weaker but still positive at the top end of the distribution thereby implying a positive elasticity between FII and revenue productivity at the firm level, at the top end of the distribution as well as for the full sample (which might be asymmetrically driven by results at the top). However this positive relationship doesn't hold to be significant when looking at lagged log inflows. Firm size even here has a negative coefficient, and thereby negative elasticity with the revenue productivity.

Next Steps forward

Having conducted a broad analysis of cleaning up the data, generating key summary trends, identifying key firm level outcome variables and identifying potential sources of variation at the policy as well as the firm level that may answer the research question at a finer detail, the next stage in the research project would be the identification of an exogenous policy shock that might be able to answer the linkage between foreign capital inflows and the allocation problem that India currently faces.

Teasing out an identification strategy that decomposes the impact of trade liberalization, financial liberalization and de-regulation would be the ideal scenario, and the classification of industries at the three digit level (which has already been used in generating much of the analysis in this paper) would be of great help in evaluating the industrial, trade and macroeconomic policy of the country. The key task hence is now a more comprehensive review of the policy environment to set up a more nuanced causal relationship between my two principal variables here.

Having established this empirical side, it is also my aim to have a tractable model around firm dynamics to be able to explain the causes behind this issue of misallocation of foreign capital inflows to firms in an emerging economy setting.

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Appendices

Table 1

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8	(9) Model 9
Lagged FDI Inflows	0.0142	0.0175	0.0270						
	(0.107)	(0.0939)	(0.275)						
Lagged FII Inflows	-0.0158	-0.0130	-0.107***						
	(0.0134)	(0.0108)	(0.0186)						
Employment		-0.00747***	0.0588		-0.00514	0.595		-0.0103***	0.520
		(0.00276)	(0.426)		(0.00387)	(0.539)		(0.00232)	(0.533)
Capital Income Share		0.812**	3.372***		1.224***	4.636***		0.959**	3.103***
		(0.351)	(0.877)		(0.464)	(0.742)		(0.428)	(1.150)
Labour Income Share		-0.280	-0.0818		-0.166	1.272		0.0180	-0.00537
		(0.318)	(1.398)		(0.432)	(1.539)		(0.367)	(1.802)
Domestic Credit Deployment		-0.0000510	0.00344**		-0.000108***	0.00328**		-0.0000993***	0.00319**
		(0.0000401)	(0.00145)		(0.0000408)	(0.00133)		(0.0000355)	(0.00149)
External Dependence			0.583			0.920			0.965
			(0.644)			(0.760)			(0.677)
Share of Economy Output			8.687*			9.909***			8.914*
			(4.634)			(3.838)			(4.822)
Log FDI Inflows				-0.00137	0.00835	0.00307			
				(0.00517)	(0.00679)	(0.0120)			
Log FII Inflows				0.00439	0.0114	-0.0149			
				(0.00566)	(0.00770)	(0.0183)			
Lagged Log FDI Inflows							0.00228	0.00690	0.00475
							(0.00603)	(0.00545)	(0.0119)
Lagged Log FII Inflows							-0.000919	0.00764	-0.0466
							(0.00535)	(0.00705)	(0.0290)
Observations	432	256	96	352	218	83	352	218	83
R^2									

Note: The Dependent Variable here is Value Added TFP Growth at the sectoral level. All estimations are included with sector and time fixed effects, with standard errors clustered at the sectoral level

