

# **Emergence of Asia: Reforms, Corporate Savings and Global Imbalances**

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## **Abstract**

A leading explanation for global imbalances is the self-financing behavior of credit-constrained firms in rapidly growing emerging markets. The growth of such firms creates lack of domestic investment opportunities for the financial sector and hence a growing share of domestic savings is invested abroad generating a current account surplus. We document, however, the increase in corporate savings, generally the largest component of national saving, was due in large part to government owned enterprises (SOEs). We identify this effect utilizing a unique firm-level data set from several Asian countries and a differences-in-differences methodology, where we document SOEs save more and invest less following various reforms in Asia during the last decade. Our results have important aggregate implications for the models that attempt to explain joint dynamics of growth and current account surplus that lead to global imbalances.

## **1 Introduction**

Before the global financial crisis, academicians and policy makers argue that one of the key reasons behind the global imbalances that led to the crisis, was the high saving rates in Asian countries. These savings found their way into the developed world in the form of reserves. The reasons behind these high savings rates and/or why they were invested mostly in the rich nations are not well understood given the lack of empirical evidence on the issue.

While several theory papers argue that financial frictions and self-finance motives of firms are responsible for an increase in private savings and capital outflows following liberalization (see for example Buera and Shin (2011) and Song et al. (2011)), other papers pushed the importance of public savings due to limited commitment of governments combined with expropriation risk to explain the observed patterns in capital outflows from Asia (see for example Aguiar and Amador (2011) and Benigno and Fornaro (2012)). Mendoza et al. (2009) and Caballero et al. (2008) argue that these high savings find their way into the developed world since

savers in emerging economies seek insurance in safe U.S. bonds given the limited supply of safe assets elsewhere. Dooley et al. (2007) propose that governments in the emerging countries of Asia influence international financial transactions, targeting current account so as to foster employment and export-led growth.

Empirical evidence so far cannot tell one theory apart from the other. There are several reasons why the existing evidence is inconclusive. First, most of the evidence that is put forth in favor of a given model is mainly plotting aggregate trends in macro data disregarding micro-level heterogeneity. Given the fact that almost all of these models will match aggregate trends, it is not surprising that we cannot tell them apart. Ignoring micro-level heterogeneity in the data is in sharp contrast to what these models aim to do since firm-level heterogeneity is a key foundation in many. Second, few papers that do take micro-level heterogeneity seriously and undertake systematic empirical exercise with firm or industry level data, do so in a static environment. This means that they identify purely from long-run average relationships and not from dynamic changes in the data, which is what the global imbalances are about. This is elusive in terms of trying to answer the key question at hand, that is why the savings rates have risen so much in rapidly growing emerging markets? Finally, almost all of the empirical papers exclusively focus on China, where during the global imbalances period of 2000s, Korea, Malaysia, Thailand, India, Indonesia, Singapore and Hong Kong all have similar growth experiences and capital outflows.<sup>1</sup>

In this paper, we formally test the key assumption in several models that attempt to explain global imbalances by focusing on rising savings together with raising productivity, that is the rise in savings is due to private firms financing themselves. The common story in many such models is as follows.<sup>2</sup> Due to legal and financial market imperfections, private firms are financing themselves out of internal savings. The rapid growth of these self-financed firms as a result of more openness/liberalization has created lack of domestic investment opportunities for banks. As a consequence, a growing share of domestic savings is invested abroad and this generates a capital account deficit and matching current account surplus. The key here is heterogeneity in productivity combined with financial frictions. Once an economy becomes more open or liberalizes through a series of reforms, pre-existing distortions got eliminated that leads a rise in productivity due to better allocation of resources. But given the financial frictions saving rates surge at the expense of domestic investment.<sup>3</sup> Though, existing financial frictions do not operate same for everybody given the heterogeneity, such as private enterprises and state-owned enterprises (SOEs), where the latter do not need to finance internally and can borrow from banks easily.

Guided by the implications of such models, we investigate the determinants of corporate

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<sup>1</sup>See Alfaro et al. (2012).

<sup>2</sup>See for example Song et al. (2011).

<sup>3</sup>See for example Buera and Shin (2011), who focus on individual distortions.

savings and investment in Asian countries, focusing on all firms and not just listed firms as the norm in the existing literature. Given the fact that listed firms only amount to approximately 30 percent of the GDP in such economies on average it is utmost essential to investigate the behavior of all firms.<sup>4</sup> In order to capture firm-level heterogeneity, we focus on the difference between SOEs and private firms in terms of saving and investment behavior. The reason to use Asian firms as our sample is simply because in order to test the key assumptions of the above theories we need to use emerging countries with current account surpluses and productivity growth during the global imbalances period and firms where we can clearly identify the ownership structure as SOEs versus private firms. The other set of countries where we can do a similar decomposition in the ownership structure is Latin America, but those countries did not have the same positive correlation between productivity growth and capital outflows during our period of study.<sup>5</sup> Similarly, any other country either do not have enough SOEs or were not real actors in the global imbalances period.

For identification we use a differences-in-differences methodology, where we compare the savings and investment behavior of SOEs to that of privately owned firms before and after reforms. In terms of dealing with endogeneity such a methodology is preferable since reforms are exogenous to these groupings of firms, where firms are classified as SOE and/or private before the reform period and did not switch from one group to another throughout. Provided that there is a similar prior trend before the reform in the savings and investment behavior of government and privately owned firms, we can deduce the causal differential effect of reforms on savings and investment of SOEs versus private firms. Given our use of firm, country-year and sector-year effects, we identify only from changes, absorbing all average differences between SOEs and private firms and also any general firm level trends together with country-year or sector-year policy or other shocks.

We focus on reforms undertaken during 2000s that are available from the most comprehensive cross-country data on financial liberalization.<sup>6</sup> There are two reasons for such a focus: First, during our sample period of 2000s, which is also the key period for global imbalances, there was a push for financial liberalization and hence several of our countries undertook such reforms, though not all, providing us with control and treatment groups of firms from different Asian countries. Second, such reforms constitute a perfect laboratory to test the key assumption of the theory, that is financial frictions. If financial frictions cause private firms to save more than SOEs originally then financial reforms that reduce such frictions should undo this behavior and lead capital inflows as also predicted by the models we describe above. Financial reforms might make SOEs less likely to obtain cheap bank loans, while at the same time make private entrepreneurs more likely to obtain bank loans reducing the need for self-finance. This impli-

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<sup>4</sup>See Bayoumi et al. (2010).

<sup>5</sup>See Gourinchas and Jeanne (2013) and Alfaro et al. (2012).

<sup>6</sup>We use data originally documented by Abiad and Mody (2005) and extended by Abiad et al. (2008).

cation can be tested with financial reforms that are undertaken at any time, however, by using this period we can also test the aggregate implications of firm-level heterogeneity for global imbalances. A finding of lower savings by private firms relative to SOEs as a result of financial reform will be supportive of the micro foundations of the theories based on financial frictions, however, they may or may not be consistent with the aggregate implications of these models depending on the dynamics of capital flows for our Asian countries sample during 2000s.

Our analysis exploits cross-country firm-level data over time from ORBIS, a commercial database provided by Bureau Van Dijk which contains administrative data on millions of firms worldwide. The financial, ownership and balance sheet information in ORBIS is initially collected by local Chambers of Commerce and in turn, is relayed to Bureau Van Dijk through some 40 different information providers. The database provides this information for each firm starting from 1996 until 2012.

ORBIS dataset is crucially different from the other data sets that are commonly-used in the literature such as COMPUSTAT for the United States, Compustat Global, and Worldscope databases in that 99 percent of the data in ORBIS covers private companies, whereas the former popular data sets are mainly for large listed companies.<sup>7</sup> A fundamental advantage of the data is to have type-specific ownership. It is not only that we know the foreign and domestic owners of each company, we also know whether the owner is “government” type, or “other” for non-classified owners such as private individuals, private shareholders, foundation, foundation/research institute.

