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## Unbalanced privatization in emerging economies and capital flows

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Financial intermediation, privatization, Foreign Direct Investment, Net Foreign Assets, emerging economies.

### JEL codes:

E22, E44, F21, G20, O16, P30

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<sup>†</sup>University of Lyon, Lyon, F-69007, France ; CNRS, GATE Lyon Saint-Etienne, Ecully, UMR 5824, F-69130, France; University of Lyon 2, Lyon, F-69007, France. Email: cubizol@gate.cnrs.fr

# 1 Introduction

Some emerging countries, particularly China and ex-Soviet Union countries in the late 1990s, experienced a fast privatization of firms (first stylized fact, see Figures 1 and 15), whereas the share of credit to State-Owned Enterprises (SOEs) increased or remained constant (second stylized fact, Figure 2 at the beginning of the transition and particularly for China, the Czech Republic, Hungary and Slovakia, ...). Thus, the credit distribution is biased, with (often) more productive private firms less financed by State-Owned Banks (SOBs) than are SOEs.<sup>1</sup> This misallocation of capital widely modifies firms' investment and saving patterns. In addition to creating domestic distortions, the misallocation is also an international issue, considering that FDI comprises opportunities for an economy in transition, whereas the accumulation of external surpluses and foreign assets is a risk for international stability. What is the effect of this capital misallocation on short- and long-term capital flows? Does it magnify the accumulation of savings and foreign assets while hindering FDI in most emerging privatizing economies, as is true in China? This misallocation of capital is a crucial issue because many countries experienced or continue to experience a transition to a market economy (e.g., the countries of Central and Eastern Europe, Central and South-Eastern Asia, and Southern and Eastern Mediterranean countries) or will experience one in the near future.<sup>2</sup> In these economies in transition, the credit bias toward SOEs continues to occur, particularly in the Commonwealth of Independent States, China, Egypt, Indonesia, Pakistan, the Philippines, South Africa, Turkey, the United Arab Emirates, Venezuela and Vietnam.<sup>3</sup>

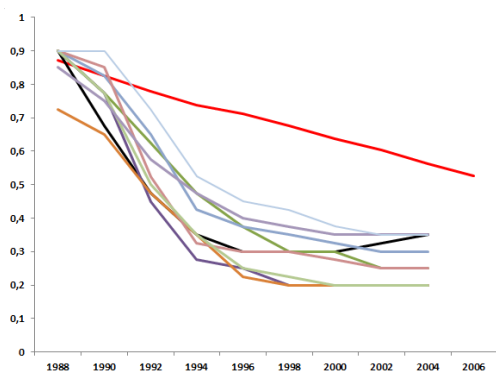


Figure 1: Stylized fact 1: the share of SOEs in GDP (%)  
Sources: European Bank for Reconstruction and Development Transition Reports, and Chinese Statistical Yearbook

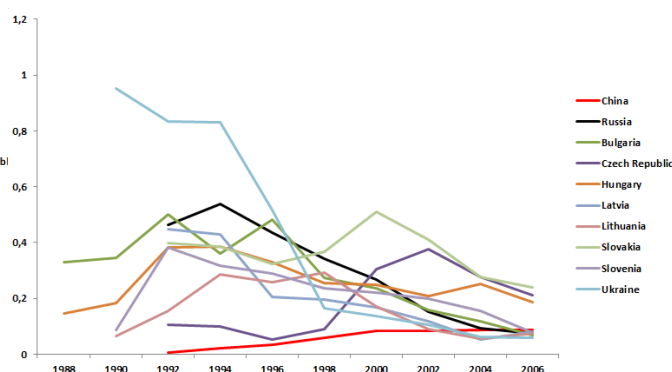


Figure 2: Stylized fact 2: ratio of credit to SOEs over credit to private firms and SOEs (%)<sup>4</sup>-  
Sources: Global Financial Development Database (2013, World Bank) and Chinese Statistical Yearbook

<sup>1</sup>Note that that the issue of SOE privatization and their productivity is more complex, particularly because there are many types of SOEs. However, for example in China, [Hsieh and Song \(2015\)](#) mention that, overall, the TFP level is lower in old and large SOEs compared with private firms; nevertheless, there is a catching-up process for SOEs (largely for labor productivity).

<sup>2</sup>The following countries continue to undergo significant privatization: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Cambodia, China, Croatia, the Czech Republic, Egypt, Estonia, Republic of Macedonia, Georgia, Hungary, Jordan, Kazakhstan, Kosovo, Kyrgyz Republic, Laos, Latvia, Lithuania, Republic of Macedonia, Moldova, Mongolia, Montenegro, Morocco, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Tajikistan, Tunisia, Turkmenistan, Ukraine, Uzbekistan, and Vietnam. The privatization in India can be qualified as a “partial privatization”; South Korea, some ASEAN countries (Thailand, the Philippines, Indonesia and Singapore) and South American countries (Brazil, Argentina, Peru, and Colombia) have nearly finished their liberalization (while in Chile, the privatization occurred between 1975 and 1989).

<sup>3</sup>Sources: Global Financial Development Database (2013, World Bank) and Chinese Dataset Yearbook.

<sup>4</sup>In this ratio SOEs include SOEs affiliated to provincial, city or other local governments, and firms controlled by a state-owned management or asset supervision.

This paper extends the previous studies of capital misallocation by SOBs in China to all major emerging countries (particularly those in transition to a market economy) and analyses the effect on foreign investments, fixed capital and financial capital. The first focus is to address a slowdown of FDI due to this credit bias. Indeed, the increasing saving rate created by the misallocation of capital is obviously hindering investments in fixed capital; see Figure 5 (particularly for inward FDI when foreign firms are financed locally).<sup>5</sup> Empirically, the misallocation of capital by public financial intermediation in China and its effect on investments and capital flows are demonstrated in [Boyreau-Debray \(2003\)](#), [Boyreau-Debray and Wei \(2005\)](#), and [Dollar and Wei \(2007\)](#). Then, Figure 3 shows that countries experiencing a credit bias toward SOEs also tend to have a strong positive Net Foreign Assets position; this last is the third stylized fact and the other main focus of the paper. Indeed, [Song et al. \(2011\)](#) show in a theoretical framework that the excessive funding of SOEs by public banks in China to the detriment of more productive private firms is primarily at the origin of its external surpluses and accumulation of foreign assets. In fact, the misallocation by SOBs raises capital intensiveness in a decreasing share of SOEs, whereas it increases the share of labor-intensive firms (productive private firms); see Figure 4. In China, the latter accumulate profits which are saved ([Huang, 2011](#)), either invested abroad by firms to finance future investments with returns on assets or invested abroad through deposit banks or sovereign funds ([Caballero et al., 2008](#); [Song et al., 2011](#); [Benhima, 2013](#), among others).<sup>6</sup> The following accumulation of foreign assets creates external surpluses and thus international instability. The last focus of the paper is policy actions in transition economies, either to reduce the credit bias at its source, or to limit the negative consequences of capital misallocation.

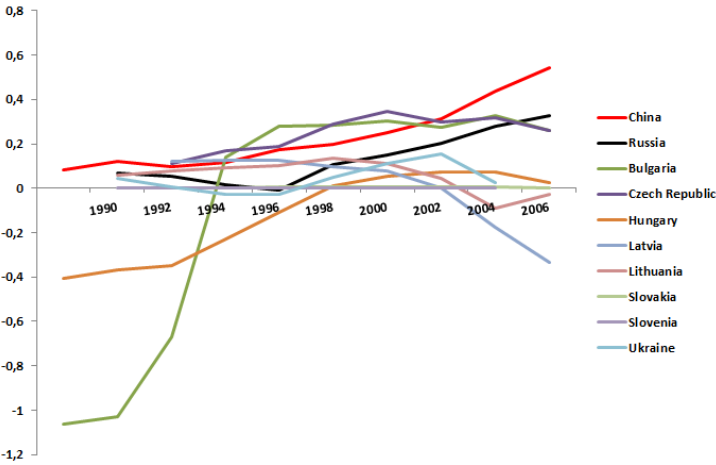


Figure 3: Net Foreign Assets in some countries privatizing (% GDP) - Source: World bank

<sup>5</sup>According to [Du and Girma \(2007\)](#), foreign firms in China were equally financed by local and national financial intermediation between 1999 and 2002.

<sup>6</sup>Chinese corporate savings remain difficult to understand. The empirical work of [Huang \(2011\)](#) demonstrates that private firms tend to save more than SOEs do because of a precautionary motive due to credit constraints. Indeed, SOBs directly drive household savings through low deposit rates to finance SOEs ([Song et al., 2011](#); [Aglietta and Bai, 2012](#)). However, these corporate savings cannot be totally attributed to private firms but should also be attributed to SOEs; see [Bayoumi et al. \(2010\)](#).

In a first approach, a GMM is used (Arellano and Bond estimator, 1991) on a sample of 40 emerging countries, with Forward Orthogonal Deviation (FOD) as an alternative to first-difference to maintain a sufficient sample size. The GMM estimator and external instruments control for endogeneity biases, and a Bayesian model averaging methodology is implemented to select the main determinants of short- and long-term capital flows. The results are strengthened by different robustness checks (bootstrap, estimations for different periods, and using additional explanatory variables or interaction terms, among others).<sup>7</sup> The first study primarily shows that Net Foreign Assets increase under privatization when public banks still favor SOEs to the detriment of private firms. This result is in line with the literature on China addressing the accumulation of foreign assets (Song et al., 2011) and extends to emerging countries facing a large privatization during their economic transition. An additional result is the slowdown of inward FDI when public financial intermediation misallocates capital. This slowdown is a new result for the literature that extends the works of Perotti (1993), Boyreau-Debray and Wei (2005), and Dollar and Wei (2007) to the effect on FDI and to many emerging economies in transition. Then, to strengthen the results and increase accuracy, a second and sectoral approach is implemented on inward FDI. The methodology follows Rajan and Zingales (1998), with a global index of sectoral financial dependence (independent of country and time) that enables correcting for country and industry characteristics to preclude any possibility of omitted variables or endogeneity issues. The second sectoral analysis provides more robustness to the first approach's results on FDI and enables quantifying the inward FDI slowdown. In both global and sectoral studies, the credit bias toward SOEs is measured when the outstanding loans for SOEs compared with private firms increase or remain constant, despite the increasing share of private firms.

Concerning the origin of the credit bias of SOBs, the literature provides different explanations. The bias largely comes from an incentive to fund former debtors (SOEs) for future repayments (Perotti, 1993) but also from distortions of the lending rate on the credit market (Aglietta and Bai, 2012; Song et al., 2014). Corruption, high bank concentration by SOBs (despite the increasing share of private banks), and politically determined lending policies (Firth et al., 2008) also play a significant role in the credit misallocation. The literature on the effects of privatization largely focuses on ex-Soviet Union countries (Commonwealth of Independent States (CIS) and Central and Eastern Europe (CEE) countries) and does not address the specific effect on capital flows but rather the effects on efficiency, profitability, and revenues (see Estrin et al., 2009).<sup>8</sup> However, here the paper focuses on the effect on foreign investments (FDI and foreign assets).

The latter points are detailed in the next section with a literature review. Then, the model, data, and Bayesian model averaging methodology are analyzed in section 3, with the results' description in section 4. Section 5 develops the model for the second and sectoral approach. To conclude, the last section suggests policy implications.

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<sup>7</sup>In addition to reducing endogeneity biases, the Arellano and Bond GMM estimator has more robust results than does a usual OLS or panel regression, even with a small number of countries close to 30-50 (Bond et al., 2001; Soto, 2009, ...).

<sup>8</sup>They conclude that in Central Europe, the effect of privatization is mostly positive but is negative in the CIS. However, according to some authors, it is too soon to draw strong conclusions about China's privatization, not only because of the lack of econometrically convincing studies but also because Chinese privatization was done at a different speed (i.e., gradually; see Figures 1 and 15).

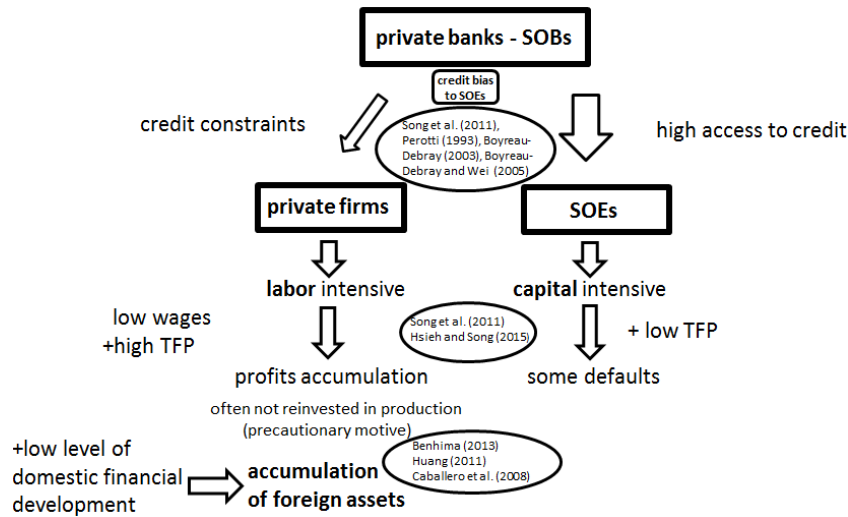


Figure 4: Credit bias toward SOEs and NFA<sup>9</sup>

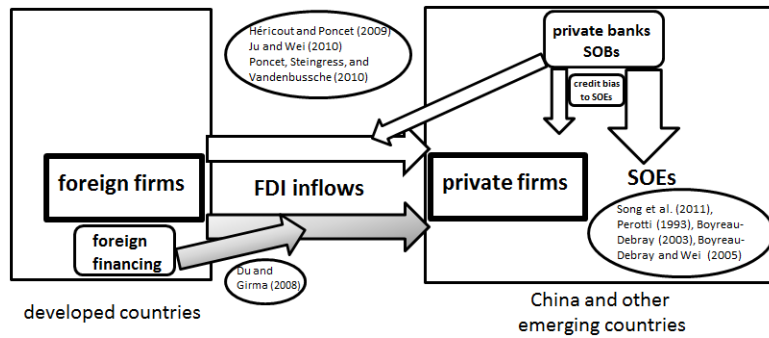


Figure 5: Credit bias toward SOEs and inward FDI

## 2 Literature review

### 2.1 The origin of the credit bias and implications

A first explanation for the origin of this misallocation by SOBs is an incentive to fund former debtors (SOEs) for future repayments, highlighted by Perotti (1993). The author demonstrates this incentive with a theoretical model in which banks maximize their profits and gain the potential repayment of previous debts. The stock of accumulated losses by SOEs on the banks' balance sheets, the "deadweight debt" (Rybczynski, 1991), is the cause of the credit distortion in Perotti (1993). By funding former debtors, which often is less productive and more risky, SOBs tend to make less efficient (or postponed)

<sup>9</sup>This mechanism has been widely demonstrated for China and could appear in other emerging economies experiencing this credit bias toward SOEs. However, two points mentioned previously in the introduction are crucial. First, there are different types of SOEs with different levels of productivity and productivity growth; however, overall, large and old SOEs have a lower TFP level compared with private firms but have a higher TFP growth (Hsieh and Song, 2015). Second, corporate savings/surpluses are often not invested in foreign assets by the companies themselves, but via deposit banks or sovereign funds.

investments and experience a greater concentration of risk. Moreover, this credit distribution does not follow the increasing share and development of often more productive private firms<sup>10</sup>, which slows the transition, the recovery of former debts, and increases the risk of financial crisis. In a post-socialist economy, even in the absence of strong political influence, it is obviously rational for banks to be biased in favor of SOEs to maximize profits. [Begg and Portes \(1993\)](#) argue that the government should write off banks' bad loans from SOEs, which were a type of subsidization before the transition and are now leading to capital misallocation. For [Calvo and Frenkel \(1991\)](#), another means to overcome the bias is to substitute these claims in the banks' balance sheets with long-term government bonds. An additional explanation for the credit distribution bias of SOBs, and also linked to the recovery of old SOEs' debts, is clearly politically determined lending policies. Even during the transition from a socialist economy to a market economy (particularly when the state retains a large influence, *e.g.* in China), "the state banks have been asked to channel savings to the loss-making state-owned enterprises", [Boyreau-Debray \(2003, p. 4\)](#). This opinion converges with those of [Dobson and Kashyap \(2006\)](#) and [Cull et al. \(2007\)](#), with SOBs which must support SOEs. In China, the credit bias toward SOEs was particularly strong in the 1980s when taxation was centralized with high tax rates for SOEs. To ensure taxes' payments at the beginning of the privatization process, the government compensated by a state-controlled banking system providing cheap credit to SOEs ([Gordon and Li, 2005](#)).<sup>11</sup> [La Porta et al. \(2002\)](#), [Sapienza \(2004\)](#), and [Khwaja and Mian \(2005\)](#) explain that SOBs remain controlled by politicians, with personal and own political incentives (*e.g.*, hire political partners and bail out low performing firms, see [Firth et al., 2008](#)). [Aglietta and Bai \(2012\)](#) indirectly follow the same explanation for China, with distortions of the lending rate, which remains largely higher for labor-intensive SME (10 to 15% greater than the central bank rates). The latter is a contentious subject in China that also raises the shadow banking issue, which is a means for private firms to bypass the credit bias toward SOEs (see [Tsai, 2002](#); [Krugman, 2011](#); [Funke et al., 2015](#)). [Song et al. \(2014\)](#) also emphasize the policy control of interest rates, with a split credit market that has low lending rates increasing firms' capital intensiveness (particularly in SOEs) and another high interest rate policy that represses wages and consumption. Finally, when SOBs have this incentive to lend to SOEs, a high share of SOBs can obviously strengthen credit distortions; furthermore, the incentive is even more relevant when there are few large banks occupying an oligopolistic position. This situation exists in China (see [Prasad and Prime Minister Wen Jiabao remarks in Barboza, 2012](#)) and in many countries in economic transition, although the competition is increasing, particularly in Vietnam ([Le, 2014](#)) and in Central and Eastern countries ([Corbett and Mayer, 1991](#); [Yildirim and Philippatos, 2007](#), among others).