Table 2

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8	(9) Model 9
Lagged FDI Inflows	-0.200	0.240	0.577						
	(0.194)	(0.277)	(0.360)						
Lagged FII Inflows	-0.0282	-0.0435	-0.201***						
	(0.0407)	(0.0510)	(0.0131)						
Employment		-0.0202***	1.318***		0.0762***	-24.80***		0.0857***	-22.31***
		(0.00541)	(0.225)		(0.0122)	(9.304)		(0.00798)	(8.232)
Capital Income Share		1.873***	2.368***		-4.785***	-6.412*		-4.690***	-4.675*
		(0.561)	(0.531)		(1.802)	(3.781)		(1.756)	(2.602)
Labour Income Share		-1.218**	-0.227		3.614*	30.48***		4.946**	33.57***
		(0.496)	(0.936)		(1.882)	(1.860)		(1.952)	(6.113)
Domestic Credit Deployment		0.000127	-0.00189***		-0.000987***	0.0361***		-0.000993***	0.0351***
		(0.0000899)	(0.000486)		(0.000333)	(0.00972)		(0.000271)	(0.00899)
External Dependence			0.141			-20.25***			-19.93***
			(0.271)			(5.661)			(5.690)
Share of Economy Output			-0.846*			-8.005			-11.54***
			(0.438)			(9.337)			(1.158)
Log FDI Inflows				0.0108	0.00208	0.00759			
				(0.0247)	(0.0219)	(0.0496)			
Log FII Inflows				0.0129	0.0453	-0.103			
				(0.0592)	(0.0557)	(0.0669)			
Lagged Log FDI Inflows							0.0142	-0.000584	-0.0334
							(0.0151)	(0.0273)	(0.0834)
Lagged Log FII Inflows							-0.0188	-0.0146	-0.201***
							(0.0572)	(0.0548)	(0.0409)
Observations	194	114	43	149	98	37	148	99	38
R^2									

Note: The Dependent Variable here is Capital Distortion at the sectoral level for Models 1-3, and log of Capital Distortions for Models 4-9. For Undercapitalized sectors, the dependent variable was constructed by taking log of the absolute value for Models 4 through 9. Hence an increase in the dependent variable in these cases would mean greater under-capitalization of the sectors. All estimations are included with sector and time fixed effects, with standard errors clustered at the sectoral level.

Table 3

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8	(9) Model 9
Lagged FDI Inflows	0.550	0.210	0.258						
	(0.682)	(0.633)	(0.213)						
Lagged FII Inflows	0.168	0.285***	-0.124**						
	(0.139)	(0.0683)	(0.0545)						
Employment		-0.698	-4.224***		1.207***	-1.979*		1.555***	-1.635
		(0.447)	(1.086)		(0.450)	(1.146)		(0.547)	(1.153)
Capital Income Share		2.208	8.845***		5.409**	9.674***		4.360*	13.21***
		(1.906)	(2.904)		(2.498)	(1.858)		(2.438)	(0.497)
Labour Income Share		-3.058	11.54***		-9.481***	7.103***		-10.49***	5.947***
		(2.750)	(2.508)		(3.014)	(0.293)		(3.074)	(1.204)
Domestic Credit Deployment		0.00165	0.00587		0.00614**	0.000408		0.00812**	-0.00169
		(0.00224)	(0.00559)		(0.00276)	(0.00612)		(0.00319)	(0.00509)
External Dependence			0			0			0
			(.)			(.)			(.)
Share of Economy Output			66.72***			78.62***			56.53***
			(15.68)			(14.78)			(13.44)
Log FDI Inflows				-0.0597	-0.0219	-0.168***			
				(0.0440)	(0.0587)	(0.0550)			
Log FII Inflows				0.0239	0.106	0.0541			
				(0.0920)	(0.0697)	(0.152)			
Lagged Log FDI Inflows							-0.00281	-0.00969	-0.108
							(0.0671)	(0.0469)	(0.0690)
Lagged Log FII Inflows							-0.0397	0.0823	-0.0565
							(0.119)	(0.112)	(0.107)
Observations	183	113	47	157	97	41	156	96	41
R^2									

Note: The Dependent Variable here is Capital Distortion at the sectoral level for Models 1-3, and log of Capital Distortions for Models 4-9. An increase in the dependent variable in these cases would mean greater over-capitalization of the sectors during the given time period. All estimations are included with sector and time fixed effects, with standard errors clustered at the sectoral level.