We find that financial reforms increase SOEs savings relative to private firms, conditional on their investment. Hence, after such reforms SOEs net saving is positive, whereas that of private firms is negative. This result holds both for listed firms and for the full sample that includes non-listed firms. For both listed firms and the full sample, one point increase in financial reform index results in about 20% higher SOE net savings on average. Although these results are consistent with the self-financing behavior of private firms when there are financial frictions, they also imply that such self-financing behavior of private firms may not be the main underlying reason for capital outflows and global imbalances. The reason is simply that upon such reforms capital should flow in once private firms start saving less but during our period of 2000–2012 the countries we use kept having current account surpluses as shown in Figure 1. The mean current account as percentage of GDP stays positive for our countries, as shown in Table 1, even when we consider the reversals experienced after the global financial crisis of 2008.<sup>8</sup>

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<sup>7</sup>For listed companies, disclosure rules vary from country to country but for most of our countries, we know the identity of the owner if the stakes owned exceed 3-5 percent. Often, we know the identity of the owners holding as low as 0.01% ownership stake in private companies.

<sup>8</sup>In Appendix, Figures 4 and 5 show national savings and investment, as percentage of GDP. Saving rates are all higher than 20%, and exceeds investment rate in the most part of the period.

Figure 1: Current Account

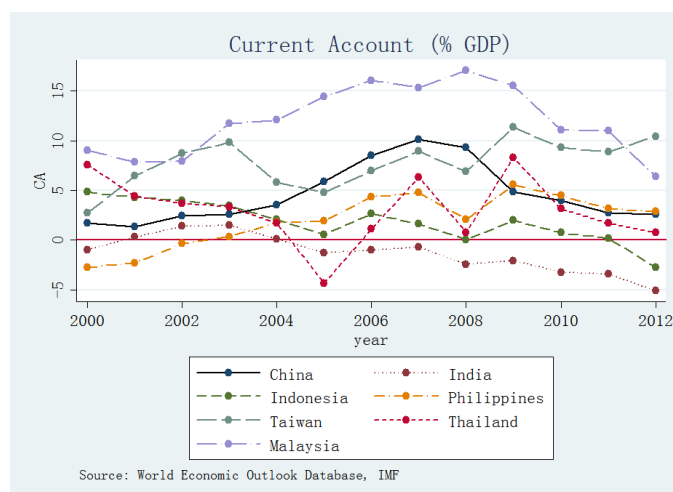


Table 1: Current Account/GDP Balances

	2000–2012	2000–2007
China	4.59	4.52
India	-1.30	-0.09
Indonesia	1.82	2.93
Philippines	1.99	0.97
Taiwan	7.78	6.79
Thailand	2.97	2.99
Malaysia	11.97	11.82
Overall	4.26	4.49

One explanation for our result might be the fact that SOEs mainly operate in capital intensive upstream sectors, such as energy, as a monopoly. If reforms help private sector growth in the downstream sectors, there would be more rent for the upstream sectors to extract. As a result, SOEs will have higher profit and save more.<sup>9</sup> Such a model will imply that capital outflows is due to government sector's savings, which will be consistent with the aggregate behavior we observe during our period of study. An alternative explanation is that our reforms do not capture a reduction in financial frictions. We use reforms on the removal of interest rate controls and security market liberalization, which supposedly capture a direct decrease in financial frictions. We also use capital account liberalization and an overall reform measure, where the latter includes some other type of reforms such as removal of entry barriers in several sectors. Although we use each reform one at a time since reforms do not happen in the same year, it is possible that our financial reforms capture some lagged effects of real reforms. Nevertheless, our results are universally robust and not change from reform to reform. In addition, we must be capturing some reduction in financial frictions given our findings of lower savings

<sup>9</sup>See Li et al. (2012) for such a model.

for private firms relative to SOEs upon the reform. For further robustness, we use placebo reforms, where we show that there is no difference between SOEs and private firms when there is no reform. Our control group countries, countries where no reform took place, also act as general controls for the smooth trend differences between SOEs and private firms since their reform index do not change discretely in the absence of a reform.

Our paper is related to a vast literature. Focusing on China, Song et al. (2011), using data from China National Bureau of Statistics Flow of Funds, show that profits, return to capital and employment are higher and rising in private firms compared to SOEs since 1998.<sup>10</sup> Li et al. (2012) argued that profit to sale ratio is higher in SOEs but productivity is lower and explain this by the rent seeking behavior of SOEs within a vertical production structure. Dollar and Wei (2007), using detailed survey data on 12,400 firms, though for a single year of 2005, also show average return to capital to be twice as high in private firms as in fully state-owned enterprises. They also show SOEs finance a larger share of investment via bank financing as opposed to private firms, a time invariant characteristic of SOE versus private firms, which is also true for many other emerging markets. Yang (2012) showed that from 2000 onwards the aggregate savings rate increased moving above the rate of investment in China and once decomposed, he shows, all sectors, corporate, government, and household, contributed to the increase in saving. Kuijs (2006) and Chamon and Prasad (2010) argue that rise in corporate and government saving contributed to increase in national saving rate more than the rise in household saving in China.<sup>11</sup>

Bayoumi et al. (2010) investigate whether or not corporate savings can explain the increase in the savings in China. They claim all the evidence on China that points to corporate savings driving the high national savings is based on evidence from China NBS flow-of-funds and this data is of suspect. It cannot be verified by a third party and is subject to many revisions. They also argue that the claim on China SOEs having higher savings rate cannot be verified without a systematic empirical study with firm-level data that investigates the profit and income patterns of firms by ownership and sector. They undertake such a study using 1500+ Chinese listed firms and 30000+ listed firms worldwide and find that listed corporate firms in China is no different than other listed firms elsewhere and rise in corporate savings is part of a trend as also documented by Karabarbounis and Neiman (2013). Comparing SOEs and private firms in China they also find no significant difference in the savings patterns of such firms.

Different from Bayoumi et al. (2010), we use a comprehensive database, where listed companies only account for 20% of the final sample, and we are not interested in the Chinese corporate saving rate per se, but instead how financial reforms affect SOEs and non-SOEs differently given our guidance by the theory. We fully control such rising trends in corporate savings let it

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<sup>10</sup>They also show a positive relation between employment in private firms and a surplus at the provincial level.

<sup>11</sup>When it comes to China, explanations for high household savings include changing demographics, changing sex ratio, income uncertainty, among others. See Chamon et al. (2010), Chamon and Prasad (2010), Wei and Zhang (2011), Du and Wei (2013).

be global or country-specific through the use of country-year effects- another advantage of our firm-time-level data from several Asian countries. The key reason for the difference between results is that, we use firm fixed effects, allowing us to identify solely from firm-specific time changes as oppose to cross-sectional long-run averages.<sup>12</sup>

We are also related to the papers on the corporate governance of SOEs and non-SOEs. State-owned enterprises, or more generally, the state sector, have been found to be associated with low efficiencies.<sup>13</sup> The (lack of) incentives has been proposed as an explanation for the poor performance of these state enterprises, and reforms that increase incentives are found to have improved the efficiency.<sup>14</sup> We are unaware of, however, studies that have used cross country over time firm level data, to systematically examine the saving and investing behaviors of SOEs and non-SOEs, and to study the impacts of reforms on this difference.

Finally, this paper is related to the studies on capital market imperfections in Asian economies. In emerging economies like China, capital markets are biased towards SOEs and this distort the saving and investing incentives of SOEs. Many papers have looked into this issue to understand the distortion better.<sup>15</sup> In this paper, we do not attempt to look into what determines this distortion but rather provide empirically sound estimates of the differences between SOEs' and private firms' savings and investment behavior, testing one of the key explanations of global imbalances.

The rest of the paper is structured as follows. Section 2 describes the methodology. Section 3 reviews the data. Section 4 presents the results and Section 5 concludes.

## 2 Methodology

We will employ a differences-in-differences methodology and run the following regression:

$$y_{i,c,j,t} = \beta SOE_{i,c,j} \times Reform_{c,t} + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \quad (1)$$

where  $i, c, j, t$  stand for firm, country, sector, and time respectively.  $y_{i,c,j,t}$  denotes firm-level savings and investment.  $SOE$  is a dummy that states whether or not a firm is state-owned.  $Reform$  denotes the reform, which is at country-time level. This variable is an index (score)

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<sup>12</sup>In the appendix we focus on China and discuss further how our results are related to those studies that focus on China such as Bayoumi, Tong and Wei (2010).