Concerning the effect of the excessive funding of SOEs by public banks to the detriment of more productive private firms, there are negative consequences on the investment rate and its efficiency, capital flows between regions, and FDI in China ([Boyreau-Debray, 2003](#); [Boyreau-Debray and Wei, 2005](#); [Dollar and Wei, 2007](#)). [Gordon and Li \(2005\)](#) also highlight that in China the credit bias toward SOEs may have

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<sup>10</sup>According to [Hsieh and Song \(2015\)](#), in China large and old SOEs have a lower TFP level compared with private firms but have a higher TFP growth (largely for labor productivity).

<sup>11</sup>This effect of the privatization process of SOEs on tax revenues also appears in other transition economies. Indeed, in addition to creating distortions in firms' financing (depending on their ownership), it constrained privatizing countries to adopt large tax reforms after the induced decline in tax revenue. This issue is more detailed in [Davis et al. \(2000\)](#), [Martinez-Vazquez and McNab \(2000\)](#), and [Crivelli \(2013\)](#).



strongly slowed the entry of competitive firms. Thus, a slowdown of the investment rate seems quite intuitive for all emerging privatizing economies that experience a credit bias toward SOEs, which is why the effect on inward and outward FDI is studied here. Note that a reverse causality exists: the entry of FDI is a means for private firms to bypass domestic credit constraints in China (Héricourt and Poncet, 2009; Ju and Wei, 2010; Poncet et al., 2010) and in CEE countries (Krkoska, 2001). Regarding the effect on foreign asset accumulation, the mechanism is less obvious and not always studied in the literature. In a first stage, the misallocation of credit in favor of SOEs mostly increases the share of labor-intensive firms (the new private and credit-constrained firms). These new productive and labor-intensive firms accumulate profits (Huang, 2011), which are partly saved and invested abroad to bypass an inefficient domestic financial system (see Figure 4 and Caballero et al., 2008, Ju and Wei, 2010, Song et al., 2011, and Benhima, 2013, among others).<sup>12</sup> The accumulation of foreign assets is one of the elements from the debate surrounding global imbalances and the Bernanke “global saving glut” (2005).<sup>13</sup> To the best of my knowledge, there is no study addressing the effects of a credit bias toward SOEs on FDI and foreign assets in many emerging privatizing countries. The latter are, specifically, ex-Soviet Union countries that experienced a fast economic transition and some South American, ASEAN, and Mediterranean countries with a lower rate of privatization. The former were strongly affected by the credit bias as China is now, with a fast privatization of firms (see Figures 1 and 15) while the share of credit to SOEs increased or remained constant (Figure 2 at the beginning of the transition). Countries that continue to experience a strong privatization process (mostly the CIS and some South-Eastern Asian countries, Laos and Vietnam for example) or a slower one, also face this credit misallocation; particularly the CIS, China, Egypt, Indonesia, Pakistan, the Philippines, South Africa, Turkey, the United Arab Emirates, Venezuela and Vietnam. Credit misallocation may have reduced investment and created shifts in the movements and stocks of capital, FDI and financial capital.

## 2.2 Empirical studies on privatization

The literature on the other effects of privatization is well summarized in the work of Estrin et al. (2009), particularly for ex-Soviet Union countries (CIS and CEE countries). An interesting point is that privatization leads to more positive effects for foreign owners than for domestic ones regarding efficiency, profitability, and revenues, mostly occurring in later rather than earlier transition periods. Even more relevant in their study is how the authors perform their literature analysis; they classify these studies between those controlling and not controlling for endogeneity of privatization variables. Indeed, Megginson (2005) argues that an endogeneity bias can appear. For instance, the government can slow the privatization when firms performances after the privatization are low. It was the case in CEE countries in the middle of the 1990s. Furthermore, Estrin et al. (2009) point out that the use of fixed effects and instrumental variables can avoid a selection bias.<sup>14</sup> In this study, the shares of SOEs and SOBs are used in the interaction terms and are instrumented by a global index of economic liberalization and lags of

<sup>12</sup>The Chinese corporate saving rate cannot be totally attributed to private firms but must also be partially attributed to SOEs (see Bayoumi et al., 2010), although there is a caveat in their empirical study concerning the absence of non-listed private firms.

<sup>13</sup>For more information concerning global imbalance explanations, see Blanchard and Milesi-Ferretti (2009).

<sup>14</sup>p. 12: “In the case of privatization, private (especially foreign) owners are naturally interested in acquiring firms that have (at least potentially) superior performance. Hence, studies that do not account for selection may erroneously attribute potentially superior performance of privatized firms to the new owners rather than to the inherently superior performance of firms selected for privatization.”

the shares of SOEs and SOBs, although there is not always an instrumentation in the literature. Indeed, many other empirical works on this topic consider that in most countries the privatization is obviously an exogenous policy decision from the government to restructure and change shareholders. Djankov and Murrell (2002, p. 754) explain that “In transition economies, ownership was largely determined through political and administrative processes rather than endogenously in markets with low transaction costs. In many cases, ownership structure is exogenous.”. Thus, some studies either consider that exogeneity is assumed (Boyreau-Debray and Wei, 2005) or do not handle it using OLS (see Estrin et al., 2009), whereas other studies try to overcome selection and endogeneity issues inherent in privatization. For example, Angelucci et al. (2001) consider that fixed effects control for endogeneity, as in Frydman et al. (2000). In Andreyeva (2003), exogeneity is controlled with instrumental variables, that is, observable factors that influence ownership but do not directly affect the dependent variable: industry and region privatization shares, industry growth in the previous period, and an indicator for leased firms. According to the author, the probability to have privatization is higher in an environment with fast privatization reforms in the past, growing industries attracting investors, and legislation stimulating leased firms. Hanousek et al. (2007) use firm-specific instrumental variables from the pre-privatization period (pre-1992) to instrument the initial post-privatization ownership observed in the market economy in 1996. The instrumental variables are economic, institutional, industry, and geographic characteristics of SOEs in the pre-market period. The authors’ next study (Hanousek et al., 2009) uses the number of privatization projects submitted to the government before the observations, and how much the size of each firm deviates in 1990 from the standard in the OECD economies, to control endogeneity for divestitures and ownership. In Pivovarsky (2003) the shares of equity privatized by different privatization methods are instruments for current ownership concentration. Regarding the impact of privatization on growth, productivity, and employment, Megginson and Netter (2001) summarize and classify some studies, either on transition or non-transition economies. Concerning the transition economies, which are the focus of this work, Megginson and Netter highlight that the firms’ privatization improves performances, often because of a better exploitation of monopoly positions (to the detriment of productivity and efficient allocation). Nevertheless, particularly for the increase in firms’ performance, the authors warn against a selection bias in the privatization analysis. In Earle and Estrin (2003), after adjusting for selection bias only outsider ownership is significantly associated with labor productivity improvements (whereas all private firms without any control for selection bias). Djankov (1999) finds that in the CIS a move to employee ownership is beneficial to labor productivity at low ownership levels ( $< 10\%$ ). According to the study of Frydman et al. (2000), privatization by outside owners is more efficient: it adds over 12 percentage points to the annual growth rate, and 9 percentage points to productivity growth. They also highlight that it is not at the expense of higher unemployment. For CEE countries, the impacts on growth, profitability, productivity, and employment, were more positive in the second wave of privatization (1994) than in the first one (1992, see Harper, 2001), which was too fast and massive.

### 3 A first approach and data

#### 3.1 The model

The model comprises a yearly study of the 40 main emerging countries, covering the period 1987-2007 to include the complete privatization of ex-Soviet Union countries, some ASEAN and South American countries, and China.<sup>15</sup> In a first stage, because there are many potential explanatory variables for FDI and foreign assets in the literature, their correct determinants are chosen with Bayesian model averaging (see subsection 3.3). This method allows for additional estimations and for the determination of the probability that a variable is included in the model. Then, to avoid many endogenous biases (see the part on exogenous and endogenous variables in the next subsection), the GMM estimator from [Arellano and Bond \(1991\)](#) is used, with the addition of external instruments. The number of countries is sufficient to have more robust results with the Arellano and Bond GMM estimator than with a usual OLS or panel regression ([Bond et al., 2001](#); [Soto, 2009](#), ...). Because the GMM estimator needs a small period of time (compared with the number of countries N, see [Roodman, 2009](#)), a variable value at one period is the average of the value of two years (so T=10).<sup>16</sup>

A difference GMM is more convenient for an analysis with a small number of countries ([Mileva, 2007](#)) because system GMM uses more instruments than the difference GMM does (instruments are levels and first-differences of explanatory variables' lags for system GMM, whereas instruments are only levels for difference GMM).<sup>16</sup> Another advantage of the first-difference is to address the problem of omitted variables with panel data. However, although a difference GMM removes unit root and individual-specific/unobserved effects, it considerably reduces the size of the sample by magnifying gaps in unbalanced panels, which is why a GMM with Forward Orthogonal Deviation (GMM FOD) is applied to overcome this issue. The latter is "an alternative to differencing proposed by [Arellano and Bover \(1995\)](#) that preserves sample size in panels with gaps" ([Roodman, 2006](#), p. 1). Indeed, instead of subtracting the observation at  $t-1$  from the one at  $t$ , it subtracts the average of all future available observations for a variable. Only the last observation for each individual is not computed, thus minimizing data loss. Via the Helmert transformation, the observations at time  $t$  become the following:

$$X_{i,t}^* = c_t \left[ X_{i,t} - \frac{1}{T-t} (X_{i,t+1} + \dots + X_{i,T}) \right], t = 1, \dots, T-1, \quad (1)$$

with  $c_t = \sqrt{\frac{T-t}{T-t+1}}$  introduced by [Arellano and Bover](#) to equalize the variances. In GMM FOD, unlike in GMM difference, lagged observations are valid as instruments because they do not enter the formula. The good performance of this estimator is detailed in the literature ([Arellano and Bover, 1995](#); [Bond](#)

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<sup>15</sup>For some countries, privatization could not be integrated because insufficient data were available, particularly from the CIS. So the sample is limited to Argentina, Bangladesh, Brazil, Bulgaria, Chile, China, Colombia, the Czech Republic, Egypt, Estonia, Greece, Hong-Kong, Hungary, India, Iran, Latvia, Lithuania, Malaysia, Morocco, Nigeria, Pakistan, Peru, the Philippines, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, Sri Lanka, Thailand, Ukraine, the United Arab Emirates, Venezuela, and Vietnam.

<sup>16</sup>The solved model and tests become inconsistent with instrument proliferation. Indeed, according to [Roodman \(2009\)](#), a small T can be justified because GMM estimators from Arellano and Bond generate instrument sets whose number grows quadratically in T; and too many instruments in system GMM generates invalid results, overfits endogenous variables, and weakens the Hansen test.

et al., 2001; Roodman, 2006; Hayakawa, 2009, ...).<sup>17</sup> The study focuses on the rates of changes of the dependent variables and therefore uses logarithms.

The model can be written as follows:

$$y_{i,t} = \alpha y_{i,t-1} + \beta \sum_{t=0}^n X_{i,t-n} + \varphi crpubpriv_{i,t} \wedge instru.ecolib_{i,t} + \gamma crpubpriv_{i,t} \times [soe; sob]_{i,t, instru.ecolib_{i,t}} + u_i + v_t$$

with countries  $i = 1, \dots, 39$  and periods  $t = 1, \dots, 10$ . A variable's value at one period is the average of the value of two years ( $X(i, 1) = \frac{X(i, 1988) + X(i, 1989)}{2}$ ,  $X(i, 2) = \frac{X(i, 1990) + X(i, 1991)}{2}$ , ...,  $X(i, 10) = \frac{X(i, 2007) + X(i, 2008)}{2}$ ).  $y_{i,t}$  ( $y_{i,t-1}$ ) represents the dependent (lagged) variable for each country at each period  $t$ ,  $X_{i,t-n}$  the set of explanatory lagged variables,  $u_i$  the specific individual effect for each country, and  $v_t$  the specific shock at some periods.  $E[x_{i,t-n}(u_i + v_{i,t})] = 0$  is valid for each country and the Roodman hypotheses (2006) for the application of Arellano and Bond estimator are verified. Explained variables ( $y_{i,t}$ ) are the stocks of inward-outward FDI and net financial capital. In this study, net financial capital is defined by the accumulation of foreign assets relative to foreign liabilities. Therefore, the most convenient variable is Net Foreign Assets (the sum of foreign assets held by monetary authorities and deposit money banks, less their foreign liabilities). As for explanatory variables ( $X_{i,t}$ ), there are the usual control variables, determinants of FDI and NFA, and variables linked to privatization and capital misallocation. The latter are a variable for the credit distribution bias (the ratio  $crpubpriv$  of credit to SOEs over total credit distribution (SOEs + private firms)) and an interaction term  $crpubpriv_{i,t} \times [soe; sob]$  between the credit distribution bias and a proxy for privatization (a decreasing share of SOEs and SOBs, instrumented or not instrumented).  $instru.ecolib_{i,t}$  are the external instruments  $ecolib$  (the mean of different indexes linked to economic liberalization) and lags of  $soe$  and  $sob$ . All of these variables are described and justified in the following subsection and in Tables 1 and 2.

### 3.2 Variables and data

In addition to the variables linked to privatization (which are used in each estimation), all other potential explanatory variables are described in this subsection and are then chosen with Bayesian model averaging in the next subsection.

#### *Privatization and the misallocation of capital:*

Because it is the crucial issue for FDI and NFA, the regressor for the misallocation of capital is added, that is, the share of credit to SOEs (against total credits to private firms and SOEs), variable  $crpubpriv$ . In some estimations, loans to SOEs affiliated with local governments (provincial, city or other local governments) are included or not included to test robustness.