Table 4a

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
FII as pct of total equity	-40.14*	-0.00342	0.144	0.0646*	0.0189***	-0.121*
	(23.37)	(0.0305)	(0.0946)	(0.0368)	(0.00692)	(0.0636)
Firm Size Measure	-114.2**	-6.548***	-1.698***	-0.305***	-0.000173***	-0.000914***
	(43.33)	(2.283)	(0.289)	(0.0200)	(0.0000497)	(0.000179)
Observations	2197	7807	21395	32954	40265	109830
R^2	0.745	0.932	0.851	0.773	0.743	0.109

Table 4b

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
FII as pct of total equity	0	0.145	0.140	0.0577	0.0158***	-0.0705
	(.)	(0.0869)	(0.0889)	(0.0392)	(0.00584)	(0.0479)
Firm Size Measure	-5510.8**	-21.71***	-2.487***	-0.348***	-0.000172**	-0.00131***
	(2206.8)	(5.549)	(0.219)	(0.0150)	(0.0000652)	(0.000155)
Observations	818	4686	15345	25369	31862	81347
R^2	0.758	0.933	0.851	0.780	0.771	0.142

Table 4c

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
FII as pct of total equity	0	0.0441	0.130	0.0566	0.0159***	-0.0837*
	(.)	(0.0675)	(0.0854)	(0.0379)	(0.00571)	(0.0488)
Firm Size Measure	-1955.1**	-9.817***	-0.807***	-0.357***	-0.000686**	-0.000778
	(889.7)	(2.126)	(0.276)	(0.0502)	(0.000298)	(0.00115)
post_2001=1 × K_firm	-4549.3**	-11.78**	-1.708***	0.0172	0.000495**	-0.000455
	(2201.3)	(4.489)	(0.305)	(0.0462)	(0.000227)	(0.000936)
Observations	949	5078	16097	26343	32882	84654
R^2	0.759	0.933	0.849	0.779	0.768	0.135

Note: The Dependent Variable in all three subtables is the Marginal Revenue Productivity of Capital calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 5a

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
FII as pct of total equity	0	-0.230	0.316	-0.367	-0.0411	-0.0886***
	(.)	(0.237)	(0.577)	(0.358)	(0.0357)	(0.0293)
Firm Size Measure	-131.7	7.366	-2.654***	-0.288***	-0.0000576	-0.000317
	(128.9)	(16.37)	(0.794)	(0.0730)	(0.000154)	(0.000206)
Observations	1641	6493	18642	29885	37637	98776
R^2	0.317	0.407	0.460	0.323	0.136	0.335

Table 5b

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
FII as pct of total equity	0	-0.361	0.334	-0.409	-0.0495	-0.0805*
	(.)	(2.713)	(0.607)	(0.411)	(0.0495)	(0.0433)
Firm Size Measure	-8881.4	34.91	-2.447**	-0.192***	0.0000148	-0.000385*
	(10225.0)	(93.85)	(1.045)	(0.0529)	(0.0000418)	(0.000200)
Observations	541	3806	13275	23020	29996	73464
R^2	0.320	0.407	0.501	0.326	0.243	0.342

Table 5c

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
FII as pct of total equity	0	-0.0166	0.327	-0.405	-0.0400	-0.0723*
	(.)	(0.376)	(0.597)	(0.401)	(0.0456)	(0.0413)
Firm Size Measure	-3201.5	32.15	-2.503	0.134	-0.000137	0.0000173
	(3537.6)	(41.77)	(1.606)	(0.272)	(0.000547)	(0.000752)
post_2001=1 × K_firm	-6517.4	6.856	0.202	-0.319	0.000155	-0.000367
	(7665.5)	(51.87)	(1.513)	(0.284)	(0.000524)	(0.000662)
Observations	637	4151	13958	23945	30953	76487
R^2	0.320	0.407	0.503	0.321	0.253	0.342

Note: The Dependent Variable in all three subtables is the Firm level revenue productivity calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 6a

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
L.(mean) fii_pct	-41.55	-0.00454	0.0196	0.0387	0.0181**	-0.142*
	(27.74)	(0.0331)	(0.0446)	(0.0299)	(0.00733)	(0.0723)
Firm Size Measure	-142.4**	-6.308***	-1.778***	-0.309***	-0.000165***	-0.000941***
	(57.55)	(2.220)	(0.291)	(0.0211)	(0.0000478)	(0.000206)
Observations	1725	6536	18740	29969	38039	99695
R^2	0.691	0.952	0.858	0.772	0.748	0.093