<sup>13</sup>See, for example Dollar and Wei (2007) and Brandt et al. (2012)

<sup>14</sup>See, for example Li (1997) and Groves et al. (1994)

<sup>15</sup>See, for example Dollar and Wei (2007), Cull and Xu (2003) and Song and Wu (2012), among many others

for each country’s state of financial liberalization and it only changes (jumps discretely) when a reform is undertaken in a given year.  $\phi_{j,t}$  and  $\varphi_{c,t}$  denote sector-year and country-year effects. These effects are important controls for any sector level policies such as subsidies and taxes and also country level policies such as exchange rate valuations that might affect results.  $\alpha_i$  denotes firm-fixed effects which means we identify from changes following reforms and not from permanent differences in savings rates of government versus privately owned firms. And finally  $\xi_{i,c,j,t}$  denote the error term. We also control for other firm-level variables such as profitability, size, and age.

## 3 Data

### 3.1 Firm-Level Data

We use the ORBIS dataset which is compiled by BvD and covers firms from many countries. ORBIS includes company financials in a standardized and internationally comparable format together with detailed company ownership information—in particular whether owners are government or foreign and also whether owners are financial or industrial firms. The identity of the owner is known and hence its balance sheet information can be also found in the dataset with a unique ID number. The database provides financial and ownership information for each firm starting from 1996 to 2012, while the best coverage is for the 2001–2011 period. We have information on close to one million observations from 11 Asian countries.<sup>16</sup> Our firm-level data are drawn from the Far East and Central Asia subset of ORBIS. Our analysis make use of: a) financial information, including balance sheet items and profit and loss account items; b) ownership information; and c) industry and activity information.

In our sample, for the majority of the companies, the financial information are from December of the year. Some companies, however, report their financial information in other months of the year. For the companies whose financial information are from months before June, we change the year of information to one year before. For example, if a company reports a profit of 1 million in May, 2013, we count this as its profit for the year of 2012.

In the empirical analysis, we focus the period with best coverage: 2001–2011. We have the following economies: China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, and Japan. All of which, except Japan, are from emerging Asia

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<sup>16</sup>In general there might be some representativeness issues in ORBIS, where many smaller and younger firms are typically under-represented. Hence, one can align the sample of firms with the distribution of the firm population as reflected in confidential national business registers. Andrews and Cingano (2012) did such a methodology for OECD countries, where they used re-sampling weights, based on the number of employees in each industry cell, which essentially scales-up the number of ORBIS observations in each cell so that they match those observed in the confidential national data. Kalemli-Ozcan, Sorensen, Volosovych (2013) do a similar adjustment also for OECD countries. They observe similar results both with adjusted and unadjusted data.



and observed similar levels of capital outflows and productivity growth during the last decade.<sup>17</sup> During this sample period, many countries have experienced financial reforms, providing us with necessary variation to identify the differential impact of financial reforms. We also have countries with no reforms acting as a control group; these are Japan, Hong Kong, Korea and Singapore.

### **3.2 Firm-Level Savings and Investment**

The financial variables are from the “Global Standard Format” and “Global Detailed Format” of ORBIS. Our preferred measure for firm savings is “Retained Earnings”, which is reported as a separate item by listed firms from the “Global Detailed Format.” Since the majority of our companies are private, we make use of the item “Other Shareholders’ Fund” (hereafter OSFD) from the “Global Standard Format.”

In balance-sheet accounting, Shareholders’ Fund = Capital + Other Shareholders’ Fund. OSFD includes retained earnings but it also includes treasury reserves, net depreciation, profit/loss for the fiscal year, voluntary provisions, and minority interests. While retained earnings is still the biggest part of OSFD, changes in OSFD in principle can be driven also by other items. In the empirical analysis, we show that for companies where we can directly observe both measures, we obtain regression coefficients that are very close to each other. We present additional evidence that OSFD is a good proxy for firms’ savings in the appendix.

Our primary measure for firm investment is the year-to-year change in fixed asset stock, which reflects the net increase on firms’ capital stock. Fixed asset stock include tangible fixed assets, like plant, properties, equipment (PPE), as well as intangible assets. Hence we also use alternative investment measures based on tangible assets and PPE, obtaining similar results.

### **3.3 Firm-Level Ownership**

Our primary goal in this paper is to investigate the differential response of SOEs and non-SOEs to financial reforms, therefore it is crucial to obtain correct classifications for state ownership. ORBIS’s unique ownership database allows us to classify firms based on both direct and indirect ultimate ownership information. There is no other data set which such information that comprehends both listed and unlisted firms over time. We proceed as follows to classify the firms according to their ownership structure:

1. We find companies whose global ultimate owner is recorded in the BvD Ownership Database in a given year. In extracting the information, we require a minimum of 25% shares along each link. We generate SOE\_DUMMY1 based on the type of this ultimate

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<sup>17</sup>Singapore and Hong Kong are financial centers and not exactly emerging markets.

owner: If a company's ultimate owner is recorded as "public authority, government," we label this company as SOE, otherwise we label it as non-SOE. In the case where a company's ultimate owner is missing, or the type of the ultimate owner is unclear, we leave SOE\_DUMMY1 with missing value.

2. We use information from step 1 to update the type of each companies' shareholders. So if company B, a shareholder of company A, where B has an ultimate owner being "Public Authority," we change the type of company B to "Public Authority" as well, even though B itself might be an "Industry Company" or "Financial Company." This serves to capture to the maximum extent the possibility that government authorities may hold companies indirectly through either industry company, financial companies or other type of entities. In this case, the ownership goes as Government–B–A, and B is the intermediary through which the government control A, so we update B's type to "Public Authority."
3. We also create SOE\_DUMMY2, and set this variable to 1, if firm's biggest *direct* shareholder in a given year is recorded as "Public Authority," where the previous SOE\_DUMMY1 is based on ultimate ownership.
4. The above measures are for firm-year observations, but the time variation is very limited since firms do not change from being private to SOE or vice versa in our sample during our period.<sup>18</sup> Hence, we collapse the data so each firm has value 1 for SOE\_DUMMY2 if it is recorded as SOE in any year in the sample; It is assigned a value 0 for SOE\_DUMMY2 if its biggest shareholder in all years are non-government related. Given the fact that our data is time-varying we can check the status of firms and they stay SOE till the end of our sample.
5. We determine firms' type based on SOE\_DUMMY1 and SOE\_DUMMY2. As we are more confident in SOE\_DUMMY1, when SOE\_DUMMY1 and SOE\_DUMMY2 differs, we use SOE\_DUMMY1. In robustness check we run all regression with SOE\_DUMMY2 only, and our results remain robust.

### 3.4 Country-Level Financial Reforms

Our measures for financial reforms are drawn from "A New Database of Financial Reforms" introduced by Abiad et al. (2008). This database covers 91 economies over the period of 1973–2005. In addition to the aggregate measure for financial reforms, this database divide the overall measure into seven dimensions and assign a score for financial reform to each of them. These dimensions are: credit controls and reserve requirements, interest rate controls, entry barriers,

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<sup>18</sup>The biggest privatization wave was before our sample period.

state ownership, policies on securities markets, banking regulations, and restrictions on the capital account. Table 2 summarizes the reforms that have taken place in our Asian countries after 2002.<sup>19</sup> During this period, Japan, Hong Kong, Korea and Singapore experienced no reforms and hence all these countries are included as the control group.<sup>20</sup>

Table 2: Financial Reforms During 2002-2005

	China		India	Indonesia	Malaysia		Philippines	Taiwan		Thailand
Overall Reform	2002	2004	2004	2003	2003	2004	2005	2002	2003	-
Interest Controls	2002	2004	-	-	2004		-	-	-	-
International Capital	-	-	2004	-	-	-	-	-	-	-
Securities Market	2004		-	-	2003		-	2003		-
Any Reversal	-	-	-	-	-	-	-	-	-	2003

The reform (reversal) dates are the years when the countries experience increase (decrease) in either overall financial reform index, or its three dimensions we focus on (Interest Controls, Capital Account Openness, and Security Market Reform). Each dimension is rated on the scale of 0-3 based on whether the financial market is fully depressed (0), partially depressed (1), partially liberalized (2), fully liberalized (3). The overall reform is simply the sum of the scores of each sub-dimension.

As shown in Table 2, several countries went through several reforms. The reform dates are the years when the countries experience increase in either overall reform index or one of its sub-components, where overall index changes only when one of the sub-components change. Hence the dates correspond to actual reforms. There can also be reversals, where Thailand experienced a reversal in 2003 (restricting capital account openness). Each sub-component is on the scale of 0-3 from least to most liberalized policy and a reversal will record a downward movement.