It is initially assumed that  $crpubpriv$  is exogenous, as in Boyreau-Debray (2003), Boyreau-Debray and

<sup>17</sup>Note that the GMM estimator remains invariant for any transformation that removes individual effects as long as the transformation matrix is upper triangular and with the use of available instruments, as is true for forward orthogonal deviation. In addition, forward orthogonal deviation preserves the orthogonality among the transformed errors; indeed, if the original individual specific effects are not autocorrelated and have constant variance, so are the transformed errors (Arellano and Bover, 1995). With this choice of  $c_t$  in Equation 1, it is assured that  $X_{i,t}$  are not only independent but also identically distributed, before and after the transformation.

Wei (2005), and Gonzalez-Garcia and Grigoli (2013). This assumption is not realistic for all emerging countries but corresponds to the situation of credit distortions in China now and in ex-Soviet Union countries in the late 1990s. In these cases, it is a choice by the government or SOBs governance to favor SOEs, as detailed in the literature review (section 2).<sup>18</sup>

Then, estimations are done with an interaction term to include privatization:  $crpubpriv \times soe$  and  $crpubpriv \times sob$  are added to  $crpubpriv$ . The low correlation between  $crpubpriv$  and  $soe$  is checked to avoid biases in the estimations (Figures 6 and 7; the low correlation also confirms the existence of a credit bias: otherwise,  $crpubpriv$  would follow  $soe$ ). As for  $crpubpriv$  and  $sob$ , the correlation is significant (Figures 6 and 8). This significance is not surprising because the credit bias toward SOEs is largely due to SOBs. Hence, difficulties exist in developing quantitative conclusions on estimations with  $crpubpriv \times sob$ .

| Variables | crpubpriv        | soe              | sob   |
|-----------|------------------|------------------|-------|
| crpubpriv | 1.000            |                  |       |
| soe       | 0.093<br>(0.152) | 1.000            |       |
| sob       | 0.344<br>(0.000) | 0.225<br>(0.003) | 1.000 |

Figure 6: Correlation table

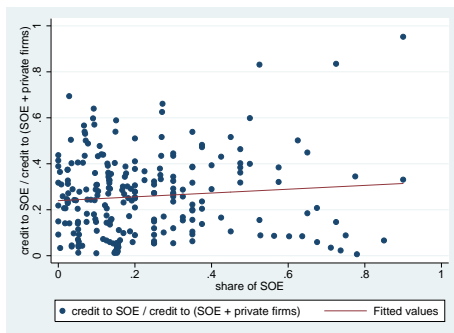


Figure 7: Credit to SOEs over total credit (to SOEs and private firms) and the share of SOEs

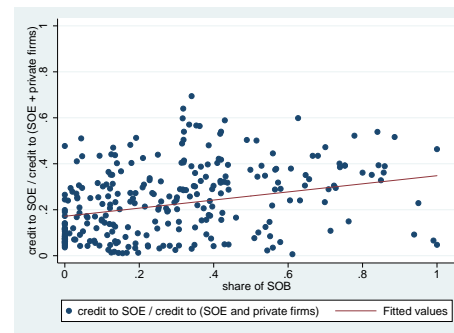


Figure 8: Credit to SOEs over total credit (to SOEs and private firms) and the share of SOBs

<sup>18</sup>According to Boyreau-Debray (2003, p. 4), “the state banks have been asked to channel savings to the loss-making state-owned enterprises”. Other studies give various explanations of the credit misallocation by SOBs: an incentive to fund former debtors (SOEs) for future repayments, but also distortions of the lending rate on the credit market, corruption, high bank concentration by SOBs and politically determined lending policies (Perotti, 1993; Gordon and Li, 2005; Firth et al., 2008; Aglietta and Bai, 2012; Song et al., 2014).

In addition, SOEs and SOBs are instrumented to ensure the exogenous process of privatization in the estimations. Indeed, although *soe* can be considered exogenous in most cases because it is directly the result of the government’s privatization policy to change ownership or sell shares, an endogenous bias can also appear (Megginson, 2005). Thus, we can find in the literature studies both controlling and not controlling for these issues (Estrin et al., 2009). Despite the difficulty with instrumenting SOEs and SOBs (see section 2), the general context of liberalization and deregulation seems to be a good indicator of the incentive to increase the share of private firms and banks. This indicator is captured by the mean of the following indexes (variable *ecolib*): the protection of property rights, regulation, the impact of government, access to international trade, controls on capital movements and controls on human mobility.<sup>19</sup> In addition to *ecolib*, lags of *soe* and *sob* are also set as external instruments for *soe* and *sob*, as is true in the literature (Andreyeva, 2003; Hanousek et al., 2007 and 2009).

***Potential explanatory and control variables for FDI:***

The usual macroeconomic control variables are used as regressors for the estimations of FDI, i.e., GDP and real exchange rate. Then, the estimator can potentially consider the elements directly affecting the gains and costs of investing fixed capital abroad. All potential explanatory variables (from the literature) will be detailed in this paragraph, and the ones explaining the data sample will be chosen through Bayesian model averaging in the next subsection (3.3). In the literature, credit cost is a determinant of FDI through the lending rate; see Gastanaga et al. (1998) and Klein et al. (2002). The former is endogenous because FDI inflows can be used as a means to bypass or lower domestic credit constraints (Harrison and McMillan, 2003; Héricourt and Poncet, 2009). The next endogenous variable is wages because, in addition to be intuitive, its effect on FDI and the reverse causality have been widely proved in the literature (Blonigen, 2005; Braconier et al., 2005; Dooley et al., 2005, ...). TFP growth also has a role in attracting FDI (Wei and Liu, 2006; Bénassy-Quéré et al., 2007), whereas a large part of the literature describes the effect of FDI on TFP growth (De Mello Jr, 1996; Javorcik, 2004; Kose et al., 2008), which makes this variable endogenous. In some regressions, FDI costs are considered (trade, administrative, and business costs; see Gastanaga et al., 1998, Bénassy-Quéré et al., 2007, ...). Some endogeneity can appear when a drop or surge in FDI inflows leads to shifts in protectionism measures, for example in China, with selections of sectors subject to imports and FDI inflows (Branstetter and Lardy, 2006). As for corruption, it is a main element of this study, initially directly affecting the inflows of FDI via the business environment (Wei, 2000; Branstetter and Lardy, 2006) and then involved in the origin of the credit bias of SOBs (see the literature review in section 2). Although corruption can come from group interests, it is widely considered as an individual reaction and thus exogenous in this framework.<sup>20</sup> To capture institutional determinants, the study follows Bénassy-Quéré et al. (2007) using (among others)

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<sup>19</sup>The indexes are from the Fraser Institute database, which uses other sources (e.g., IMF IFS, the World Economic Forum Global Competitiveness Report, and the PRS Group International Country Risk Guide). Each index is detailed on <http://www.freetheworld.com/2015/economic-freedom-of-the-world-2015.pdf>.

<sup>20</sup>However, as highlighted in Bénassy-Quéré et al. (2007), multicollinearity and endogeneity are issues for corruption; it is likely to be correlated to GDP per capita, and FDI inflows reduce levels of corruption (Selowsky and Martin, 1997; Larrain and Tavares, 2004). For the endogeneity of corruption, a part of the literature controls for it with a gravity model or instrumenting. Here, the GMM estimator reduces this issue. Concerning multicollinearity, estimations with and without correlated variables are performed. Note that the level of administrative costs can be correlated with, for example, corruption, the degree of openness (trade and financial) and wages (Morisset and Neso, 2002). This database does not contain such issues.

a database from The Fraser Institute for a time dimension.<sup>19</sup> Here, the index of legal system and level of property rights is exploited (variable *leg*). Although [Bénassy-Quéré et al.](#) instrument institutional determinants, doing so is not essential here because the latter will mostly act as control variables and not as a vector of causality.<sup>21</sup>

Capital accumulation, the share of capital in production, and savings are also main determinants of FDI, but they directly result from the evolution of the previous variables. Therefore, these variables are added or removed to control multicollinearity. Lastly, with the sample and estimator used in this study, for most estimations, adding too many dummies considerably raises the number of instruments (it is critical because the number of instruments becomes greater than the number of countries); and some dummies are often dropped due to collinearity. Thus, for some estimations, time dummies are only set for the 2007-2008 contagion of the U.S. financial collapse; otherwise, they are set for all periods.

***Potential explanatory and control variables for financial capital (Net Foreign Assets):***

Concerning regressors for the stock of financial capital in-outflows (via NFA), the main difference is the addition of capital controls (the revised and updated Chinn-Ito index of financial openness, [Chinn and Ito, 2006](#)). The latter are not exogenous ([Chinn and Prasad, 2003](#)) because the causality between NFA and capital controls is not clear. In addition to the usual macroeconomic control variables (GDP and real exchange rate), some explanatory variables of FDI are determinants of financial external imbalances via savings and investments. Indeed, countries with fast TFP growth tend to have both large capital outflows and large investment rates ([Song et al., 2011](#); [Gourinchas and Jeanne, 2013](#)). There is an endogeneity bias because of the reverse effects; portfolio equity liabilities boost TFP growth and external debt is negatively correlated with TFP growth ([Kose et al., 2008](#)). In the theoretical framework of [Feldstein \(1983\)](#), higher real domestic interest rate reduces net foreign investment (or causes a greater net inflow from abroad). The world interest rate is also used as a determinant of NFA and is proxied by the U.S. interest rate, because most savings from emerging countries in transition were invested in U.S. assets. For each country, the world interest rate can be considered exogenous, but not at the aggregate level. World liquidity is not considered here because the sample does not include the post-crisis U.S. Quantitative Easing. Similar to FDI flows, estimations also account for the legal environment, property rights protection, and corruption. The empirical works of [Gelos and Wei \(2002 and 2005\)](#) and [Papaioannou \(2005\)](#) show that corruption reduces foreign financial flows, as is also shown by [Wei and Wu's](#) theoretical model (2001). To the best of my knowledge, there is no study proving any reverse causality (a shift in corruption due to foreign equity portfolio inflows), which makes corruption exogenous in NFA estimations.

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<sup>21</sup>[Bénassy-Quéré et al. \(2007\)](#) follow the growth literature ([Mauro, 1995](#); [Hall and Jones, 1999](#); [Acemoglu et al., 2001](#)), controlling endogeneity of institutional variables not only with the latitude of the country but also with ethno-social fragmentation of the population ([Alesina et al., 1999](#)).

### **Observations:**

*sob*, *soe*, *leg*, and *ecolib* have considerable data gaps. For *soe* and *sob*, no studies include a yearly ratio of SOEs or SOBs in the period 1988-2008 for the main emerging countries, and the few databases with information are limited to the most recent seven years (e.g., Bankscope). Therefore, the sample has been completed by picking up values from various studies and sources (see Tables 1 and 2). Concerning *leg* and *ecolib*, the sample is reduced to 1985, 1990, 1995, 2000, 2005 and 2010, but the Fraser Institute is the only source giving a time dimension to many indexes of economic liberalization. Hence, the sample size was reduced to approximately 100-150 observations for *soe*, *sob*, *leg*, and *ecolib*. Without these variables, the number of observations increases to 170-300, depending on the associated variables.<sup>22</sup> Thus, to have a usable database, interpolation is needed for *soe*, *sob*, *leg*, and *ecolib*. Different estimations are done with linear, log-linear, Catmull-Rom Spline or Cardinal Spline interpolations.<sup>23</sup> However, because Catmull-Rom Spline and Cardinal Spline interpolations do not return any value when both the previous and next ones are missing, *soe* still have many data gaps with these two interpolations' methods. Therefore, linear and log-linear are preferred; there is a negligible difference between these two types of interpolations (Figure 15). For *sob*, the four methods return quite close values (Figures 16 and 17) and affect estimations similarly (see robustness checks in the results, section 4). Variables, data, and statistics are summarized in Tables 1, 2 and 10.

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<sup>22</sup>The other variables have observations for nearly each period and country, except the first and last periods for wages and corruption, FDI costs and the real effective exchange rate, which are available for 1992-2008 and 1994-2008, respectively. Countries such as Brazil, Bulgaria, Iran, Romania, Russia, Ukraine, the United Arab Emirates, Venezuela, and Vietnam have sizeable data gaps.

<sup>23</sup>Catmull-Rom Spline interpolation is based on the previous two non-missing values and the next two non-missing values, and tries to fit the missing data to a non-linear or curved pattern. Denoting  $V_{t-1}$  and  $V_{t-2}$  as the previous two non-missing values,  $V_{t+1}$  and  $V_{t+2}$  as the next two non-missing values, the interpolated value is calculated as:

$$IV_{lin} = (2\lambda^3 - 3\lambda^2 + 1) \cdot V_{t-1} + (1 - \varphi)(\lambda^3 - 2\lambda^2 + \lambda) \cdot (V_{t+1} - V_{t-2}) + (2\lambda^3 - 3\lambda^2) \cdot V_{t+1} + (1 - \varphi)(\lambda^3 - \lambda^2) \cdot (V_{t+2} - V_{t-1})$$

where  $\varphi$  is called tension parameter and affects the curvature of the spline. As for the Catmull-Rom Spline, it is a special case of the Cardinal Spline with the tension parameter,  $\varphi$ , set at 0. As mentioned on Eviews' informations, with the linear and log-linear routines both spline interpolations will not return any value if either  $V_{t-1}$  or  $V_{t+1}$  are missing. However, if  $V_{t-2}$  is missing it is simply set equal to  $V_{t-1}$ , and if  $V_{t+2}$  is missing it is set equal to  $V_{t+1}$ .



| <b>name</b>                  | <b>definition</b>   | <b>sources</b>   |
|------------------------------|---|--|
| <b>dependent variables</b>   |   |  |
| fdiin                        | FDI-inflows stock (/GDP)  | UNCTAD Statistics  |
| fdiout                       | FDI-outflows stock (/GDP)   | UNCTAD Statistics  |
| nfa                          | Net Foreign Assets (/GDP)<br>(sum of foreign assets held by monetary authorities and deposit money banks, less their foreign liabilities) | World Bank   |
| <b>explanatory variables</b> |   |  |
| gdp                          | GDP (billions U.S. \$), nominal   | World Bank   |
| defl                         | Deflator GDP (index 2005=100)   | World Bank   |
| gdpr                         | Real GDP (billions U.S. \$, divided by deflator)  | World Bank   |
| reer                         | Real effective exchange rate base 2010=100  | Bank of International Settlements, World Bank, and author's calculations                                       |
| r                            | Interest rate (% , lending rate)  | International Monetary Fund and World Bank   |
| w                            | Wages (U.S.\$, monthly average)   | ILOSTAT Database<br>(International Labour Organisation)  |
| ky                           | Share of capital in production  | World Bank   |
| kr                           | Gross capital accumulation (billions U.S. \$), real   | World Bank   |
| s                            | Gross savings (/GDP)  | World Bank   |
| tfpg                         | TFP growth (%)  | The Conference Board Data and World Bank   |
| cp                           | Capital controls (financial openness)   | The Chinn-Ito index (KAOPEN, Chinn and Ito, 2006), revised and updated to 2012                                 |
| fdicsts                      | Trade costs, and administrative and business fees ( /GDP)   | World Development Indicators (Trade costs Dataset, the World Bank) and author's calculations on bilateral data |
| rw                           | Word interest rate (mean of U.S. short- and long-term interest rates)   | OECD   |
| corru                        | Corruption index 0 (high corruption) to 10 (low corruption)   | The Corruption Perceptions Index of Transparency International   |
| leg                          | Legal system and property rights 0 (low quality) to 10 (high quality)   | The Fraser Institute Database  |

Table 1: Variables

| name   | definition   | sources   |
|--|--|---|
| <b>privatization and the misallocation of capital:</b> |  |   |
| soe  | Share of SOEs  | Kowalski et al. (2013, Source: Bureau Van Dijk Databases)<br>Estrin et al. (2009, Source: European Bank for Reconstruction and Development Transition Reports),<br>Ramamurti (1999), and Chinese Statistical Yearbook   |
| sob  | Share of SOBs  | Barth et al. (2001, Source: versions 2000 and 2003 of Bank Regulation and Supervision Survey of the World Bank),<br>La Porta et al. (2002, various sources),<br>Gonzalez-Garcia and Grigoli (2013, Source: Bank Regulation and Supervision Survey of the World Bank),<br>and Almanac of China's Finance and Banking |
| dcprs  | Domestic credit to private sector (/GDP)   | Global Financial Development Database (2013, World Bank)  |
| crpub  | Credit to public sector (/GDP): SOEs, and some estimations with SOEs affiliated to local governments   | Global Financial Development Database (2013, World Bank)  |
| crpubpriv  | $crpub/(crpub+dcprs)$<br>Ratio of credit to the public sector over total credit  | Global Financial Development Database (2013, World Bank), Chinese Statistical Yearbook, and Kowalski et al. (2013)  |
| ecolib   | Economic liberalization (mean of different indexes: the impact of government, legal system and property rights, regulation, international trade freedom, controls on capital and human mobility, ...) 0 (low liberalization) to 10 (high liberalization) | Indices of economic freedom from The Fraser Institute Forum (based on other sources: IMF IFS, the World Economic Forum Global Competitiveness Report, the PRS Group International Country Risk Guide, ... )   |

Note:

For *crpub* and *crpubpriv*, “public sector” includes SOEs; to have more robustness, some estimations are done with SOEs affiliated with provincial, city or other local governments, and with firms controlled by a state-owned management or asset supervision. An example of the latter is the SASAC in China (State-owned Asset Supervision and Administration Commission, which controls 157 listed firms; it comes directly under the supervision of the central government and is scrutinized closely by the latter).