Table 6b

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
oL.(mean) fii_pct	0	0.0293	0.0273	0.0320	0.0136**	-0.0967*
	(.)	(0.0523)	(0.0503)	(0.0292)	(0.00611)	(0.0568)
Firm Size Measure	-5194.7**	-18.83***	-2.514***	-0.349***	-0.000168**	-0.00133***
	(2107.6)	(4.330)	(0.227)	(0.0171)	(0.0000640)	(0.000190)
Observations	700	3990	13580	23201	30270	74800
R^2	0.699	0.953	0.854	0.780	0.775	0.127

Table 6c

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
oL.(mean) fii_pct	0	0.0353	0.0254	0.0316	0.0138**	-0.108*
	(.)	(0.0496)	(0.0492)	(0.0288)	(0.00605)	(0.0582)
Firm Size Measure	-1725.1*	-9.347***	-0.862**	-0.335***	-0.000656**	-0.00101
	(985.3)	(1.947)	(0.331)	(0.0559)	(0.000302)	(0.00136)
post_2001=1 × K_firm	-4815.2*	-9.435**	-1.676***	-0.00804	0.000472**	-0.000244
	(2518.6)	(3.640)	(0.310)	(0.0521)	(0.000233)	(0.00110)
Observations	797	4321	14218	24059	31241	77737
R^2	0.693	0.953	0.853	0.778	0.772	0.119

Note: The Dependent Variable in all three subtables is the Firm level MRPK calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 7a

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
oL.(mean) fii_pct	0	-0.600	0.0758	-0.405	-0.0325	-0.103***
	(.)	(0.714)	(0.0554)	(0.403)	(0.0380)	(0.0291)
Firm Size Measure	-156.1	9.834	-3.068***	-0.268***	-0.0000513	-0.000356
	(140.5)	(20.89)	(0.611)	(0.0657)	(0.000163)	(0.000222)
Observations	1317	5523	16570	27525	35836	90845
R^2	0.350	0.407	0.480	0.301	0.139	0.348

Table 7b

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
oL.(mean) fii_pct	0	-0.662	0.0746	-0.447	-0.0500	-0.104**
	(.)	(0.986)	(0.0591)	(0.453)	(0.0515)	(0.0400)
Firm Size Measure	-6785.5	45.82	-2.929***	-0.171***	0.0000144	-0.000377**
	(7607.5)	(112.5)	(0.639)	(0.0370)	(0.0000395)	(0.000176)
Observations	474	3295	11927	21285	28686	68320
R^2	0.350	0.407	0.539	0.302	0.253	0.356

Table 7c

	(1) 0-25	(2) 25-45	(3) 45-65	(4) 65-85	(5) 85-99	(6) Full Sample
oL.(mean) fii_pct	0	-0.524	0.0870	-0.452	-0.0450	-0.0981**
	(.)	(1.101)	(0.0564)	(0.450)	(0.0486)	(0.0384)
Firm Size Measure	-2543.3	38.04	-2.971*	0.380	0.000229	-0.000129
	(2993.6)	(51.40)	(1.556)	(0.391)	(0.000393)	(0.000698)
post_2001=1 × K_firm	-5116.7	13.21	0.177	-0.544	-0.000203	-0.000219
	(5733.0)	(62.99)	(1.512)	(0.411)	(0.000376)	(0.000599)
Observations	553	3591	12509	22109	29598	71034
R^2	0.351	0.407	0.542	0.295	0.254	0.355

Note: The Dependent Variable in all three subtables is the Firm level Revenue Productivity calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 8a

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
ln_fii_pct	-0.0161***	0.00102	0.00309	0.0417***	0.0396***
	(8.67e-16)	(0.0433)	(0.0192)	(0.00683)	(0.00716)
ln_K_firm	0.663***	-0.776***	-0.625***	-0.566***	-0.566***
	(1.42e-15)	(0.131)	(0.0569)	(0.0314)	(0.0224)
Observations	16	393	1729	10729	13118
R^2	1.000	0.919	0.884	0.817	0.803