Strict interest rate control takes the form of government specifying either lending or deposit rates (or both) by fiat. An intermediate case allows interest rates to fluctuate within a band. A reform on interest rate control could take the form of either abandoning control completely or expand the band. International capital control reform is opening up capital account, and security market reforms is stock market liberalization.

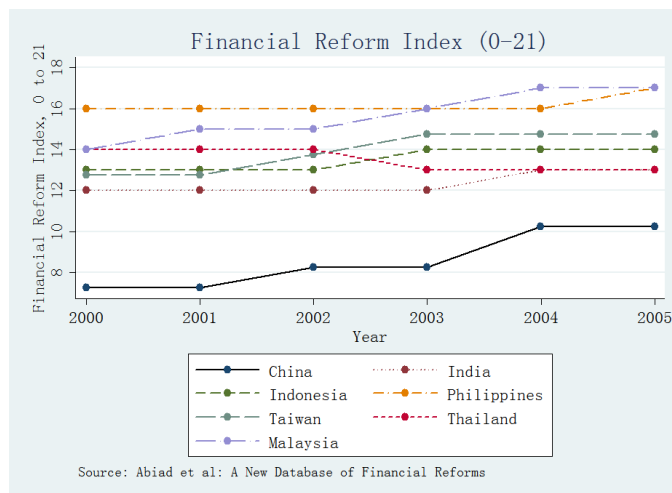
To make sense of the magnitude of a one point increase in score for financial reform, in the full sample (91 countries over the period of 32 years), the mean for overall score is 10.3 out of 21, and the standard deviation is 6.333. So one point increase in the overall score is only 1/6 of the standard deviation. Within the seven countries listed in Table 2, the mean for the overall score is 7.61 and the standard deviation is 5.43. When we look at those countries for only the period between 2002-2005, the sample mean is 13.7, while the standard deviation is 2.36, so a one point increase in overall score corresponds to less than one half standard deviation.

<sup>19</sup>Our firm-level data has better coverage after 2002.

<sup>20</sup>We do not use banking supervision and entry barriers reforms since only Taiwan went through these in 2003 at the same time and hence we cannot separately identify their impact. We also do not use banking privatization reform, because the channels through which it affects firm saving is hard to interpret.

Figure 2 plots the overall reform index for the sample countries over the period of 2000–2005. As we can see, during this period, all countries experience at least one point increase in the overall score; countries like Malaysia, China, experienced 3 points increase in this score, where each change corresponds to a discrete jump in a given year, which is ideal for a differences-in-differences estimation. Even though the reforms are not frequent, there are different timing of reforms, from which we can identify their differential impacts.

Figure 2: Overall Financial Reforms



### 3.5 Descriptive Statistics

Our measures for firms savings’ are retained earnings for listed firms and other shareholders’ fund (OSFD) which includes retained earnings for non-listed firms. Our measure for investment is the year-to-year change in fixed assets, so it reflects firms’ net investment in fixed assets. We also use the breakdown of fixed assets as year-to-year change in tangible fixed assets and PPE (net plants, properties and equipment). Notice that the use of country-year fixed effects will absorb all exchange rate related valuation changes. The summary statistics are reported in Table 3.<sup>21</sup> All dependent variables are normalized by total assets to control for firm size.

Based on the summary statistics, the listed companies and unlisted companies look similar. Listed companies have slightly higher investment but this can simply be due to selection into being listed where these firms are big. Measured by  $\frac{OSFD}{TotalAssets}$ , listed companies retained a higher proportion of profits in the company, again something that can be due to selection since unlisted companies are younger and accumulate less past earnings. Within the sample of listed companies,  $\frac{OSFD}{TotalAssets}$  are higher than  $\frac{RetainedEarnings}{TotalAssets}$ , but the two distributions are similar as shown in the appendix. This can be due to the fact that OFSD include other items in addition to

<sup>21</sup>We used the trimmed data set for both summary statistics and empirical analysis. Winsorized data gives similar results. We report the trimming procedures in the appendix.

retained earnings and hence the discrepancy between the two can be bigger for big listed firms.

Table 4 summarizes the average number of observations we have after trimming outliers and dropping firms without relevant financial information or ownership information. The average number is obtained by taking arithmetic mean of number of observations over the sample period. The number of firms available in the data set for each million population ranges from only 2 (India and Indonesia) to 404 (Korea). We want to point out that we have several order of magnitude more firms per country compared to other studies (China firm level studies generally use around 1500 listed firms for example, where we have 20,000+). Hence, our sample covers a non-trivial fraction of production in each country.

## 4 Empirical Analysis

### 4.1 Firm Saving

As described in the methodology section, in order to investigate how financial reforms affects saving and investment behaviors of SOEs relative to non-SOEs, we run the following regression.

$$y_{i,c,j,t} = \beta SOE_{i,c,j} \times Reform_{c,t} + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \quad (2)$$

where  $i, c, j, t$  are firm, country, sector, and time respectively.  $\phi_{j,t}$  and  $\varphi_{c,t}$  denote sector-year and country-year effects. Recall that,  $\alpha_i$  denotes firm-fixed effects which means we identify from changes following reforms and not from permanent differences in savings rates of government versus privately owned firms.  $y_{i,c,j,t}$  denotes firm-level savings, where we use  $\frac{\text{Retained Earnings}}{\text{Total Asset}}$  for savings in the baseline regression which is for listed firms.

$Reform$  denotes the financial reform, which is at country-time level. In the baseline regression, we use the overall score for financial system for each country, and it is interacted with SOE dummy to capture the differential impacts of reforms on SOEs and non-SOEs.<sup>22</sup> We also control for firm profitability, measured as  $\frac{Profit}{Total Assets}$ , and investment rate, measured as the change in fixed assets divided by total assets.

Our primary results are reported in Column (1) in Table 5. The coefficient for the interaction term of overall score for financial reform and SOE dummy is positive and significant, suggesting financial reforms drives SOEs to save more than non-SOEs. One point increase in

<sup>22</sup>See the previous section for the detailed construction of this dummy.

the overall score (close to half standard deviation and a typical observed increase) results in 1.92 percentage point increase in firms saving rate. To put this number into context, the mean  $\frac{\text{Retained Earnings}}{\text{Total Asset}}$  in the sample of listed firms is about 10%. So a one-point increase leads to about 20% increase in mean firm saving rate. In the regression, we control for investment level of firms already, and hence the regression coefficients should be interpreted as conditional on the level of investment. As a result financial reforms drive SOEs to have higher net savings.

Since our data captures specific types of financial reforms, we take a closer look at how each reform differ from each other in terms of their impacts. To do so, we replace overall score for financial reform with specific reforms and run the regression using the same set of fixed effects and control variables.

Column (2) to (4) in Table 5 report the coefficients for the interaction between score for each dimension of financial reform and SOE ownership dummy. Each reform differ in terms of their impact on SOE saving, where the direction of the effect is similar: interest rate control reform has the biggest impacts, increasing SOE saving rate by as much as 4.16 percentage point, or 40% increase. International capital control reform does not affect SOEs saving significantly. Security market reform increase SOEs' net savings by 3.79 percentage point, or 37%.

$\frac{\text{Retained Earnings}}{\text{Total Asset}}$  is our preferred measure of investment. Listed firms report this as a separate item. For non-listed firms we will use of  $\frac{\text{Other Shareholders' Fund}}{\text{Total Asset}}$  which includes retained earnings with other funds. But first, for listed firms since we have both variables, we report results with this other measure of savings. Table 6 reports the regressions similar to those in Table 5, except that the dependent variable is now  $\frac{\text{Other Shareholders' Fund}}{\text{Total Asset}}$ . The coefficients are very close to those in Table 5, suggesting reforms do not affect other components of OSFD differently for SOEs and non-SOEs.

Table 7 reports the regressions using the full sample, where we use  $\frac{\text{Other Shareholders' Fund}}{\text{Total Asset}}$  as measure of firm saving. We find the coefficients are very close to those report in Table 6. Since for the full sample we do not observe retained earnings, we cannot interpret these coefficients relative to the retained earnings. To be conservative, we use mean OSFD as measure for the mean saving rate for the full sample. Then our results suggest reforms lead to a change of 1.56 (overall score) to 3.27 (security market reform) percentage point increase in saving, and this is about 15% of the mean saving rate.

In robustness check, we also use other variables for investment and the results do not change. In all these regressions, the standard errors are clustered at country\*sector levels since that is the level of treatment. Clustering at either firm level or country level results in slightly smaller standard errors and hence higher significance.