Table 2: Variables (2)

### 3.3 The determination of fundamentals

A problem appears when there are too many potential explanatory variables  $X_i$  for a dependent variable  $y$ , a situation that pertains to this study for the determinants of capital flows. The models and combinations of explanatory variables from the literature are numerous (see subsection 3.2), which can skew the study of a specific variable and causality. Bayesian Model Averaging (BMA) addresses model uncertainty and allows determining which variables  $X_i \in X$  should be included in the model and their importance. BMA is based on a linear model structure with all potential explanatory variables and a normal *iid* error term with variance  $\sigma^2$  ( $y = \alpha + \beta X + \epsilon$ ,  $\epsilon \sim N(0, \sigma^2 I)$ ). BMA creates a weighted average over estimated models for all combinations of  $X$ , meaning  $2^K$  combinations of variables (capital flows fundamentals) for  $K$  potential explanatory variables, i.e.,  $2^K$  models. Let  $p(y|M_i, X)$  denote the marginal likelihood of the model (the probability of the data given the model  $M_i$ ). The *posterior* model probability,  $p(M_i|y, X)$ , is proportional to  $p(y|M_i, X)$  times a *prior* model probability  $p(M_i)$ :

$$p(M_i|y, X) = \frac{p(y|M_i, X)p(M_i)}{p(y|X)} = \frac{p(y|M_i, X)p(M_i)}{\sum_{s=1}^{2^K} p(y|M_s, X)p(M_s)} \quad (2)$$

$p(y|X)$  is a multiplicative term (the integrated likelihood, which is constant). The *prior*  $p(M_i)$  is the probability that model  $M_i$  can fit  $y$  before examining the data. However, because the usual context is the lack of prior knowledge about the determinants of  $y$ , it is common to set a uniform probability for each model  $p(M_i)$ .

The above then leads to the model weighted posterior distribution for the vector  $\theta$  of unknown parameters to be estimated:

$$p(\theta|y, X) = \sum_{i=1}^{2^K} p(\theta|M_i, y, X)p(M_i|X, y) \quad (3)$$

and the marginal likelihood in Equation 2 can be written

$$p(y|M_i, X) = \int_{\theta} p(y|\theta^i, M_i)p(\theta^i|M_i) d\theta^i$$

for each model  $M_i$ .

For further details on BMA, see [Hoeting et al. \(1999\)](#) and [Sala-I-Martin et al. \(2004\)](#). In this paper, the study is based on panel data following the methodology of [Feldkircher \(2011\)](#) and [Moral-Benito \(2012\)](#). As is often true for BMA, and because of uncertainty among a variety of potential determinants, priors are set to be uniform. In other words, the prior expected model size is  $K/2$  with a common prior model probability.<sup>24</sup> Markov Chain Monte Carlo (MCMC) sampling and birth-death methods are used, as in [Fernández et al. \(2001\)](#).<sup>25</sup> The number of burn-ins and draws (iterations) does not significantly change the results, but a minimum of 5000 “burn-ins” and 10000 draws is set.<sup>26</sup> The hyperparameter “g” is fixed at  $g = \max(N, K^2)$  as in [Fernández et al. \(2001\)](#).

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<sup>24</sup>Indeed, for  $K$  potential explanatory variables, there are  $2^K$  possible variable combinations. Therefore, the common prior model probability is  $p(M_i) = 2^{-K}$  for a uniform prior model. Hence, a prior expected model size of  $\sum_{k=0}^K \binom{K}{k} 2^{-K} = K/2$  is anticipated.

<sup>25</sup>MCMC is used when there are many covariates, and birth-death sampler is the standard model sampler used in most BMA routines. These methods are well developed in [Zeugner \(2011\)](#).

<sup>26</sup>The number of draws (iterations) limits the quality and duration of MCMC approximation to the actual posterior distribution. Because the first set of iterations does not draw models with high PMPs, this first set of iterations (the “burn-ins”) is not included in the computation of results.

- *FDI*: 13 potential explanatory variables are selected (*Lfdiin*, *gdpr*, *reer*, *r*, *ky*, *s*, *w*, *dcprs*, *tfgg*, *corru*, *fdicsts*, *cp*, and *lleg*); thus, the BMA routine obtains  $2^{13}$  models, i.e. 8192 models, each of them defined by a different combination of FDI fundamentals, and by a probability of being the “true” model (therefore, the prior expected model size is 6.5).
- *NFA*: 16 potential explanatory variables are selected (*Lnfa*, *gdpr*, *reer*, *r*, *ky*, *s*, *dcprs*, *tfgg*, *fdicsts*, *cp*, *cp2*, *mh*, *corru*, *rw*, *lleg*, and *busreg*); thus, the BMA routine obtains  $2^{16}$  models, i.e. 65536 models, each of them defined by a different combination of Net Foreign Assets fundamentals, and by a probability of being the “true” model (therefore, the prior expected model size is 8).

**Results:** The posterior inclusion probability of each variable is given by the “PIP” column in Figures 9 and 11. “Post Mean” is the coefficients averaged over all models (including a zero coefficient when the variable was not contained), “Post SD” the corresponding standard deviations, and “Cond. Pos. Sign” the probability that the coefficient’s sign is positive. All coefficients with a PIP above 0.5 are selected, as is usually true for uniform priors. In addition to the above, control variables just below the 0.5 threshold in the PIP rank are selected, or the variables that, according to the literature, still seem crucial.<sup>27</sup> Therefore, GDP and the real effective exchange rate are included as control variables for both FDI inflows and NFA. Then, in addition to explanatory variables with a  $PIP > 0.5$  (*r*, *w*, *corru* and *Lfdiin* for FDI inflows; *rw*, *mh*, *Lnfa*, *cp* and *corru* for NFA), savings, investments, and FDI costs are also included as fundamentals for FDI inflows; and the domestic interest rate, savings and TFP growth are included as fundamentals for NFA.<sup>28</sup> The legal environment *leg* is included in a few estimations for both FDI and NFA. Moreover, because the focus of the study is the public sector bias and privatization, all of the associated variables (*crpubpriv*,  $crpubpriv \times [soe; sob]$ , and instrumentation with *ecolib*) are added to the previous fundamentals for each estimation. Note that BMA is not applied to the determinants of FDI outflows; indeed, for the latter, the fundamentals of FDI inflows are selected in addition to some world variables (e.g., world interest rate and GDP), with FDI-out lag replacing FDI-in lag.<sup>29</sup> There is a quite good certainty concerning coefficients’ signs (see “Cond. Pos. Sign” in Figures 9 and 11), particularly for FDI inflows, which broadly corresponds to the literature, the expected results, and to the results in the next section. However, for some variables in NFA models, a large uncertainty remains (for GDP, the real effective real exchange rate and the legal environment).

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<sup>27</sup>Indeed, the BMA regression from  $y = \alpha + \beta X + \epsilon$  cannot fully reflect the GMM FOD estimations presented in this paper; primarily because of the addition of variables for the credit misallocation, privatization, and instruments (dependent variables’ lags from GMM and external instruments). Therefore, not to omit some determinants, variables with a PIP close to 0.5, or those that are often used in the literature, are also considered.

<sup>28</sup>Note that *cp2* is another version of the capital-controls/Chinn-Ito index. There is no strong difference between *cp* and *cp2*; therefore, the standard one, *cp*, is included in the model.

<sup>29</sup>This study does not consider bilateral flows, which makes the selection of FDI outflow fundamentals difficult, as described later in the paper (the corresponding results for FDI outflows must be carefully interpreted).

| Variable       | PIP    | Post Mean | Post SD | Cond.    |
|----------------|--------|-----------|---------|----------|
|                |        |           |         | Pos.Sign |
| <b>r</b>       | 0.9992 | -0.0850   | 0.0198  | 0.0000   |
| <b>w</b>       | 0.8709 | 0.0021    | 0.0011  | 1.0000   |
| <b>corru</b>   | 0.8509 | -0.7880   | 0.4257  | 0.0000   |
| <b>Lfdiin</b>  | 0.6881 | 1.0903    | 0.8910  | 1.0000   |
| <b>s</b>       | 0.3825 | -0.5682   | 0.8487  | 0.0000   |
| <b>gdpr</b>    | 0.2432 | -0.0111   | 0.0236  | 0.0000   |
| <b>reer</b>    | 0.1893 | -0.0034   | 0.0087  | 0.0005   |
| <b>ky</b>      | 0.1686 | -1.2936   | 3.5657  | 0.0000   |
| <b>fdicsts</b> | 0.1075 | -0.0059   | 0.0242  | 0.0000   |
| dcprs          | 0.0972 | 0.0674    | 0.3548  | 0.9866   |
| cp             | 0.0897 | 0.0200    | 0.0923  | 0.9967   |
| lleg           | 0.0845 | 0.0016    | 0.1111  | 0.7290   |
| tfpg           | 0.0647 | 0.0043    | 0.0308  | 1.0000   |

Figure 9: BMA - determinants of FDI

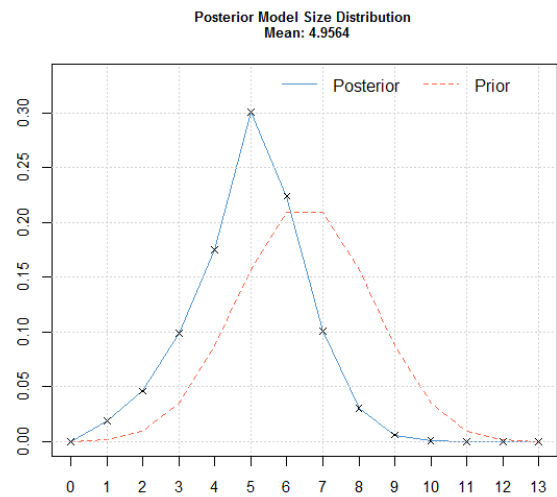


Figure 10: FDI model size

| Variable     | PIP    | Post Mean | Post SD | Cond.    |
|--------------|--------|-----------|---------|----------|
|              |        |           |         | Pos.Sign |
| <b>rw</b>    | 1.0000 | -1.207    | 0.1889  | 0.0000   |
| <b>mh</b>    | 0.9819 | -0.0984   | 0.0308  | 0.0000   |
| <b>Lnfa</b>  | 0.8131 | 1.521     | 1.0374  | 1.0000   |
| <b>cp</b>    | 0.7553 | 0.4667    | 0.3454  | 1.0000   |
| <b>corru</b> | 0.7418 | -0.3556   | 0.2600  | 0.0000   |
| cp2          | 0.6519 | -0.3609   | 0.2945  | 0.0000   |
| <b>r</b>     | 0.6319 | -0.0265   | 0.0253  | 0.0000   |
| <b>tfpg</b>  | 0.3461 | -0.0701   | 0.1065  | 0.0000   |
| <b>s</b>     | 0.1832 | 0.0628    | 1.0849  | 0.5682   |
| <b>gdpr</b>  | 0.1266 | -0.0026   | 0.0208  | 0.1201   |
| dcprs        | 0.1253 | 0.0594    | 0.3045  | 0.8683   |
| ky           | 0.1229 | 0.5271    | 1.9439  | 1.0000   |
| <b>reer</b>  | 0.0917 | 0.0004    | 0.0036  | 0.7372   |
| lleg         | 0.0798 | -0.0008   | 0.0845  | 0.6090   |
| busreg       | 0.0141 | 0.0009    | 0.0419  | 0.5532   |
| fdicsts      | 0.0007 | 0         | 0.0019  | 0.0000   |

Figure 11: BMA - determinants of NFA

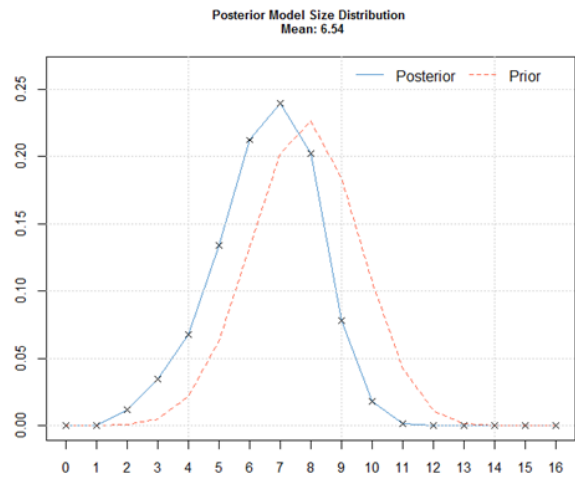


Figure 12: NFA model size

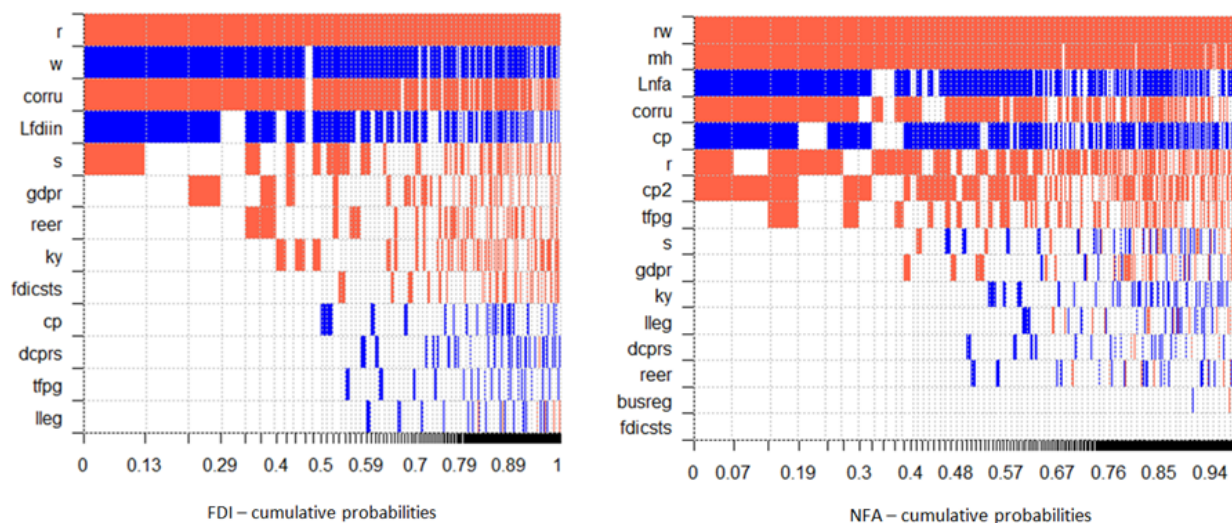


Figure 13: Model inclusion  
(based on best 444 (846) models for FDI (NFA))

### 3.4 Expected results

The study focuses on two points: the effect of the credit bias toward SOEs on FDI and the accumulation of foreign assets. According to the literature and to the mechanisms detailed in the introduction and in Figures 5 and 4, the expected results are a negative effect on direct investment and a positive effect on NFA. The main channel is the investment and saving rates, which are, respectively hindered and enhanced by credit distortions. The channel would intuitively reduce the flows of fixed capital entering the country and raise the accumulation of assets due to savings (particularly foreign assets, considering the low level of financial development in these transition economies). A large uncertainty will surely remain for a slowdown or an increase in outward FDI because a significant part of the latter includes tax haven operations or necessary investments in natural resources by SOEs. Another important element will be the significance of this credit bias whether it is instrumented because the literature considers it either exogenous or endogenous.