Table 8b

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
ln_fii_pct	-0.0161***	0.00102	0.00309	0.0417***	0.0396***
	(8.67e-16)	(0.0433)	(0.0192)	(0.00683)	(0.00716)
ln_K_firm	0.663***	-0.776***	-0.625***	-0.566***	-0.566***
	(1.42e-15)	(0.131)	(0.0569)	(0.0314)	(0.0224)
Observations	16	393	1729	10729	13118
R^2	1.000	0.919	0.884	0.817	0.803

Table 8c

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
ln_fii_pct	-0.0161***	0.00215	0.00255	0.0418***	0.0397***
	(8.67e-16)	(0.0434)	(0.0194)	(0.00681)	(0.00715)
ln_K_firm	0.663***	-0.272	-0.693***	-0.570***	-0.569***
	(1.42e-15)	(0.346)	(0.164)	(0.0333)	(0.0231)
post_2001=1 × K_firm	0	-0.460*	0.0139	0.0000124	0.0000145**
	(.)	(0.265)	(0.0377)	(0.00000820)	(0.00000605)
Observations	16	393	1729	10729	13118
R^2	1.000	0.920	0.884	0.817	0.803

Note: The Dependent Variable in all three subtables is the Firm level Revenue Productivity calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 9a

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
ln_fii_pct	0.310	-0.00539	0.00774	0.00831*	0.00868**
	(.)	(0.0273)	(0.0138)	(0.00474)	(0.00391)
ln_K_firm	0	-0.406**	-0.509***	-0.563***	-0.584***
	(.)	(0.154)	(0.0788)	(0.0204)	(0.0205)
Observations	6	349	1675	10493	12749
R^2	1.000	0.829	0.856	0.899	0.914

Table 9b

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
ln_fii_pct	0.310	-0.00539	0.00774	0.00831*	0.00868**
	(.)	(0.0273)	(0.0138)	(0.00474)	(0.00391)
ln_K_firm	0	-0.406**	-0.509***	-0.563***	-0.584***
	(.)	(0.154)	(0.0788)	(0.0204)	(0.0205)
Observations	6	349	1675	10493	12749
R^2	1.000	0.829	0.856	0.899	0.914

Table 9c

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
ln_fii_pct	0.310	-0.00494	0.00636	0.00822*	0.00866**
	(.)	(0.0273)	(0.0134)	(0.00475)	(0.00391)
ln_K_firm	0	-0.0560	-0.668***	-0.556***	-0.580***
	(.)	(0.356)	(0.0944)	(0.0194)	(0.0208)
post_2001=1 × K_firm	0	-0.317	0.0324**	-0.0000245***	-0.0000242**
	(.)	(0.255)	(0.0155)	(0.00000908)	(0.0000117)
Observations	6	349	1675	10493	12749
R^2	1.000	0.830	0.857	0.899	0.914

Note: The Dependent Variable in all three subtables is the Firm level Revenue Productivity calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 10a

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
L.ln_fii_pct	0.103*	0.0466	0.00166	0.0348***	0.0324***
	(0.0358)	(0.0564)	(0.0185)	(0.00677)	(0.00698)
ln_K_firm	0.430	-0.619***	-0.582***	-0.581***	-0.564***
	(0.366)	(0.147)	(0.0433)	(0.0285)	(0.0214)
Observations	25	340	1532	9932	12046
R^2	0.984	0.915	0.889	0.826	0.811

Table 10b

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
L.ln_fii_pct	0.103*	0.0466	0.00166	0.0348***	0.0324***
	(0.0358)	(0.0564)	(0.0185)	(0.00677)	(0.00698)
ln_K_firm	0.430	-0.619***	-0.582***	-0.581***	-0.564***
	(0.366)	(0.147)	(0.0433)	(0.0285)	(0.0214)
Observations	25	340	1532	9932	12046
R^2	0.984	0.915	0.889	0.826	0.811