## 4.2 Firm Investment

Although we condition the effect of reforms on savings behavior of SOE versus non-SOE on investment, we also look into how financial reforms affects' SOEs and Non-SOEs' investing behavior. We run the following regressions.

$$y_{i,c,j,t} = \beta SOE_{i,c,j} \times Reform_{c,t} + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \quad (3)$$

where  $i, c, j, t$  are firm, country, sector, and time respectively.  $\phi_{j,t}$  and  $\varphi_{c,t}$  denote sector-year and country-year effects. Recall that,  $\alpha_i$  denotes firm-fixed effects which means we identify from changes following reforms and not from permanent differences in savings rates of government versus privately owned firms.  $y_{i,c,j,t}$  denotes firm-level investment, where we use yearly change in total fixed assets normalized by assets.

Column (1) in Table 8 and Table 9 report the regression results for the listed sample and the full sample. Overall, financial reforms decreases the fixed asset investment of SOEs relative to non-SOEs, and the decrease is both statistically and economically significant. In the sample of listed companies, each one point increase in the overall score for financial reform decrease SOEs' investment by 2.6 percentage point, which is close to the mean net fixed asset investment rate. In the full sample, this effect is bigger: one point increase in financial reforms decrease SOEs' fixed asset investment rate by 3.2 percentage point, which is higher than the mean net investment rate.

Column (2)-(4) in Table 8 and 9 report the regressions for each dimension of financial reforms. The results differ for different reforms. In the listed sample, security market reform has a significant negative effect on SOE investment, with a much bigger impact, while other reforms do not have a major effect. In the full sample, all reforms have a significant negative impact. SOEs have much higher investment rate compared to non-SOEs. So financial reforms tend to decrease the difference in investment rate between SOEs and non-SOEs. In general, the estimates for investment regressions are bigger. This finding is consistent with the big dispersion in fixed asset investment rate in our sample (see Figure 8 in Appendix).

Taken together, our results suggest that conditional on investment rate and profitability, financial reforms tend to increase SOEs retained earnings; financial reforms also tend to decrease SOE investment rates.

### **4.3 Robustness: Sovereign Wealth Funds**

Before we define a company as majority-owned SOE, if its biggest shareholder is classified as "Public Authority, State, or Government." But these owners can also be investors in sovereign wealth funds, meaning owners reside in foreign countries. To drop these companies, we drop SOEs, whose biggest shareholder's country of origin is not the same as where the company is located. These companies are found mainly in Taiwan and Japan. There are several hundreds of them, and they add up to about 6000 observations for the period of 2001-2011.

Tables 10-12 report the main results, after dropping the companies previously classified as SOE, whose biggest shareholder are not domestic governments, but foreign sovereign funds, for example the "Government of Norway via its funds". These funds are owned by foreign national governments, whose type is "Public authority, State, Government" in ORBIS. These companies are mostly located in Taiwan and Japan. Dropping these companies do not affect the results.

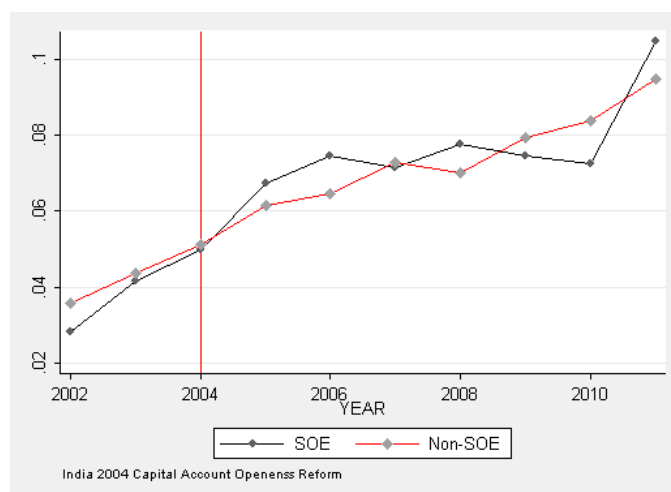
### **4.4 Robustness: Threats to Identification**

Since we use a diff-in-diff methodology, it is crucial that there were no divergence in trends between SOEs and non-SOEs' saving behaviors prior to reforms. Figure 3 plots the median saving rates for India listed companies for SOEs and non-SOEs. This graph shows there was no visible prior trend difference in savings between SOEs and non-SOEs, where the difference emerges after the reform. This graph should be interpreted with caveat, though, as it does not net out the full range of fixed effects.

A better way to test for the effect of any trend difference between SOEs and non-SOEs on our results is to conduct placebo tests. We have a limited pretreatment period and hence we focus on countries with longer pre-treatment periods. Two such countries with two fake reform dates are India 2003, and Philippines, 2004. These two placebos are chosen to make sure they are one year prior to the actual reforms, and at least three years after previous reforms, so that they are not capturing the lagged effects from previous financial reforms. Table 13 report the main results using these placebo reforms. Controlling for a series of fixed effects, as well as firms investment and profitability, we do not find significant impacts of these fake reforms on savings of SOEs versus non-SOEs.



Figure 3: Indian Listed Firms



To investigate whether our primary findings are affected by the financial-crisis period, we exclude the sample from 2008 onwards. Table 14 report results that are similar to our our main results using this sample.

## 5 Concluding Remarks

We investigate the savings and investment behavior of state-owned versus private enterprises in 11 Asian countries after financial reforms using a unique firm-level data. We find that state-owned firms (SOEs) save more and invest less relative to private firms after the financial reforms.

Our results cast doubt on financial friction view of global imbalances. The reason is as follows. According to this view, private firms self-finance their productivity growth given the extent of domestic financial frictions, leading to capital outflows. Hence any reduction in such frictions should undo this behavior leading to capital inflows. During our period of study, our countries consistently run current account surpluses in spite of the fact that there is reduction in financial frictions as a result of financial reforms. In addition due to these financial reforms SOEs saved more on net relative to private firms. Hence if capital outflows are driven by corporate savings as argued elsewhere in the literature then they must be driven by SOEs increased savings during our period of study of 2000s.

We use a difference-in-differences methodology, where we compare the savings and investment behavior of SOEs to that of privately owned firms before and after reforms. In terms of dealing with endogeneity such a methodology is preferable since reforms are exogenous to these groupings of firms, where firms classified as SOE and/or private pre-reform. Provided that (as we show) there is a similar prior trend before the reform in the savings and investment behavior of government and privately owned firms, we can deduce the causal differential effect

of reforms on savings and investment of SOEs versus private firms. Given our use of firm, country-year and sector-year effects, we identify only from changes, absorbing all average and trend differences between SOEs and private firms and also any country-year or sector-year policy or other shocks.

Several caveats are in order that deserve further study. Our reforms might not capture a reduction in financial fractions and/or their effect might take longer to affect saving-investment decisions. Since our data does not cover the universe of private firms, we might not capture the private firms who might behave differently. Nevertheless, our results are robust using the most comprehensive firm-country-time level data set so far in the literature. We interpret our results as evidence for the strong role of governments in emergence of several Asian countries in the global arena and role of such governments in driving capital outflows and global imbalances.

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Table 3: Summary Statistics

	Mean	std	Min	Max	#Obs
<b>Listed Companies</b>					
Profit/Total Asset	0.03	0.10	-0.96	0.93	93,174
Retained Earnings/Toal Asset	0.10	0.39	-4.77	0.99	85,001
Investment/Total Asset	0.03	0.26	-2.32	0.85	87,737
Tangible Investment/Total Asset	0.03	0.13	-0.71	0.79	85,143
PPE Investment/Total Asset	0.03	0.08	-0.25	0.44	77,112
OSFD/Total Asset	0.25	0.41	-6.44	1.00	90,016
<b>Unlisted Companies</b>					
Profit/Total Asset	0.05	0.12	-0.97	0.93	583,436
Investment/Total Asset	0.01	0.29	-2.32	0.85	549,115
Tangible Investment/Total Asset	0.03	0.14	-0.71	0.79	193,733
OSFD/Total Asset	0.15	0.44	-6.47	1.00	582,270

Investment is defined as year-to-year change in fixed asset stock;

Tangible Investment is defined as year-to-year change in tangible fixed asset stock;

PPE Investment is defined as year-to-year changes in Plants, Properties and Equipment Investment.