## 4 Results

Some elements are verified to attest to the robustness of the results. First, although the stationarity of each variable is not a crucial issue with a *xtabond2* procedure, it is checked. Then, to avoid multicollinearity, correlation tests are done before estimations, and other estimations are conducted with correlated variables such as GDP, which may be removed (this test is a means to tackle multicollinearity in many studies, as in [Bénassy-Quéré et al., 2007](#)). The coefficient of the dependent variable lag is, for most of the estimations, between the OLS and fixed effects ones for each estimation.<sup>30</sup> Moreover, the Arellano and Bond test ensures that there is no second-order autocorrelation of residuals' first-difference. Regarding instruments, their number is always less than N and their exogeneity is controlled by Hansen statistics (most of the estimations verify that the values of the latter are

<sup>30</sup>When the ordinary least squares estimator is used, there is some correlation between the explanatory variables and the error term due to individual effects, creating an upward bias. Concerning the within estimator, when the number of periods is limited, the dependent lagged variable is correlated with the fixed effects in the error term, leading to a downward bias ([Arellano and Bond, 1991](#)).

between 0.1 and 0.25 and are not biased by too many instruments, although there is no precise rule, see [Ruud, 2000](#), p. 515, and [Roodman, 2009](#)).<sup>31</sup> Additionally, note that the standard deviations of the coefficients are often largely below the coefficients' values (approximately 20-40 %) to ensure some robustness. Finally, the results are strengthened by different robustness checks (e.g., bootstrap, estimations for different periods, and the addition of explanatory variables or interaction terms; see Table 3).

#### 4.1 Results summary and robustness checks

| The effect of SOBs' credit bias on:   | FDI-in                     |                          | FDI-out  |                          | NFA  |                      |
|---|----------------------------|--------------------------|--|--------------------------|--|----------------------|
|   | Significance               | Coefficient              | Significance   | Coefficient              | Significance                                     | Coefficient          |
| <b>Results</b>  |                            |                          |  |                          |  |                      |
| Exogenous <i>crpubpriv</i> (GMM FOD)  | * up to ***                | -0.128<br>down to -0.190 | No   |                          | * up to ***                                      | 0.222<br>up to 0.449 |
| <i>crpubpriv</i> instrumented (GMM FOD)   | **                         | -0.206<br>down to -0.248 | No   |                          | ***  | 0.703<br>up to 1.14  |
| Interacting with privatization (GMM FOD)  | * up to ***                | -0.191<br>down to -0.244 | * up to **<br>For some estimations heteroscedasticity and AR(2) test not valid | -0.118<br>down to -0.133 | ** up to ***                                     | 0.326<br>up to 0.502 |
| <b>Robustness checks</b>  |                            |                          |  |                          |  |                      |
| OLS   | ** up to ***               | -0.108<br>down to -0.159 |  |                          | Rare, *  | 0.268<br>up to 1.968 |
| Fixed effects   | * up to **                 | -0.079<br>down to -0.22  |  |                          | * up to ***                                      | 0.380<br>up to 0.393 |
| Bootstrap on OLS and fixed effects (when possible) and robust standard errors   | * up to **                 | -0.079<br>down to -0.22  |  |                          | * up to ***                                      | 0.268<br>up to 1.968 |
| Shorter period of time (T=5) (GMM FOD, OLS, and within)                         | Reduced for OLS and within | -0.088<br>down to -0.193 | * up to **<br>For some estimations heteroscedasticity and AR(2) test not valid | -0.098<br>down to -0.17  | Reduced for OLS fixed effects                    | 0.228<br>up to 0.75  |
| Other data: <i>crpubpriv</i> restricted to some SOEs (GMM FOD, OLS, and within) | * up to ***                | -0.042<br>down to -0.23  | " "  | -1.05<br>down to -0.192  | Standard errors not always robust<br>* up to *** | 0.089<br>up to 0.41  |
| Different interpolations techniques:<br>-linear interpolation:                  | * up to ***                | -0.128<br>down to -0.248 | " "  | -0.118<br>down to -0.133 | * up to ***                                      | 0.222<br>up to 1.14  |
| -log-linear interpolation:  | * up to ***                | -0.128<br>down to -0.248 | " "  | -0.118<br>down to -0.133 | * up to ***                                      | 0.222<br>up to 1.14  |
| -Catmull-Rom Spline interpolation: (not enough observations for <i>soe</i> )    | * up to ***                | -0.12<br>down to -0.231  | " "  | -0.11<br>down to -0.131  | * up to ***                                      | 0.209<br>up to 0.94  |
| -Cardinal Spline interpolation: (not enough observations for <i>soe</i> )       | * up to ***                | -0.12<br>down to -0.231  | " "  | -0.11<br>down to -0.131  | * up to ***                                      | 0.209<br>up to 0.94  |

Notes: This table contains results for additional combinations of explanatory variables, hence, larger variances of coefficients compared to the results below.

Table 3: The impact of SOBs' credit bias and robustness checks

<sup>31</sup>It is preferable to reduce as much as possible the number of instruments when the latter is close to the number of individuals because doing so considerably lowers the average bias in the two-step estimate of the parameters ([Windmeijer, 2005](#)). In the literature and in the STATA *xtabond2* procedure, the number of instruments becomes critical when it is equal to or greater than the number of individuals in the panel (which could be true here if the GMM System was applied because it has more instruments than GMM FOD or difference).

## 4.2 Effect on FDI inflows

|  | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin | GMM <i>fod</i><br>lfdiin |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| L.lfdiin   | 0.751***<br>[0.058]      | 0.739***<br>[0.056]      | 0.698***<br>[0.053]      | 0.699***<br>[0.043]      | 0.722***<br>[0.057]      | 0.609***<br>[0.076]      | 0.776***<br>[0.052]      | 0.665***<br>[0.077]      | 0.731***<br>[0.077]      |
| lgdpr  |                          | -0.075<br>[0.103]        | 0.061<br>[0.137]         |                          |                          | -0.052<br>[0.082]        |                          | -0.124<br>[0.100]        |                          |
| lreer  |                          | 0.473**<br>[0.180]       | 0.018<br>[0.261]         |                          |                          | 0.533***<br>[0.190]      |                          | 0.722***<br>[0.196]      |                          |
| ky   | -0.664<br>[0.975]        | -1.200*<br>[0.668]       | -3.214**<br>[1.325]      | -2.460***<br>[0.799]     | -1.418<br>[0.993]        | -4.285***<br>[0.947]     | -1.886*<br>[1.091]       | -2.673*<br>[1.423]       | -2.115*<br>[1.234]       |
| r  | 0.004***<br>[0.001]      | 0.002<br>[0.002]         | -0.003<br>[0.003]        | 0.005***<br>[0.001]      | 0.003<br>[0.004]         | 0.000<br>[0.002]         | 0.006***<br>[0.002]      | 0.000<br>[0.002]         | 0.005<br>[0.003]         |
| lw   | -0.025<br>[0.065]        |                          |                          | -0.045<br>[0.060]        |                          | 0.008<br>[0.101]         |                          | -0.089<br>[0.087]        | 0.084<br>[0.119]         |
| <b>lcrpubpriv</b>                                | -0.113***<br>[0.039]     | -0.086*<br>[0.042]       |                          | -0.225**<br>[0.089]      |                          | -0.075<br>[0.073]        | -0.191*<br>[0.108]       | -0.106<br>[0.079]        |                          |
| <b>lcrpubpriv<sub>instru.ecolib</sub></b>        |                          |                          | -0.248**<br>[0.099]      |                          | -0.244***<br>[0.058]     |                          |                          |                          | -0.212**<br>[0.084]      |
| <b>lcrpubpriv × lsoe<sub>instru.ecolib</sub></b> |                          |                          |                          | -0.070***<br>[0.025]     | -0.058***<br>[0.015]     | -0.039*<br>[0.022]       |                          |                          |                          |
| <b>lcrpubpriv × lsob<sub>instru.ecolib</sub></b> |                          |                          |                          |                          |                          |                          | -0.096<br>[0.085]        | 0.036<br>[0.074]         | -0.036<br>[0.059]        |
| L.corru  | 0.076<br>[0.049]         | 0.043<br>[0.036]         | 0.074*<br>[0.043]        | 0.045<br>[0.059]         | 0.011<br>[0.049]         | -0.002<br>[0.030]        | 0.020<br>[0.061]         | -0.065*<br>[0.033]       | -0.048<br>[0.057]        |
| lleg   |                          | 0.698***<br>[0.241]      | 0.660*<br>[0.342]        |                          |                          | 0.478**<br>[0.232]       |                          | 0.897***<br>[0.293]      |                          |
| fdicsts  | 0.009<br>[0.007]         | 0.013*<br>[0.007]        | -0.023<br>[0.016]        | -0.008<br>[0.014]        | -0.030**<br>[0.011]      | -0.034***<br>[0.012]     | -0.005<br>[0.013]        | -0.028*<br>[0.014]       | -0.029*<br>[0.015]       |
| 10.years   | 0.055*<br>[0.031]        | 0.055<br>[0.033]         | -0.011<br>[0.049]        | 0.114*<br>[0.061]        | 0.073<br>[0.048]         | 0.041<br>[0.051]         |                          |                          |                          |
| Observations                                     | 173                      | 202                      | 105                      | 117                      | 60                       | 134                      | 92                       | 108                      | 53                       |
| Number of countries                              | 35                       | 38                       | 29                       | 32                       | 24                       | 36                       | 28                       | 32                       | 23                       |
| Sargan statistic                                 | 10.37                    | 20.10                    | 15.68                    | 16.51                    | 15.26                    | 11.99                    | 12.64                    | 8.251                    | 14.63                    |
| p-value of Sargan statistic                      | 0.409                    | 0.127                    | 0.333                    | 0.0859                   | 0.123                    | 0.607                    | 0.245                    | 0.876                    | 0.146                    |
| Hansen statistic                                 | 7.937                    | 15.50                    | 15.30                    | 11.01                    | 9.247                    | 17.22                    | 9.217                    | 12.85                    | 10.50                    |
| p-value of Hansen statistic                      | 0.635                    | 0.345                    | 0.358                    | 0.356                    | 0.509                    | 0.245                    | 0.512                    | 0.538                    | 0.398                    |
| Arellano-Bond test for AR(1)                     | -2.599                   | -2.710                   | -1.923                   | -2.692                   | -2.187                   | -2.250                   | -2.329                   | -1.881                   | -0.613                   |
| p-value AR1                                      | 0.00934                  | 0.00673                  | 0.0545                   | 0.00710                  | 0.0288                   | 0.0244                   | 0.0198                   | 0.0599                   | 0.540                    |
| Arellano-Bond test for AR(2)                     | -1.680                   | -0.880                   | -0.750                   | -1.678                   | 0.137                    | -1.483                   | -1.491                   | -1.254                   | -1.204                   |
| p-value AR2                                      | 0.0930                   | 0.379                    | 0.453                    | 0.0933                   | 0.891                    | 0.138                    | 0.136                    | 0.210                    | 0.229                    |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4: FDI inflows - GMM with Forward Orthogonal Deviation

It is initially assumed that the share of credit to SOEs (variable *crpubpriv*) is exogenous.<sup>32</sup> *crpubpriv* is quite significant whether some variables (e.g., wages, FDI costs, the share of capital in production, GDP, the real effective exchange rate, and legal environment) are added or removed (Table 4). The coefficient of *crpubpriv* is negative: although there is a likely endogeneity, there is a clear negative effect of credit bias toward SOEs (rather than private firms) on FDI inflows.<sup>33</sup> The coefficient values of the dependent variable's lag are close to or between OLS and fixed effects ones, which can be biased (Arellano and Bond, 1991).

Then, *crpubpriv* is instrumented and interacts with privatization (variable *soe*, which is also instrumented by the

<sup>32</sup>See subsection 3.2 for justifications.

<sup>33</sup>The value of *crpubpriv*'s coefficient is close to the OLS and fixed effects values (see Tables 11 and 12 in the Appendix). Note that in the literature, GMM with FOD is considered as an alternative to first-difference; therefore, OLS and fixed effects estimations are done under first-difference for comparison; level estimations are also available in the Appendix. A comparison of OLS and fixed effects in levels with GMM System estimations would be relevant. However, as explained in the model paragraph, for many estimations with the GMM System, the number of instruments can become greater than N (the number of countries). Then, the solved model becomes inconsistent; "instrument proliferation in system GMM may generate results that are invalid", and "a large instrument collection overfits endogenous variables even as it weakens the Hansen test of the instruments' joint validity" (Roodman, 2009).



environment of liberalization (variable *ecolib*) and lags of the share of SOEs).<sup>32</sup> There is an underlying first step in which *crpubpriv* and *soe* are estimated by the external instruments, whose predicted values are substituted for *crpubpriv* and *soe* in the next GMM, OLS, and fixed effects.<sup>34</sup> Note that because a credit distribution bias toward SOEs exists, there is no correlation between *crpubpriv* and *soe* (Figures 6 and 7) that could disturb the estimations. The same work is done with the interaction between *crpubpriv* and *sob*. In the new estimations with the interaction term, *crpubpriv*×*soe*, *crpubpriv* is also significant with a negative coefficient, regardless of whether other explanatory variables are removed (Table 4). As for *crpubpriv*×*sob*, the interaction can bias the estimations. Indeed, intuitively and according to Figures 6 and 8, the correlation is strong between *crpubpriv* and *sob*.

Some other estimations are done without SOEs directly affiliated with local governments (i.e., provincial, city, or others) accounted for in credit amounts to the public sector. With these new values, the effect on FDI inflows is roughly similar, which adds some robustness to the study (see Table 3, and further details are available upon request). This effect is consolidated by estimations with T=5 instead of T=10, which yield results close to Table 4. These elements strengthen the fact that, in this study, an increasing share of credit to SOEs (rather than to private firms) reducing the inflows of FDI is a quite robust result. However, at this step and considering the error margins, it is difficult to quantify precisely the slowdown of FDI inflows due to an increase in *crpubpriv*.

This result extends to all emerging privatizing countries the result for China. In the latter, the misallocation of capital by public financial intermediation negatively affects domestic investments and FDI in Boyreau-Debray (2003), Boyreau-Debray and Wei (2005), and Dollar and Wei (2007). Gordon and Li (2005) also emphasize that in China the credit distortions toward SOEs may have strongly slowed the entry of competitive firms. Note that a reverse causality exists and is controlled here by GMM and external instruments. Indeed, the entry of FDI is a means for private firms to bypass domestic credit constraints in China (Héricourt and Poncet, 2009; Ju and Wei, 2010; Poncet et al., 2010) and CEE countries (Krkoska, 2001).

Regarding other variables, note the significance of capital-output ratio, real effective exchange rate, the legal environment and property rights protections. The negative effect of a rise in the capital-output ratio is in line with the theory under which capital flows to where it is scarce. Concerning the legal environment and property rights protection, a better quality of the latter attracts FDI as mentioned in both empirical and theoretical studies (Bénassy-Quéré et al., 2007; Ju and Wei, 2010). As for FDI costs, they are significant for most of the estimations.<sup>35</sup>

The effect on FDI inflows is strengthened by the second approach in section 5, adding a sectoral dimension and relying on another methodology to control for omitted variables and endogeneity issues. The results are close and more accurate; therefore, quantification is possible.