Table 10c

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
L.ln_fii_pct	0.101	0.0767	0.00195	0.0349***	0.0325***
	(0.151)	(0.0570)	(0.0190)	(0.00675)	(0.00698)
ln_K_firm	0.864	0.435	-0.551**	-0.584***	-0.566***
	(0.892)	(0.500)	(0.200)	(0.0312)	(0.0230)
post_2001=1 × K_firm	-2.103	-0.978**	-0.00608	0.0000107	0.00000894
	(6.665)	(0.365)	(0.0397)	(0.0000108)	(0.00000984)
Observations	25	340	1532	9932	12046
R^2	0.984	0.919	0.889	0.826	0.811

Note: The Dependent Variable in all three subtables is the Firm level Revenue Productivity calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

Table 11a

	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
L.ln_fii_pct	-1.237	-0.0256	0.00900	0.00426	0.00599
	(.)	(0.0428)	(0.0118)	(0.00499)	(0.00406)
ln_K_firm	8.285	-0.469***	-0.494***	-0.561***	-0.574***
	(.)	(0.146)	(0.0666)	(0.0222)	(0.0193)
Observations	8	308	1492	9715	11725
R^2	1.000	0.823	0.855	0.899	0.915

Table 11b

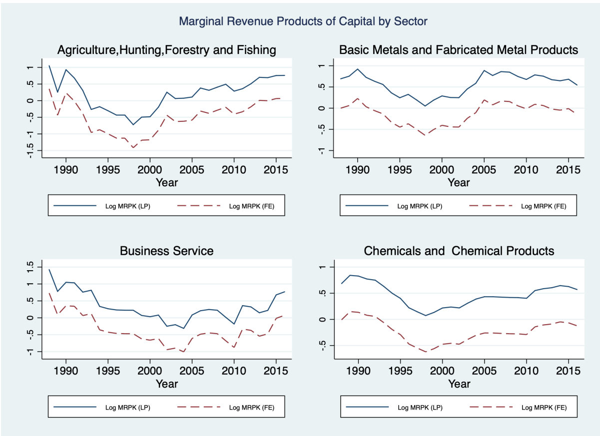
	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
L.ln_fii_pct	-1.237	-0.0256	0.00900	0.00426	0.00599
	(.)	(0.0428)	(0.0118)	(0.00499)	(0.00406)
ln_K_firm	8.285	-0.469***	-0.494***	-0.561***	-0.574***
	(.)	(0.146)	(0.0666)	(0.0222)	(0.0193)
Observations	8	308	1492	9715	11725
R^2	1.000	0.823	0.855	0.899	0.915