Shareholders' Fund = Capital + Other Shareholders' Fund (OFSD)

OSFD includes retained earnings but it also includes treasury reserves, net depreciation, profit/loss for the fiscal year, voluntary provisions, and minority interests.

Table 4: Firm Sample

	Population (Million)	Average Number of Firms <sup>a</sup>	Number of Firms Per Million People
Japan	127.8	9967	78
China	1344	22072	16
Indonesia	242.3	416	2
Indian	1241	2709	2
Hon Kong	7.02	242	34
Singapore	5.18	1926	372
Thailand	69.52	1684	24
Taiwan	23.34	1639	70
Philippines	94.85	528	6
Korea	49.78	20120	404
Malaysia	28.86	1704	59

<sup>a</sup>Average is taken over the period of 2002-2011

Table 5: Retained Earnings (Listed Companies)

	(1)	(2)	(3)	(4)
	Retained Earnings Over Total Assets			
Overall Score*SOE	0.0192*** (0.00633)			
Interest Control*SOE <sup>a</sup>		0.0416*** (0.0137)		
International Capital*SOE <sup>b</sup>			-0.0248 (0.0381)	
Security Market*SOE <sup>c</sup>				0.0379*** (0.0110)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
Investment <sup>e</sup>	Y	Y	Y	Y
$\bar{R}^2$	0.059	0.059	0.059	0.059
Observations	89246	89246	89246	89246

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table only use listed companies, 2001-2011

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

<sup>e</sup>Change in Fixed Assets/Total Assets

Table 6: Other Share Holders' Fund (Listed Companies)

	(1)	(2)	(3)	(4)
	"Other Shareholders' Fund" Over Total Assets			
Overall Score*SOE	0.0176*** (0.00633)			
Interest Control*SOE <sup>a</sup>		0.0379*** (0.0134)		
International Capital*SOE <sup>b</sup>			-0.0266 (0.0391)	
Security Market*SOE <sup>c</sup>				0.0352*** (0.0109)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
Investment <sup>e</sup>	Y	Y	Y	Y
$R^2$	0.046	0.046	0.046	0.046
Observations	89525	89525	89525	89525

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table only use listed companies

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

<sup>e</sup>Change in Fixed Assets/Total Assets



Table 7: Other Share Holders' Fund (Full Sample)

	(1)	(2)	(3)	(4)
	"Other Shareholders' Fund" Over Total Assets			
Overall Score*SOE	0.0156** (0.00725)			
Interest Control*SOE <sup>a</sup>		0.0280* (0.0156)		
International Capital*SOE <sup>b</sup>			-0.00923 (0.0367)	
Security Market*SOE <sup>c</sup>				0.0327*** (0.0125)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
Investment <sup>e</sup>	Y	Y	Y	Y
$R^2$	0.024	0.024	0.024	0.024
Observations	667659	667659	667659	667659

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table use only listed companies

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

<sup>e</sup>Change in Fixed Assets/Total Assets

Table 8: Investment (Listed Companies)

	(1)	(2)	(3)	(4)
	Fixed Asset Investment Over Total Assets			
Overall Score*SOE	-0.0261**			
	(0.0125)			
Interest Control*SOE <sup>a</sup>		-0.0296		
		(0.0229)		
International Capital*SOE <sup>b</sup>			-0.0616	
			(0.0481)	
Security Market*SOE <sup>c</sup>				-0.0603**
				(0.0278)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
$R^2$	0.107	0.107	0.107	0.107
Observations	87584	87584	87584	87584

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table use the full sample

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Measured as Profit/Total Asset

Table 9: Investment (Full Sample)

	(1)	(2)	(3)	(4)
	Fixed Asset Investment Over Total Assets			
Overall Score*SOE	-0.0323*** (0.0115)			
Interest Control*SOE <sup>a</sup>		-0.0354* (0.0203)		
International Capital*SOE <sup>b</sup>			-0.114*** (0.0391)	
Security Market*SOE <sup>c</sup>				-0.0665** (0.0259)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
$R^2$	0.036	0.035	0.035	0.036
Observations	634155	634155	634155	634155

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table use the full sample

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Measured as Profit/Total Asset

Table 10: Robustness: Retained Earnings (Listed Companies without Foreign-Owned)

	(1)	(2)	(3)	(4)
	Retained Earnings Over Total Assets			
Overall Score*SOE	0.0158*** (0.00608)			
Interest Control*SOE <sup>a</sup>		0.0304** (0.0121)		
International Capital*SOE <sup>b</sup>			-0.0211 (0.0428)	
Security Market*SOE <sup>c</sup>				0.0326*** (0.0116)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
Investment <sup>e</sup>	Y	Y	Y	Y
$R^2$	0.054	0.054	0.053	0.054
Observations	79127	79127	79127	79127

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table exclude those majority-owned by foreign governments

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

<sup>e</sup>Change in Fixed Assets/Total Assets

Table 11: Other Share Holders' Fund (Full Sample without Foreign-Owned)

	(1)	(2)	(3)	(4)
	"Other Shareholders' Fund" Over Total Assets			
Overall Score*SOE	0.0161** (0.00704)			
Interest Control*SOE <sup>a</sup>		0.0350** (0.0145)		
International Capital*SOE <sup>b</sup>			-0.0145 (0.0409)	
Security Market*SOE <sup>c</sup>				0.0307** (0.0131)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
Investment <sup>e</sup>	Y	Y	Y	Y
$R^2$	0.025	0.025	0.025	0.025
Observations	659812	659812	659812	659812

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table exclude those majority-owned by foreign governments

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

<sup>e</sup>Change in Fixed Assets/Total Assets

Table 12: Investment (Full Sample without Foreign-Owned)

	(1)	(2)	(3)	(4)
	Fixed Asset Investment Over Total Assets			
Overall Score*SOE	-0.0268** (0.0113)			
Interest Control*SOE <sup>a</sup>		-0.0381* (0.0205)		
International Capital*SOE <sup>b</sup>			-0.108*** (0.0415)	
Security Market*SOE <sup>c</sup>				-0.0476* (0.0246)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
$R^2$	0.035	0.035	0.035	0.035
Observations	627886	627886	627886	627886

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table exclude those majority-owned by foreign governments

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

Table 13: Placebo Test

	(1)	(2)	(3)
	Retained Earnings (Listed)	OSFD (Listed)	OSFD(Full Sample)
Placebo Reform * SOE <sup>a</sup>	0.0169 (0.0484)	-0.0134 (0.0368)	-0.0212 (0.0370)
Profit_Asset	Y	Y	Y
Investment	Y	Y	Y
Country*Time	Y	Y	Y
Sector *Time	Y	Y	Y
Firm Fixed Effects	Y	Y	Y
$R^2$	0.053	0.047	0.022
Observations	84314	88990	647069

Clustered (at country\*sector level) Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

<sup>a</sup>The placebo reforms are India, 2003 and Philippines, 2004

Table 14: Prior-Crisis Subsample (Listed)

	(1)	(2)	(3)	(4)
	Retained Earnings Over Total Assets			
Overall Score*SOE	0.0167** (0.00656)			
Interest Control*SOE <sup>a</sup>		0.0267* (0.0152)		
International Capital*SOE <sup>b</sup>			-0.00439 (0.0416)	
Security Market*SOE <sup>c</sup>				0.0366*** (0.0101)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Firm Fixed Effect	Y	Y	Y	Y
Profitability <sup>d</sup>	Y	Y	Y	Y
Investment <sup>e</sup>	Y	Y	Y	Y
$R^2$	0.039	0.038	0.038	0.039
Observations	45450	45450	45450	45450

Clustered (at Country\* Sector Level) standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Profit/Total Assets