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<sup>34</sup>The first estimation of *soe* by *ecolib* is equivalent to the first step of a *ivreg* STATA procedure.

<sup>35</sup>Multicollinearity can be an issue for FDI costs because of its correlation with corruption mentioned in Morisset and Neso (2002, although it apparently does not exist here), and Branstetter and Lardy (2006) highlight a reverse causality between FDI inflows and FDI costs. As for corruption, its correlation with *crpubpriv* would require a deeper study. Indeed, corruption is one of several explanations of the credit distribution bias of SOBs.

### 4.3 Effect on the accumulation of foreign assets

|  | GMM <i>fod</i><br>lnfa     | GMM <i>fod</i><br>lnfa | GMM <i>fod</i><br>lnfa    | GMM <i>fod</i><br>lnfa | GMM <i>fod</i><br>lnfa     | GMM <i>fod</i><br>lnfa     | GMM <i>fod</i><br>lnfa | GMM <i>fod</i><br>lnfa     | GMM <i>fod</i><br>lnfa |
|--|----------------------------|------------------------|---------------------------|------------------------|----------------------------|----------------------------|------------------------|----------------------------|------------------------|
| L.lnfa   | 0.309***<br>[0.052]        | 0.451***<br>[0.093]    | 0.372***<br>[0.050]       | 0.458***<br>[0.065]    | 0.381***<br>[0.081]        | 0.332***<br>[0.048]        | 0.466***<br>[0.063]    | 0.299***<br>[0.070]        | 0.322***<br>[0.099]    |
| lgdpr  | 0.078<br>[0.239]           | 0.317<br>[0.266]       | 0.358*<br>[0.183]         | 0.007<br>[0.224]       | 0.861**<br>[0.383]         | 0.150<br>[0.164]           | -0.166<br>[0.246]      | -0.261<br>[0.258]          | 0.340<br>[0.628]       |
| lreer  | -1.101***<br>[0.367]       | -0.418<br>[0.290]      | -0.871*<br>[0.457]        | -0.366<br>[0.306]      |                            | -0.450<br>[0.369]          | -1.010**<br>[0.456]    | -0.966*<br>[0.541]         | 1.167<br>[1.055]       |
| ky   | -0.633<br>[1.638]          | -1.418<br>[1.865]      | -3.847**<br>[1.527]       | -2.025<br>[1.365]      |                            | -0.434<br>[0.893]          | -1.714<br>[1.521]      | -0.207<br>[1.311]          | -8.653***<br>[2.990]   |
| s  | 0.629***<br>[0.115]        | 0.208<br>[0.164]       | 0.130<br>[0.088]          | 0.400***<br>[0.135]    | 0.800***<br>[0.141]        | 0.306***<br>[0.087]        | 0.042<br>[0.110]       | -0.181<br>[0.140]          | 0.773*<br>[0.390]      |
| r  | -0.011**<br>[0.004]        | -0.010<br>[0.010]      | -0.008**<br>[0.003]       | -0.005<br>[0.011]      | -0.009*<br>[0.005]         | -0.013***<br>[0.003]       | -0.012<br>[0.007]      | -0.011***<br>[0.002]       | -0.018<br>[0.013]      |
| rw   | 0.029<br>[0.031]           | 0.028<br>[0.054]       | -0.014<br>[0.031]         | -0.007<br>[0.041]      | 0.088<br>[0.065]           | 0.013<br>[0.036]           | -0.012<br>[0.026]      | -0.025<br>[0.027]          | 0.026<br>[0.035]       |
| <b>lcrpubpriv</b>                                | <b>0.449***</b><br>[0.113] |                        | <b>0.222**</b><br>[0.106] |                        | <b>0.326***</b><br>[0.115] | <b>0.502***</b><br>[0.082] |                        | <b>0.342***</b><br>[0.090] |                        |
| <b>lcrpubpriv<sub>instru.ecolib</sub></b>        |                            | 0.938*<br>[0.520]      |                           | 0.867*<br>[0.483]      |                            |                            | 0.803*<br>[0.402]      |                            | 1.140**<br>[0.420]     |
| <b>lcrpubpriv × lsoe<sub>instru.ecolib</sub></b> |                            |                        |                           |                        | 0.379**<br>[0.155]         | 0.380**<br>[0.173]         | -0.228<br>[0.204]      |                            |                        |
| <b>lcrpubpriv × lsob<sub>instru.ecolib</sub></b> |                            |                        |                           |                        |                            |                            |                        | 0.273**<br>[0.133]         | -0.157<br>[0.370]      |
| lleg   |                            |                        |                           |                        |                            | 0.243<br>[0.368]           | 1.878***<br>[0.301]    | 1.151***<br>[0.210]        | 3.418***<br>[0.600]    |
| cp   | 0.165**<br>[0.074]         | -0.079<br>[0.069]      |                           |                        | -0.074<br>[0.108]          | -0.054<br>[0.064]          | -0.138**<br>[0.055]    | -0.024<br>[0.065]          | -0.081<br>[0.078]      |
| tfpg   |                            |                        | -0.047*<br>[0.025]        | 0.018<br>[0.021]       |                            | -0.047**<br>[0.023]        | 0.030*<br>[0.016]      |                            |                        |
| corru  | -0.304***<br>[0.072]       | 0.095<br>[0.141]       |                           |                        | 0.048<br>[0.159]           |                            |                        | 0.050<br>[0.122]           | -0.682*<br>[0.361]     |
| 10.years   | -0.126<br>[0.087]          | -0.249**<br>[0.111]    | -0.318***<br>[0.105]      | -0.098<br>[0.117]      | -0.532***<br>[0.183]       | -0.285***<br>[0.085]       | -0.075<br>[0.083]      | -0.123<br>[0.137]          | -0.824***<br>[0.252]   |
| Observations                                     | 194                        | 122                    | 210                       | 122                    | 168                        | 168                        | 122                    | 168                        | 76                     |
| Number of iso                                    | 38                         | 36                     | 38                        | 36                     | 37                         | 37                         | 36                     | 37                         | 28                     |
| Sargan statistic                                 | 38.85                      | 42.43                  | 47.45                     | 48.41                  | 29.52                      | 53.75                      | 29.97                  | 30.56                      | 19.58                  |
| p-value of Sargan statistic                      | 0.00114                    | 0.000341               | 5.78e-05                  | 4.10e-05               | 0.00329                    | 2.01e-05                   | 0.0182                 | 0.00230                    | 0.0755                 |
| Hansen statistic                                 | 19                         | 19.39                  | 15.79                     | 22.14                  | 15.76                      | 22.09                      | 15.41                  | 13.27                      | 13.60                  |
| p-value of Hansen statistic                      | 0.269                      | 0.249                  | 0.468                     | 0.139                  | 0.203                      | 0.228                      | 0.495                  | 0.349                      | 0.327                  |
| Arellano-Bond test for AR(1)                     | -0.960                     | 0.593                  | -1.241                    | 0.735                  | -0.996                     | -1.047                     | 0.474                  | -0.902                     | 0.640                  |
| p-value AR1                                      | 0.337                      | 0.554                  | 0.215                     | 0.462                  | 0.319                      | 0.295                      | 0.635                  | 0.367                      | 0.522                  |
| Arellano-Bond test for AR(2)                     | -1.483                     | -0.450                 | -0.848                    | -0.889                 | -1.197                     | -0.847                     | -0.854                 | -1.294                     | -1.629                 |
| p-value AR2                                      | 0.138                      | 0.653                  | 0.397                     | 0.374                  | 0.231                      | 0.397                      | 0.393                  | 0.196                      | 0.103                  |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5: NFA - GMM with Forward Orthogonal Deviation

In the estimations in which the share of credit to SOEs (*crpubpriv*) is exogenous, we can observe an increase of NFA when SOEs are more financed across time compared with private firms (Table 5). The results remain significant whatever the control variables are, and GMM FOD coefficients for the dependent variable's lag are often between or close to OLS and fixed effects ones (Tables 13 and 14). Results remain valid when *crpubpriv* is instru-

mented and interacting with *soe*.<sup>36</sup> The conclusion to be drawn is a rise in NFA when credit is more distributed to SOEs to the detriment of productive private firms. This conclusion is strengthened by estimations with  $T=5$  and *crpubpriv* restricted to some SOEs (Table 3), for which results are roughly similar to Table 5. As for the choice of *soe* and *sob* interpolations, there is no significant difference between methodologies (see Tables 3, 15, 16 and 17).

The results are in line with the literature linking a lack of funding of private firms to global imbalances. As detailed in the literature review (section 2), high credit distribution to a decreasing share of SOEs raises capital intensiveness in the latter, whereas it increases the share of labor-intensive private firms that accumulate profits (Figure 4). In the Chinese case, these profits are saved, either invested abroad by firms to finance future investments with returns on assets or invested abroad via financial institutions through foreign reserves (Caballero et al., 2008; Song et al., 2011; Benhima, 2013). The subsequent accumulation of foreign assets drives external surpluses, thus raising NFA. The above is a quite important result because it generalizes to most emerging countries a key element in the allocation puzzle in China.

Concerning other variables, there is a positive effect of savings on NFA, which is intuitive and supports the literature: a higher saving rate enhances the accumulation of foreign assets, as opposed to the capital-output ratio (thus, financial capital flows out of the country when capital is scarce, which is in line with the allocation puzzle of capital flows in emerging countries). Then, note that as in the literature (Feldstein, 1983), a higher real domestic interest rate reduces net foreign investment; however, the results remain ambiguous for the world interest rate. When significant, a rise of *corru* (a decrease in corruption) reduces NFA. This consequence is intuitive because a low level of corruption attracts foreign financial capital, and it is in line with the literature (Wei and Wu, 2001; Gelos and Wei, 2002 and 2005; Papaioannou, 2005). Regarding capital controls (financial openness), there is a difficulty with embedding any type of capital controls, considering the variety of flows, which need specific controls in transition economies. Lastly, control variables (GDP and real effective exchange rate) have little effect, and when they do have effect, the coefficient is positive for *gdpr* and negative for *reer*. For the latter, a reverse causality exists that complicates the determination of the link between NFA and the exchange rate.

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<sup>36</sup>However, as is true for FDI inflows, estimations with *crpubpriv*×*sob* can be biased by the correlation between *crpubpriv* and *sob*.

#### 4.4 Effect on FDI outflows

|  | GMM fod<br>lfdiout  | GMM fod<br>lfdiout  | GMM fod<br>lfdiout   | GMM fod<br>lfdiout   | GMM fod<br>lfdiout   | GMM fod<br>lfdiout  | GMM fod<br>lfdiout   | GMM fod<br>lfdiout  |
|--|---------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------------|---------------------|
| L.lfdiout                                  | 0.962***<br>[0.043] | 1.029***<br>[0.083] | 0.854***<br>[0.048]  | 0.577***<br>[0.045]  | 0.856***<br>[0.061]  | 0.672***<br>[0.086] | 0.961***<br>[0.071]  | 0.796***<br>[0.150] |
| lgdpr                                      | -0.295<br>[0.202]   | 0.030<br>[0.163]    | -0.211<br>[0.164]    | -0.405**<br>[0.161]  |                      |                     | -0.316**<br>[0.127]  |                     |
| lreer                                      | 0.996***<br>[0.228] | 0.347<br>[0.354]    | 0.420**<br>[0.205]   | 0.194<br>[0.245]     |                      |                     | 0.638**<br>[0.259]   | -1.903*<br>[0.986]  |
| ky   | 1.672*<br>[0.957]   | 6.262**<br>[2.644]  | -1.661**<br>[0.721]  | 6.666***<br>[1.476]  | -2.464**<br>[1.075]  | 8.049*<br>[4.087]   | 0.947<br>[1.453]     | 1.286<br>[3.028]    |
| r  | 0.005**<br>[0.002]  | 0.007<br>[0.008]    | 0.004**<br>[0.002]   | 0.001<br>[0.003]     | 0.003**<br>[0.002]   | -0.006**<br>[0.003] | 0.008***<br>[0.001]  | -0.005<br>[0.007]   |
| rw   | -0.041<br>[0.031]   | 0.095**<br>[0.037]  | 0.029<br>[0.040]     | -0.088**<br>[0.042]  | 0.082*<br>[0.042]    | 0.022<br>[0.058]    | 0.020<br>[0.035]     | 0.053*<br>[0.027]   |
| <b>lcrpubpriv</b>                          | -0.018<br>[0.055]   |                     | -0.118*<br>[0.061]   |                      | -0.133**<br>[0.058]  |                     | 0.043<br>[0.087]     |                     |
| <b>lcrpubpriv</b> <sub>instru.ecolib</sub> |                     | -0.499<br>[0.693]   |                      | 0.136<br>[0.134]     |                      | 0.079<br>[0.486]    |                      | -0.937<br>[1.170]   |
| lcrpubpriv × lsoe <sub>instru.ecolib</sub> |                     |                     | -0.089***<br>[0.033] | -0.073***<br>[0.025] | -0.140***<br>[0.031] | -0.062*<br>[0.034]  |                      |                     |
| lcrpubpriv × lsob <sub>instru.ecolib</sub> |                     |                     |                      |                      |                      |                     | -0.059***<br>[0.022] | -0.098**<br>[0.044] |
| lleg                                       | 0.065<br>[0.242]    | -1.856**<br>[0.768] | 0.008<br>[0.226]     | -2.384***<br>[0.654] | 0.152<br>[0.312]     | -2.194<br>[1.743]   | -0.149<br>[0.272]    | 0.226<br>[0.655]    |
| fdicsts                                    | 0.004<br>[0.011]    | 0.018<br>[0.033]    | -0.065***<br>[0.008] | -0.048***<br>[0.009] | -0.066***<br>[0.014] | -0.018<br>[0.043]   | -0.072***<br>[0.012] | -0.078*<br>[0.044]  |
| 10.years                                   | 0.222**<br>[0.097]  | -0.115<br>[0.070]   | 0.072<br>[0.101]     | 0.399***<br>[0.104]  | 0.035<br>[0.108]     | 0.254**<br>[0.097]  | 0.071<br>[0.418]     | 0.702<br>[1.183]    |
| Observations                               | 209                 | 150                 | 142                  | 65                   | 150                  | 65                  | 141                  | 90                  |
| Number of iso                              | 37                  | 35                  | 36                   | 24                   | 36                   | 24                  | 33                   | 28                  |
| Sargan statistic                           | 26.95               | 9.285               | 31.87                | 28.04                | 28.43                | 10.57               | 31.08                | 10.28               |
| p-value of Sargan statistic                | 0.0421              | 0.901               | 0.0104               | 0.0313               | 0.00478              | 0.566               | 0.0131               | 0.246               |
| Hansen statistic                           | 15.28               | 9.699               | 12.99                | 15.36                | 15.28                | 14.23               | 17.57                | 6.922               |
| p-value of Hansen statistic                | 0.504               | 0.882               | 0.673                | 0.499                | 0.226                | 0.286               | 0.349                | 0.545               |
| Arellano-Bond test for AR(1)               | -1.516              | -1.345              | -2.664               | -1.907               | -2.573               | -1.623              | -2.196               | -1.407              |
| p-value AR1                                | 0.129               | 0.179               | 0.00773              | 0.0565               | 0.0101               | 0.105               | 0.0281               | 0.160               |
| Arellano-Bond test for AR(2)               | -0.821              | -0.221              | -2.681               | -0.790               | -2.659               | -1.197              | -2.368               | -1.108              |
| p-value AR2                                | 0.412               | 0.825               | 0.00733              | 0.429                | 0.00783              | 0.231               | 0.0179               | 0.268               |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: FDI outflows - GMM with Forward Orthogonal Deviation

The GMM results for outward FDI are difficult to interpret because of high residuals' second order autocorrelation for some estimations (which is not true for inward FDI and NFA estimations) and heteroscedasticity (non-robust standard errors). Thus, any comparison with OLS and fixed effects would also be biased. Bilateral estimations between countries would be more convenient for FDI outflows, with more variables from host countries (see for example the study of [Ramasamy et al., 2012](#)), but FDI outflows are not the main focus. Moreover, it was also difficult to expect a slowdown in outward FDI stock due to the effect of the credit bias toward SOEs. Indeed, a large part of FDI outflows includes tax haven operations with corporate savings. Thus, the slowdown of investment due to the credit bias would reduce outward FDI, but the induced rise in savings could also increase it.