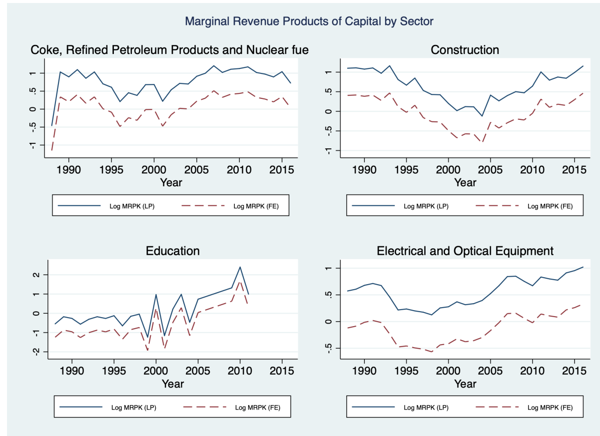
Table 11c

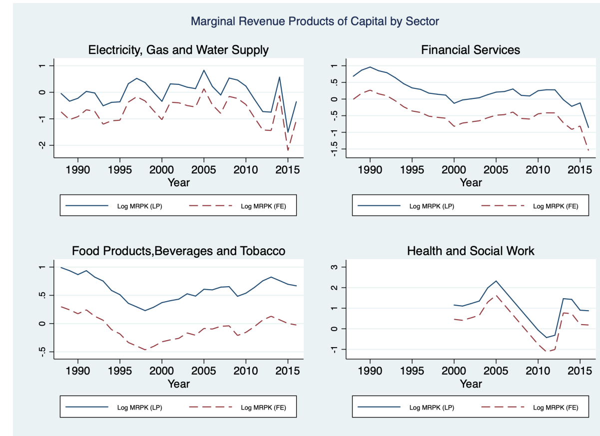
	(1) 25-45	(2) 45-65	(3) 65-85	(4) 85-99	(5) Full Sample
L.ln_fii_pct	-1.237	-0.0220	0.00786	0.00412	0.00593
	(.)	(0.0503)	(0.0118)	(0.00499)	(0.00406)
ln_K_firm	8.285	-0.346	-0.605***	-0.555***	-0.569***
	(.)	(0.294)	(0.109)	(0.0213)	(0.0192)
post_2001=1 × K_firm	0	-0.113	0.0218	-0.0000232**	-0.0000242**
	(.)	(0.283)	(0.0157)	(0.00000900)	(0.0000107)
Observations	8	308	1492	9715	11725
R^2	1.000	0.824	0.856	0.899	0.915

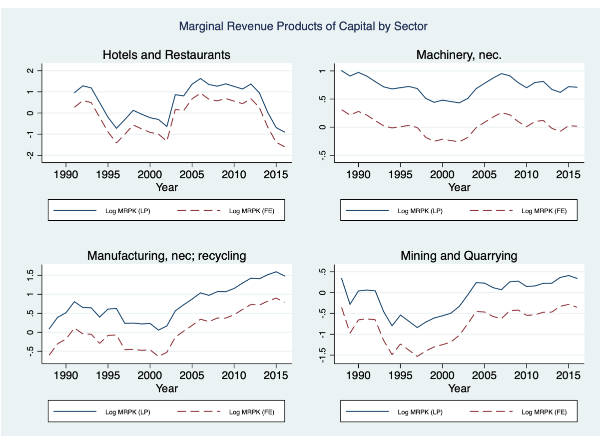
Note: The Dependent Variable in all three subtables is the Firm level Revenue Productivity calculated using the Levinson Petrin production function estimation. The estimation includes the sample of all firms, split according to different decile classifications (corresponding to the estimation column). Firm fixed effects, State, time and Sectoral Fixed Effects have been accounted for here. Subtable (a) deals with the entire time period, (b) with the post 2001 period only and (c) deals with the entire period with the inclusion of a post 2001 dummy.

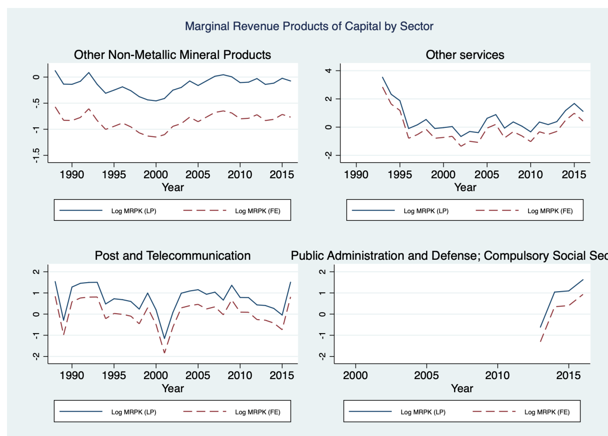
Figures for Sectoral Trends in MRPK

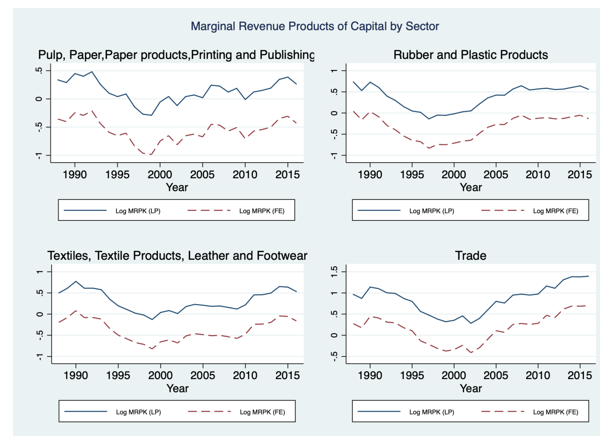












Figures for Sectoral Trends in TFPR