<sup>e</sup>Change in Fixed Assets/Total Assets

# A Appendix

## A.1 Aggregate Saving and Investment

Figure 4: Investment

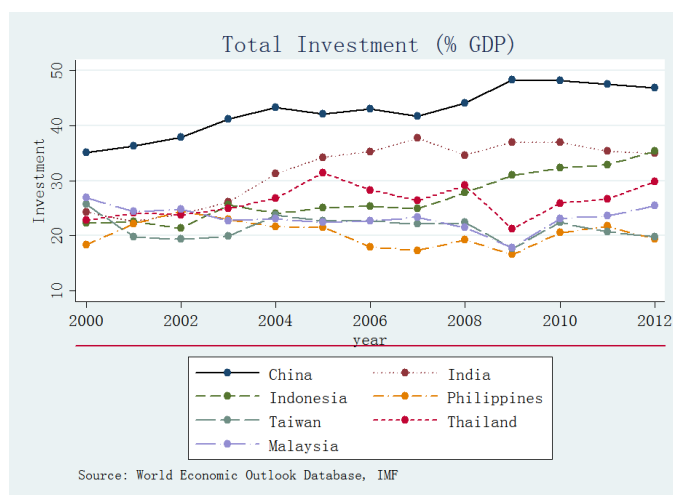
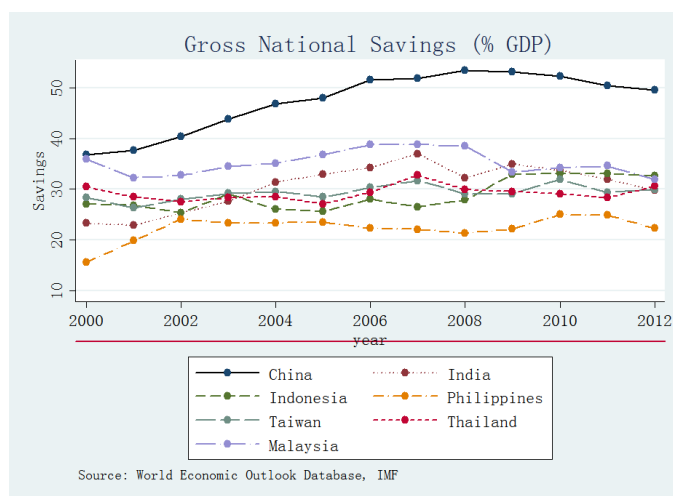


Figure 5: Savings



## A.2 Relationship Between OSFD and Retained Earnings

The following evidence support the idea that OSFD is a good measure for firms saving, like retained earnings.

First of all, as we can see from Figures 6 and 7, the distribution of these two variables assemble each other, although their means differ.

Secondly, even if we don't count other items under OSFD as firm saving, as long as the relationship between retained earnings and OSFD don't respond to financial reforms differently for SOEs and non-SOEs, the coefficients from regressions using OSFD should be same as those using retained earnings. We use OSFD/Asset the run the baseline regressions for the sample



of listed companies only. As reported in Table 6, the results very close to Table 5: at least for listed sample, using these two measures would lead to similar conclusions.

Finally, to test whether  $\frac{RetainedEarnings}{OSFD}$  respond to financial reforms differently for SOEs and non-SOEs, we use this item as dependent variables in our baseline regression. Reassuringly, none of the coefficients are significantly different from zero.

### A.3 China Focus

This section relates the findings in this paper to studies that focus on China, in particular to Bayoumi et al. (2010), which uses financial data for listed companies over the world to look at corporate saving patterns. Their main findings are the following: First, the Chinese listed companies do not have a significantly higher saving rate than the global average; second, within Chinese listed companies, SOE and non-SOEs do not display different saving and investment behaviors; there are no significant trend difference between SOEs and non-SOEs either.

Our results are mainly related to their third finding mentioned above: we find financial reforms tend to increase saving and decrease fixed asset investment of SOEs relative to non-SOEs. Since countries mostly experience improvements in the scores for financial reforms, our results are consistent with a positive trend in gross saving, and a negative trend in fixed asset investment. Another difference between our approach and Bayoumi et al. (2010) is that we utilize a new database on financial reforms, therefore are able to identify the impacts of the reforms directly, instead of relying on time trend, where we control for all trends explicitly.

To investigate why our results differ, we restrict our analysis to the Chinese listed companies for the period of 2002-2007, as Bayoumi et al. (2010). We construct measure for gross saving, investment, as well as net saving in similar ways. We run the following regression, with and without firm fixed effects (without fixed effects version is identical to Bayoumi et al. (2010)):

$$y_{sit} = \Phi_s + Year_t + SOE_i + SOE_i * Financial\ Reform + Size_i \quad (4)$$

for firm  $i$  in sector  $s$  at time  $t$ . Company size is total assets.  $\Phi_s$  is the sector fixed effects and  $Year_t$  is the time fixed effects.  $y$  is savings.

Table 15 report results from regression Equation 4 for corporate savings. Column (1) and (3) in Table 15 report the results using gross savings (measures used by Bayoumi et al. (2010)) and retained earnings (our preferred measure), respectively. As we can see, consistent with Bayoumi et al. (2010), we find improvement in overall score does not drive different saving behavior of SOEs and non-SOEs; with our preferred measure, we find there is a statistically significant effect, but it is not economically significant, and is much smaller compared to our main results. Column (2) and (4) control for firm-fixed effects. As can be seen, once firm fixed effects are included, the coefficients are significant and bigger in magnitude. In particular,

using our preferred measure (Column (4)), the coefficient is very close to our baseline results. Adding investment as a control deliver similar results.

#### A.4 First Differences: Savings

In the main empirical analysis, we use “Retained Earnings/Total Asset” and use fixed effect regressions to find out the impacts of reforms on increase in savings, since with fixed effect the coefficients will be identified from the change in retained earnings, hence savings. In this section we present an alternative approach, where we use  $\frac{RetainedEarnings_t - RetainedEarnings_{t-1}}{TotalAsset_{t-1}}$  as the outcome variables, and run OLS regressions, controlling for investment rate, country\*time fixed effects, and sector\*time fixed effects as before.<sup>23</sup>

We obtain similar results as we show in Table 16, 17 and 18. Overall financial reforms and specific reforms along interest rate control, security market and capital account openness all have positive and significant impact on SOE saving, conditioning on the level of investment. To interpret the magnitude, we need now the sample mean of  $\frac{RetainedEarnings_t - RetainedEarnings_{t-1}}{TotalAsset_{t-1}}$ , that is 0.0236; the sample mean of  $\frac{OSFD_t - OSFD_{t-1}}{TotalAsset_{t-1}}$ , that is 0.038 for listed companies, and 0.02 for the full sample. We obtain similar results as before. Using  $\frac{OSFD_t - OSFD_{t-1}}{TotalAsset_{t-1}}$  as the measure, the reforms in interest rate control, security market and capital account openness will lead to 14% to 20% increase in saving rate.

#### A.5 Other Robustness Checks

We did some other robustness checks to our main results. We try clustering at different levels (firm, country and country\*sector), and our main results are robust to these choices. In the regression for firm savings (so the dependent variables are  $\frac{Retained Earnings}{Total Assets}$  and  $\frac{Other Shareholders' Fund}{Total Asset}$ ), we try controlling for the level of fixed capital stock, instead of fixed asset investment (as in the baseline regressions), and the point estimates remain unchanged.

#### A.6 Trimming

We trim the data in the following way. For variables that are stock in nature, and normalized by total assets, we trim it at 1% from the left, and 1 from the right (because these variables by construction is bounded from above by 1) from the right. These variables include:  $\frac{OSFD}{TotalAsset}$ ,  $\frac{RetainedEarnings}{TotalAsset}$ .

For Profit, we also normalize it by total assets, and trim it at 1% from both side.

For investment variables, measured as changes in Fixed Asset/Tangible Fixed Asset/PPE, we normalize it by total asset, and trim it at 5% from the left and 1% from the right. The

<sup>23</sup>The sample is trimmed at 5% from both tails based on the distribution of the outcome variables.

trimming is not symmetric, because these variables are characterized by long left tails, and if we trim it at 1% from the left tail, the regressions will give big negative results that are not very sensible.

All these trimming procedures apply to the full sample that we have corresponding financial information. The summary statistics in Table 3 is based on the sample after trimming and dropping the observations where we don't have ownership information. Regressions are based on this same sample, or the listed subset of this sample.

The following graphs are the distributions of the variables after trimming. As we can see they are centered around the means, without very long tails.