We can still quickly analyze some estimations. There is no significance for the credit bias when *crpubpriv* is considered exogenous and without interaction with privatization. However, as for inward FDI, the interaction terms show a decrease in outward FDI stock when capital is driven too much to SOEs during privatization (Table 6). FDI does not vary significantly when some control variables (*gdpr* and *reer*) are removed or when other explanatory variables are added (*corru*, *w*, not in this table of results). Therefore, it seems that the effect of the credit bias would be negative, but it is not possible to draw any conclusion because of the lack of significance,

residuals' second order autocorrelation, and heteroscedasticity. The case of outward FDI is all the more difficult to analyze because there are various locations (Ramasamy et al., 2012) and purposes; FDI outflows can also be a means to supply raw materials to a country or to bring capital to tax havens. A deeper study splitting the different types of outward FDI would be necessary to gain a more accurate idea of their slowdown. Moreover, FDI from private firms and SOEs should be separated. Indeed, locations, amount, and nature of FDI projects vary significantly between firms' ownership; therefore, a credit bias in favor of a certain type of firm might have an effect on specific locations of capital flows. In fact and again for China, tax havens are often a destination for SOEs' outward FDI (in 2000, 55.1% of China's outward FDI was located in Hong Kong; in 2006, 44.4% was located in the Cayman Islands).<sup>37</sup> SOEs are also attracted to countries with large sources of natural resources, whereas private firms often seek larger gains by diversifying market shares abroad (for the case of China see the empirical study of Ramasamy et al., 2012). Moreover, the majority of outward FDI comes from SOEs and not from private firms (in the 2006-2008 period on the Shanghai and Shenzhen stock exchanges, 73% of companies with outward FDI were state-owned or directly controlled by the central government (SASAC companies)). With this ownership composition of outward FDI, it is more understandable that the results for FDI outflows are less robust than for FDI inflows and NFA. The negative effect of a credit bias toward SOEs would be more significant in estimations including sectors with greater numbers of private firms. These details regarding the sectoral and ownership composition of FDI highlight the necessity to go further by examining sectoral data, which is done in the following analysis.

**To summarize** the results, an excessive funding of SOEs to the detriment of private firms slows inward FDI and enhances the accumulation of foreign assets. These results confirm the literature on China and extend it to all emerging privatizing economies. The effect on FDI inflows and NFA is robust, but the variance of the coefficients remains too large to quantify this effect. Concerning FDI outflows, the results are less significant and the robustness is lower (some heteroscedasticity and autocorrelation of residuals remain). The lower significance and robustness can be explained by the sectoral composition of outward FDI, which is less composed of private firms (but primarily of SOEs). To have a more accurate evaluation of the credit bias' effect, particularly on FDI, a sectoral approach is proposed in the next section.

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<sup>37</sup>Sources: Chinese Statistical Yearbook and Ramasamy et al. (2012).

## 5 A sectoral approach and financial dependence

This analysis is implemented to strengthen the previous results and provide more accuracy to the quantification of the effect of an excessive funding of SOEs to the detriment of private firms. Moreover, a different methodology is set to reduce omitted variables and endogeneity issues. The sectoral approach also allows capturing more specific and richer firms' effects, knowing that the ownership structure and dependence on external finance widely vary between sectors.

### 5.1 Model

In this section, the focus is on the interaction between the credit bias of SOBs, which can be considered a characteristic of the country's financial development, and the index of sectoral financial dependence, which is independent of time and country. Therefore, estimations rely on an interaction between country and sectoral characteristics in the period 1992-2012. This model and the selected variables enable correcting for country and industry characteristics and preclude any possibility of omitted variables or endogeneity issues, following the methodology developed by [Rajan and Zingales \(1998\)](#).

The estimated model is as follows:

$$FDI_{i,j,t} = \alpha X_{i,j,t} + \mu Z_{i,t} + \beta crpubpriv_{i,t, \wedge \setminus \begin{matrix} instru.ecolib_{i,t} \\ instru.ecolib_{i,t} \end{matrix}} + \varphi crpubpriv_{i,t} \times soe_{i,t, \setminus instru.ecolib_{i,t}} \quad (4) \\ + \gamma crpubpriv_{i,t} \times fidep_j + u_i + v_j + \eta_t + Cste$$

with  $X_{i,j,t} = [GDP_{i,j,t}; TB_{i,j,t}]$ ,  $Z_{i,t} = [gdpr; r; leg; fdicsts]$  and  $u_i, v_j, \eta_t$ , dummies for dimensions i (country), j (sector), and t (time).

A first study concerns manufacturing sectors (ISIC revision 2 classification) and a second one tertiary sectors (ISIC revision 4 classification).  $FDI_{i,j,t}$  is the dependent variable: the amount of FDI stock by country, sector, and time (from CEIC database) relative to GDP (aggregated GDP by country and time).  $X_{i,j,t} = [GDP_{i,j,t}; TB_{i,j,t}]$  are the two control variables by country, sector, and time: the trade balance (from [Nicita and Olarreaga, 2007](#)) and GDP (from CEIC database, relative to aggregated GDP (by country and time)). Because of data constraints, trade balance is used in estimations for manufacturing and GDP in estimations for tertiary sectors.  $Z_{i,t}$  are control variables by country and time, which were previously described in section 3.  $crpubpriv_{i,t}$  is the key variable proxy for the credit bias, i.e., the amount of credit afforded to SOEs relative to credit to private firms and SOEs, by time and country.  $fidep_j$  represents financial dependence for each sector, independent of time. For manufacturing sectors, financial dependence data (Table 7) come from [Rajan and Zingales \(1998\)](#). For tertiary sectors, the data come from [Alfaro and Charlton \(2007, following Rajan and Zingales, 1998\)](#). Only financial dependence on external finance is considered because the study focuses on credit distribution.<sup>38</sup> The privatization of SOEs is also considered through an interaction with  $soe_{i,t}$  (by country and time).  $instru.ecolib_{i,t}$  are the external instruments  $ecolib_{i,t}$  (the mean of different indexes linked to economic liberalization) and lags of  $soe_{i,t}$  and  $sobi_{i,t}$  ([Andreyeva, 2003; Hanousek et al., 2007 and 2009](#)). The external instruments are used or not used with  $crpubpriv_{i,t}$  and  $soe_{i,t}$  to ensure exogeneity because the latter are considered either exogenous or endogenous (see section 3). Finally, country, sector, and time dummies control for omitted variables and characteristics for

<sup>38</sup>Note that financial dependence is calculated by [Rajan and Zingales \(1998\)](#) and often used in the literature as a global sectoral index, independent of country and time, based on a large sample of U.S. firms (from the Compustat database). The authors specify that this index is calculated based on the 1980s and corresponds to the emerging economies' product life cycle in the 1990s. For all of the arguments concerning the use of this index as a global index independent of time and country, see the work of [Rajan and Zingales \(1998\)](#).

each dimension. Estimations are done on a panel of eight countries, restricted by sectoral data availability. These countries experienced or continue to experience an economic transition (China, Indonesia, Romania, Slovenia, South Africa, South Korea, and Turkey) in the last 25 years.<sup>39</sup>

| Manufacturing                                 |                      | Tertiary                                      |                      |
|---|----------------------|---|----------------------|
| Sector  | Financial dependence | Sector  | Financial dependence |
| 311 Food products                             | 0.14                 | 1- Agriculture, forestry and fishing          | -0.297               |
| 313 Beverages                                 | 0.08                 | 50- Mining and quarrying                      | 0.455                |
| 314 Tobacco                                   | -0.45                | 35- Electricity, gas and water                | -0.359               |
| 321 Textile                                   | 0.4                  | 41- Construction                              | -0.919               |
| 322 Apparel                                   | 0.03                 | 45- Trade and repair                          | -0.416               |
| 323 Leather products                          | -0.14                | 50- Accommodation and food service activities | -0.1                 |
| 324 Footwear                                  | -0.08                | 64- Financial and insurance activities        | -3.5995              |
| 331 Wood products, except furniture           | 0.28                 | 68- Real estate and business activities       | -0.173               |
| 332 Furniture                                 | 0.24                 |   |                      |
| 341 Paper and products                        | 0.18                 |   |                      |
| 342 Printing and publishing                   | 0.2                  |   |                      |
| 351 Industrial chemicals                      | 0.21                 |   |                      |
| 352 Other chemicals                           | 0.22                 |   |                      |
| 353 Petroleum refineries                      | 0.04                 |   |                      |
| 354 Miscellaneous petroleum and coal products | 0.33                 |   |                      |
| 355 Rubber products                           | 0.23                 |   |                      |
| 356 Plastic products                          | 1.14                 |   |                      |
| 361 Pottery, china, earthenware               | -0.15                |   |                      |
| 362 Glass and products                        | 0.53                 |   |                      |
| 369 Other non-metallic mineral products       | 0.06                 |   |                      |
| 371 Iron and steel                            | 0.09                 |   |                      |
| 372 Non-ferrous metals                        | 0.01                 |   |                      |
| 381 Fabricated metal products                 | 0.24                 |   |                      |
| 382 Machinery                                 | 0.45                 |   |                      |
| 383 Electric machinery                        | 0.77                 |   |                      |
| 384 Transport equipment                       | 0.31                 |   |                      |
| 385 Professional and scientific equipment     | 0.96                 |   |                      |
| 390 Other manufactured products               | 0.47                 |   |                      |

Table 7: Sectors' financial dependence -  
Sources: Rajan and Zingales (1998) and Alfaro and Charlton (2007)

## 5.2 Results

First, we can observe that the credit bias toward SOEs is significant only when instrumented ( $crpubpriv_{instru.ecolib}$  in Table 8); it emphasizes the endogeneity of  $crpubpriv$  for FDI inflows (see subsection 3.2). Moreover, such a bias is significant both with and without interaction with privatization ( $crpubpriv \times soe$ ): a credit distribution that favors SOEs to the detriment of private firms has a negative effect on inward FDI stock. Note that the credit bias toward SOEs is significant in manufacturing but not in tertiary sectors. Indeed, new private firms are largely in manufacturing, whereas SOEs are mostly in tertiary sectors (Figure 14). The second explanation

<sup>39</sup>Brazil, India Russia, and some CEE countries are not in the sample because of a lack of available sectoral data, particularly on FDI and GDP.

is that firms depend more upon external finance in manufacturing sectors (Table 7). When possible, bootstrap estimations are implemented and provide substantial robustness. Dummies do not appear in Tables 8 and 9 but have a significant effect, particularly in 1999-2002 and 2007-2011 (during financial crises), in CEE countries (that is, where privatization was the largest) and in many sectors (particularly in financial, insurance, real estate and business activities, and some manufacturing sectors (ISIC codes 332, 341, 342, 355, 369 and 381)). These results are completely consistent with those of the first approach for FDI inflows. The two studies have different approaches, models, and ways to control endogeneity, but converge to the same results. Hence, a quantification is possible, although the margin error is not negligible; the rise in the credit afforded to SOEs to the detriment of private firms slowed inward FDI by approximately 16% to 23%, conditional on economic liberalization. Like the GMM results, the estimations extend to some emerging privatizing countries the result for China (Boyreau-Debray, 2003; Boyreau-Debray and Wei, 2005; Gordon and Li, 2005; Dollar and Wei, 2007). As detailed in the previous sections, the reverse causality has also been studied, which confirms the endogeneity of *crpubpriv* with FDI inflows when it is not instrumented. Indeed, the entry of FDI is a means for private firms to bypass domestic credit constraints in China (Héricourt and Poncet, 2009; Ju and Wei, 2010; Poncet et al., 2010) and CEE countries (Krkoska, 2001).

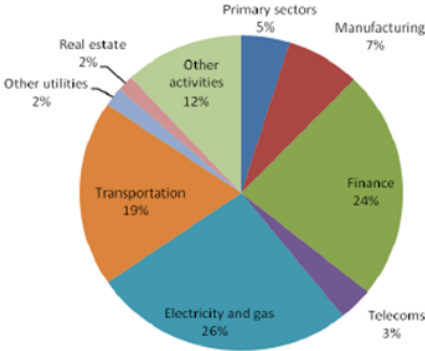


Figure 14: Sectoral composition of SOEs



| Explained variable:<br><i>fdiin<sub>indus</sub></i>   | Level<br>(1)         | Level<br>(2)        | Level<br>(3)         | Level<br>(4)         | Bootstrap<br>(5)     | Level<br>(6)         | Bootstrap<br>(7)     |
|---|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| <i>tb<sub>manuf</sub></i>                             | -0.132***<br>[0.046] | -0.081<br>[0.113]   | -0.177***<br>[0.048] | -0.012<br>[0.126]    | -0.012<br>[0.130]    | 0.094<br>[0.106]     | 0.094<br>[0.114]     |
| <b>crpubpriv</b>                                      | -0.001<br>[0.006]    | 0.017<br>[0.014]    |                      |                      |                      |                      |                      |
| <b>crpubpriv<sub>instru.ecolib</sub></b>              |                      |                     | -0.169***<br>[0.033] | -0.208***<br>[0.073] | -0.208***<br>[0.063] | -0.228***<br>[0.057] | -0.228***<br>[0.056] |
| <i>crpubpriv</i> × <i>depfi<sub>indus</sub></i>       | -0.003<br>[0.012]    | -0.040**<br>[0.018] | 0.006<br>[0.010]     | -0.012<br>[0.017]    | -0.012<br>[0.019]    | 0.019<br>[0.014]     | 0.019<br>[0.015]     |
| <i>crpubpriv</i> × <i>soe<sub>instru.ecolib</sub></i> |                      | -0.057<br>[0.058]   |                      | -0.036<br>[0.030]    | -0.036<br>[0.035]    | -0.021<br>[0.022]    | -0.021<br>[0.020]    |
| <i>gdpr</i>   | -0.002***<br>[0.000] | -0.001<br>[0.001]   | -0.001***<br>[0.000] | -0.002***<br>[0.000] | -0.002***<br>[0.001] |                      |                      |
| <i>r</i>  |                      | 0.001**<br>[0.000]  | -0.000**<br>[0.000]  | -0.000<br>[0.000]    | -0.000<br>[0.000]    |                      |                      |
| <i>leg</i>  |                      | -0.008<br>[0.005]   | -0.007***<br>[0.001] |                      |                      |                      |                      |
| <i>fdicsts</i>  |                      | -0.001<br>[0.001]   | -0.000<br>[0.001]    | -0.000<br>[0.001]    | -0.000<br>[0.001]    |                      |                      |
| Constant  | 0.017***<br>[0.005]  | 0.035<br>[0.031]    | 0.076***<br>[0.010]  | 0.052***<br>[0.012]  | 0.052***<br>[0.011]  | 0.028***<br>[0.008]  | 0.028***<br>[0.007]  |
| Observations  | 605                  | 345                 | 510                  | 345                  | 345                  | 384                  | 384                  |
| R-squared   | 0.462                | 0.637               | 0.591                | 0.596                | 0.596                | 0.531                | 0.531                |

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: This table does not include dummies for the three dimensions (time, country and sector), more complete results are available upon request.