Figure 6: Retained Earnings

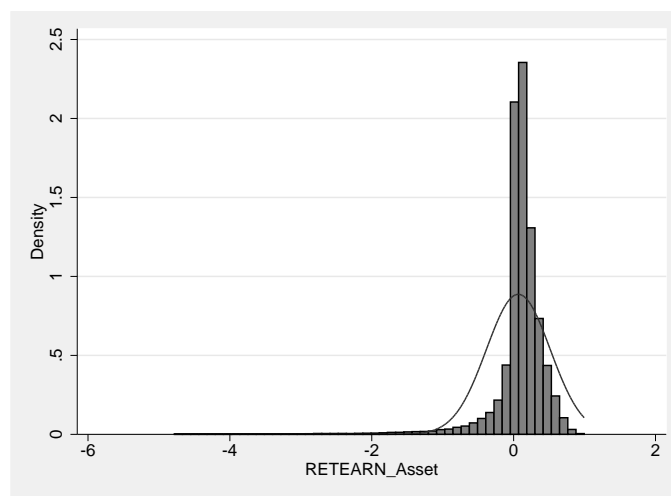


Figure 7: Other Shareholders' Funds

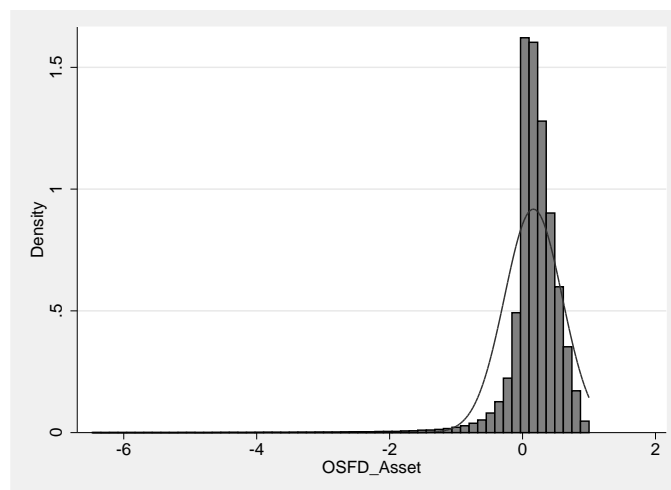


Figure 8: Fixed Asset Investment

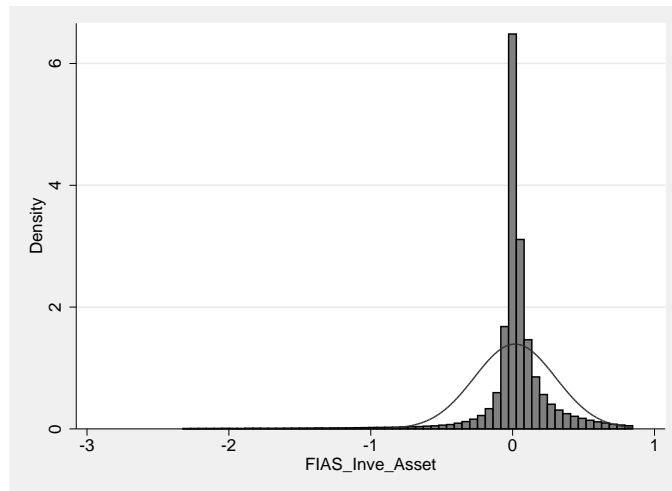


Figure 9: Tangible Fixed Asset Investment

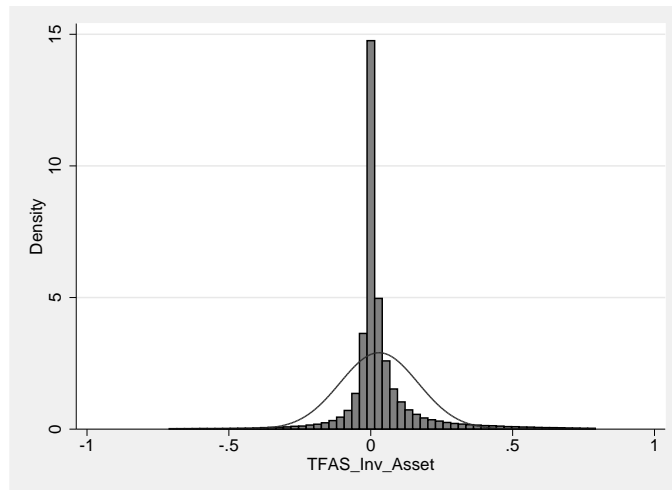


Figure 10: Profitability

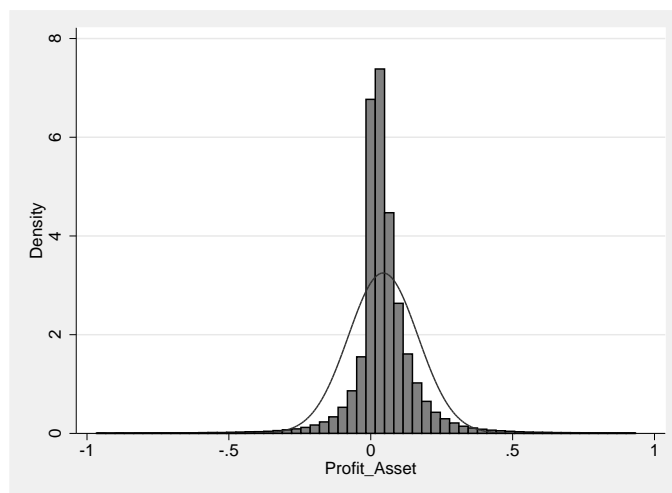


Table 15: Corporate Savings: Chinese listed companies

	(1)	(2)	(3)	(4)
	Gross Savings		Retained Earnings	
Overall Score*SOE	-0.000224 (0.000182)	0.00418** (0.00163)	0.00181** (0.000915)	0.0207** (0.00928)
Firm Fixed Effects	-	Y	-	Y
Firm Size	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
Sector Fixed Effects	Y	Y	Y	Y
$R^2$	0.130	0.034	0.110	0.010
Observations	6748	6748	7499	7499

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Sample is restricted to 2002-2007 period

Table 16: First Differences: Retained Earnings (Listed Companies)

	(1)	(2)	(3)	(4)
	$\frac{RetainedEarnings_t - RetainedEarnings_{t-1}}{TotalAsset_{t-1}}$			
Overall Score*SOE	0.000270*** (0.0000667)			
Interest Control*SOE <sup>a</sup>		0.00151*** (0.000387)		
International Capital*SOE <sup>b</sup>			0.00178*** (0.000372)	
Security Market*SOE <sup>c</sup>				0.00145*** (0.000371)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Investment <sup>d</sup>	Y	Y	Y	Y
$R^2$	0.125	0.125	0.125	0.125
Observations	73638	73638	73638	73638

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table only use listed companies, 2001-2011

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Increase in Fixed Assets, normalized by lagged Total Assets

Table 17: First Differences: “Other Shareholders’ Fund” (Listed Companies)

	(1)	(2)	(3)	(4)
		$\frac{OSFD_t - OSFD_{t-1}}{TotalAsset_{t-1}}$		
Overall Score*SOE	0.000542*** (0.000106)			
Interest Control*SOE <sup>a</sup>		0.00309*** (0.000612)		
International Capital*SOE <sup>b</sup>			0.00322*** (0.000597)	
Security Market*SOE <sup>c</sup>				0.00280*** (0.000580)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Investment <sup>d</sup>	Y	Y	Y	Y
$R^2$	0.153	0.153	0.153	0.153
Observations	61301	61301	61301	61301

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table only use listed companies, 2001-2011

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Increase in Fixed Assets, normalized by lagged Total Assets

Table 18: First Differences: “Other Shareholders’ Fund” (Full Sample)

	(1)	(2)	(3)	(4)
		$\frac{OSFD_t - OSFD_{t-1}}{TotalAsset_{t-1}}$		
Overall Score*SOE	0.000633*** (0.000112)			
Interest Control*SOE <sup>a</sup>		0.00403*** (0.000660)		
International Capital*SOE <sup>b</sup>			0.00331*** (0.000628)	
Security Market*SOE <sup>c</sup>				0.00363*** (0.000610)
Country*Year	Y	Y	Y	Y
Sector*Year	Y	Y	Y	Y
Investment <sup>d</sup>	Y	Y	Y	Y
$R^2$	0.032	0.032	0.032	0.032
Observations	607925	607925	607925	607925

Clustered (at country\*sector level) standard errors in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The regressions reported in this table only use listed companies, 2001-2011

<sup>a</sup>Score for interest rate controls. It measures whether lending and borrowing interest rates are controlled. Higher score means the controls are relaxed.

<sup>b</sup>This score measures the capital account openness of a country. The higher the score, the more open.

<sup>c</sup>The score on security market reform measures whether the country has taken measures to develop the security market; whether the security market is open to foreigners.

<sup>d</sup>Increase in Fixed Assets, normalized by lagged Total Assets