Table 8: Results: manufacturing sectors

| Explained variable:<br><i>fdiin<sub>serv</sub></i>    | Level<br>(1)         | Level<br>(2)        | Level<br>(3)        | Level<br>(4)        | Level<br>(5)        | Level<br>(6)        |
|---|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <i>gdp<sub>serv</sub></i>                             | 0.235***<br>[0.048]  | 0.162***<br>[0.057] | 0.228***<br>[0.049] | 0.223***<br>[0.052] | 0.176***<br>[0.055] | 0.182***<br>[0.057] |
| <b>crpubpriv</b>                                      | 0.018<br>[0.014]     | 0.013<br>[0.043]    |                     |                     |                     |                     |
| <b>crpubpriv<sub>instru.ecolib</sub></b>              |                      |                     | 0.089<br>[0.061]    | 0.057<br>[0.065]    | 0.135<br>[0.142]    | -0.020<br>[0.163]   |
| <i>crpubpriv</i> × <i>depfi<sub>serv</sub></i>        | 0.109***<br>[0.016]  | 0.065***<br>[0.015] | 0.088***<br>[0.015] | 0.087***<br>[0.015] | 0.075***<br>[0.016] | 0.076***<br>[0.016] |
| <i>crpubpriv</i> × <i>soe<sub>instru.ecolib</sub></i> |                      | -0.063<br>[0.152]   |                     |                     | -0.133*<br>[0.076]  | -0.127<br>[0.111]   |
| <i>r</i>  |                      | 0.000<br>[0.000]    |                     | 0.000<br>[0.000]    |                     | 0.000<br>[0.000]    |
| <i>leg</i>  |                      | 0.009<br>[0.013]    |                     | -0.006<br>[0.007]   |                     | 0.012<br>[0.017]    |
| <i>fdicsts</i>  |                      | -0.007**<br>[0.003] |                     | -0.003*<br>[0.002]  |                     | -0.007*<br>[0.004]  |
| Constant  | -0.034***<br>[0.008] | -0.082<br>[0.078]   | -0.043**<br>[0.017] | -0.004<br>[0.035]   | -0.066*<br>[0.034]  | -0.107<br>[0.101]   |
| Observations  | 440                  | 330                 | 323                 | 315                 | 291                 | 283                 |
| R-squared   | 0.597                | 0.569               | 0.656               | 0.662               | 0.622               | 0.627               |

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: This table does not include dummies for the three dimensions (time, country and sector), more complete results are available upon request.

Table 9: Results: tertiary sectors

## 6 Policy implications

The previous results provide a glimpse of the possibility of improvement through policy actions, knowing from the literature that inward and outward FDI comprise opportunities for an economy in transition, whereas an accumulation of external surpluses and foreign assets is an international risk factor for stability.

First, the problem might obviously be solved at its source by directly reducing the credit bias. The first option would be to restructure SOEs' debts to reduce the incentive for SOBs to fund former debtors for future repayments. Some other options are summarized in [Perotti \(1993, see the literature review\)](#), particularly for government, which should write off banks' bad loans from SOEs ([Begg and Portes, 1993](#)). Indeed, such debt raises and concentrates financial risk and instability in addition to hindering investment in private firms. [Calvo and Frenkel \(1991\)](#) argue that a substitution of these claims in the banks' balance sheets with long-term government bonds could be a solution. Furthermore, the scourge of corruption significantly reduces capital inflows in this study (both FDI and financial) and is one cause of the credit bias of SOBs.<sup>40</sup> The fight against corruption is not a new element and is already in progress in these emerging economies in transition, but this study adds a new important consequence if this issue is underestimated.

Second, a more intensive use of instruments such as capital controls and trade, business, and administrative costs would reduce the consequences of the credit distortion issues if the latter were not solved. For instance, because it has been demonstrated in the literature that FDI inflows can improve the efficiency of a domestic credit market ([Krkoska, 2001](#); [Héricourt and Poncet, 2009](#); [Ju and Wei, 2010](#)), administrative and business barriers must be reduced as much as possible. It is even more important according to this paper's results in which inward FDI is already hindered by SOBs' credit bias; FDI costs might be alleviated, particularly in sectors more weakened by credit distortions. Moreover, the accumulation of large stocks of FDI can also be associated with protectionism measures in specific sectors (for example in China; see [Branstetter and Lardy, 2006](#)), which does not encourage the overcoming of domestic financial constraints, or simply amplify the slowdown of inward FDI due to credit bias. These protectionism measures in specific sectors might also be alleviated when there is capital misallocation. Concerning financial capital, a rise in credit distortions to SOEs increases NFA, which is also demonstrated theoretically by [Ju and Wei \(2010\)](#) and [Song et al. \(2011\)](#). These savings are not driven to domestic productive private firms but rather seek deeper and more efficient financial markets abroad. Thus, the setting up of high controls on foreign equity and portfolio investments would obviously prevent foreign asset accumulation and reduce international financial stability. Such actions would, of course, occur in parallel with reforms of the domestic credit market. As for FDI outflows, the issue is different because their objectives vary significantly based on whether they come from private firms or SOEs. The latter often seek natural resource projects or tax havens, whereas the ownership is largely private for commercial or technology purposes (which are the minor part of FDI outflows; for the Chinese case, see [Ramasamy et al., 2012](#)). Therefore, if an empirical study could assess the negative effect of the credit

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<sup>40</sup>See the literature review and data description for more details (section 2 and subsection 3.2). For the effect of corruption on capital flows, see particularly [Wei \(2000\)](#), [Wei and Wu \(2001\)](#), [Gelos and Wei \(2002 and 2005\)](#), [Papaioannou \(2005\)](#), and [Branstetter and Lardy \(2006\)](#). For its effect on financial intermediation during privatization, see [La Porta et al. \(2002\)](#), [Sapienza \(2004\)](#), [Khwaja and Mian \(2005\)](#), and [Firth et al. \(2008\)](#).

bias on FDI outflows, a deeper analysis on the sectoral and ownership composition of these investments could help to determine where to set useful capital controls (for example, to limit outward FDI to tax havens and to support market share seekers).

Third, in addition to reducing the credit bias at its origin or use capital controls, it is necessary to slow privatization. Indeed, although the credit distortion by SOBs is high in China, the privatization catch-up was done step by step compared with other countries. That process allowed this country to avoid or reduce many issues encountered by ex-Soviet bloc countries and others (e.g., underdevelopment of supporting institutions, huge capital flight, government favors, public and private indebtedness, and the Russian crisis; for more details, see [Roland, 1994](#), and [Havrylyshyn and Mc Gettigan, 1999](#)). Moreover, if the bias of SOBs cannot be reduced and if SOBs still have an incentive to fund former debtors (SOEs) for future repayments, a gradual privatization will reduce the volume of poor funding to private firms each year. This consequence will allow supplementary time for future SOE repayments and adjustments, thus providing more credit opportunities for future new private firms. Lastly, one approach for the government and some banks to lend more to certain types of firms is to control lending rates (see section 2 for more details, particularly [Aglietta and Bai, 2012](#), and [Song et al., 2014](#)). Hence, the necessity to liberalize interest rates, bearing in mind that doing so will most likely result in an increase in lending rate volatility (which could occur in China; see [Feyzioglu et al., 2009](#)).

## 7 Conclusion

In this empirical study, a higher credit distribution by SOBs to SOEs, to the detriment of some highly productive private firms, hinders inward FDI but enhances the accumulation of foreign assets in emerging countries experiencing an economic transition. The results are confirmed by various robustness checks (bootstrapped estimates, fewer periods, other data for the credit bias, and different types of interpolations). The second approach, sectoral, correcting differently for endogeneity issues and omitted variables, strengthens the results for FDI inflows. Thus, a quantitative evaluation of SOBs' credit bias can be deduced; the rise in the credit afforded to SOEs to the detriment of growing private firms is associated with a slowdown of inward FDI stocks by approximately 16% to 23%, conditional on economic liberalization. This conclusion is valid in sectors with more private firms and external finance dependence (in manufacturing but not in tertiary sectors).

These results have several implications. First, many policy actions can be set up to improve capital allocation, either by reducing the credit bias at its source, or by limiting the negative consequences. Moreover, the results complete different fields of the literature. On the one hand, they bring to the literature on global imbalances and capital flows an explanation for foreign asset accumulation and patterns of FDI in emerging countries with substantial privatization (not only China). On the other hand, the results constitute an extension of the literature about the credit bias of SOBs, with empirical evidence for many countries. Finally, this analysis can also bring elements to previous studies addressing the effect of privatization on capital flows, particularly on FDI inflows.

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## 8 Appendix

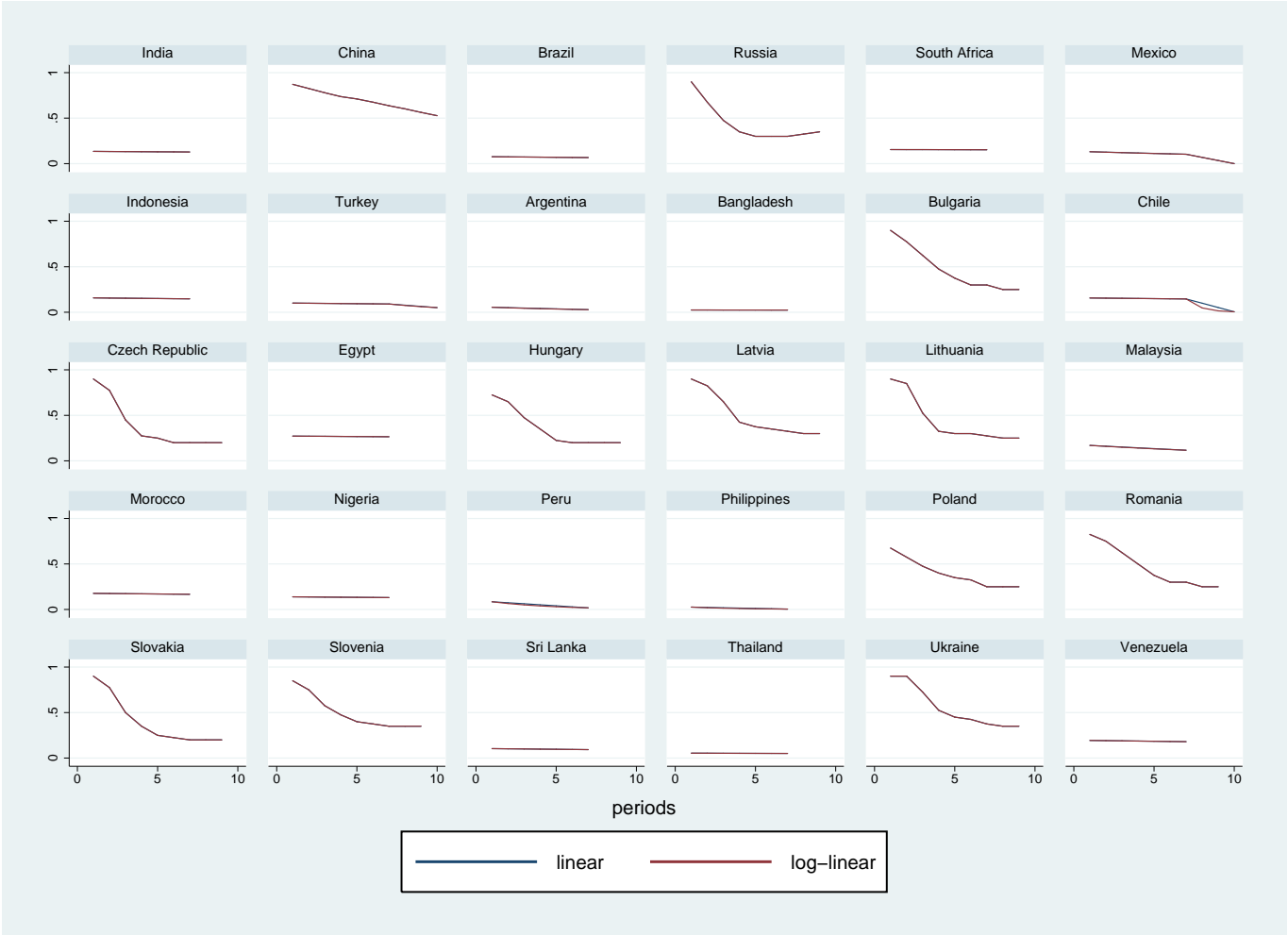


Figure 15: Share of SOEs (linear and log-linear interpolations) - T=1 (1988), 2 (1990), ... 9 (2004), 10 (2006)

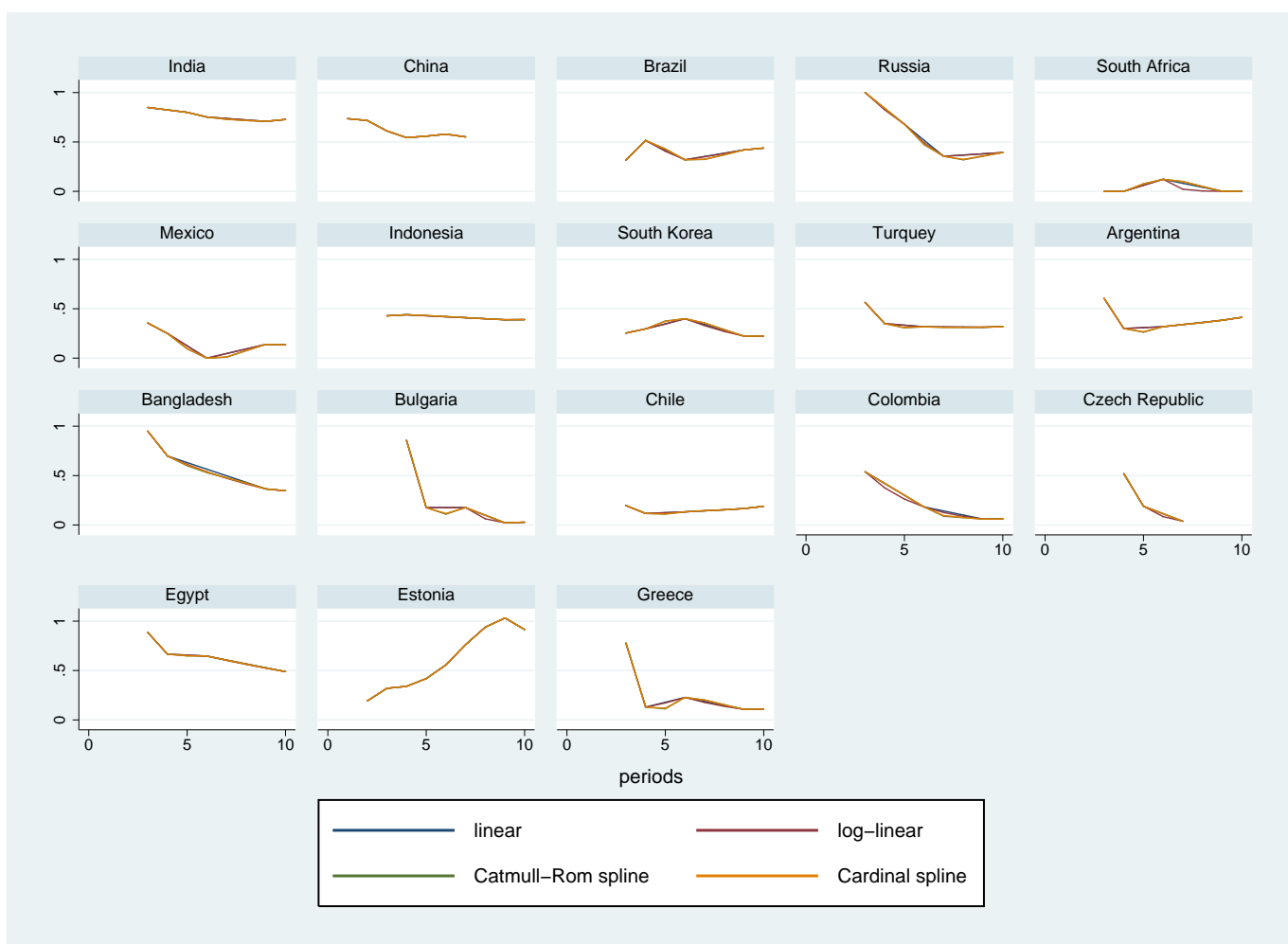


Figure 16: Share of SOBs (linear, log-linear, Catmull-Rom spline, and Cardinal spline interpolations - T=1 (1988), 2 (1990), ... 9 (2004), 10 (2006))

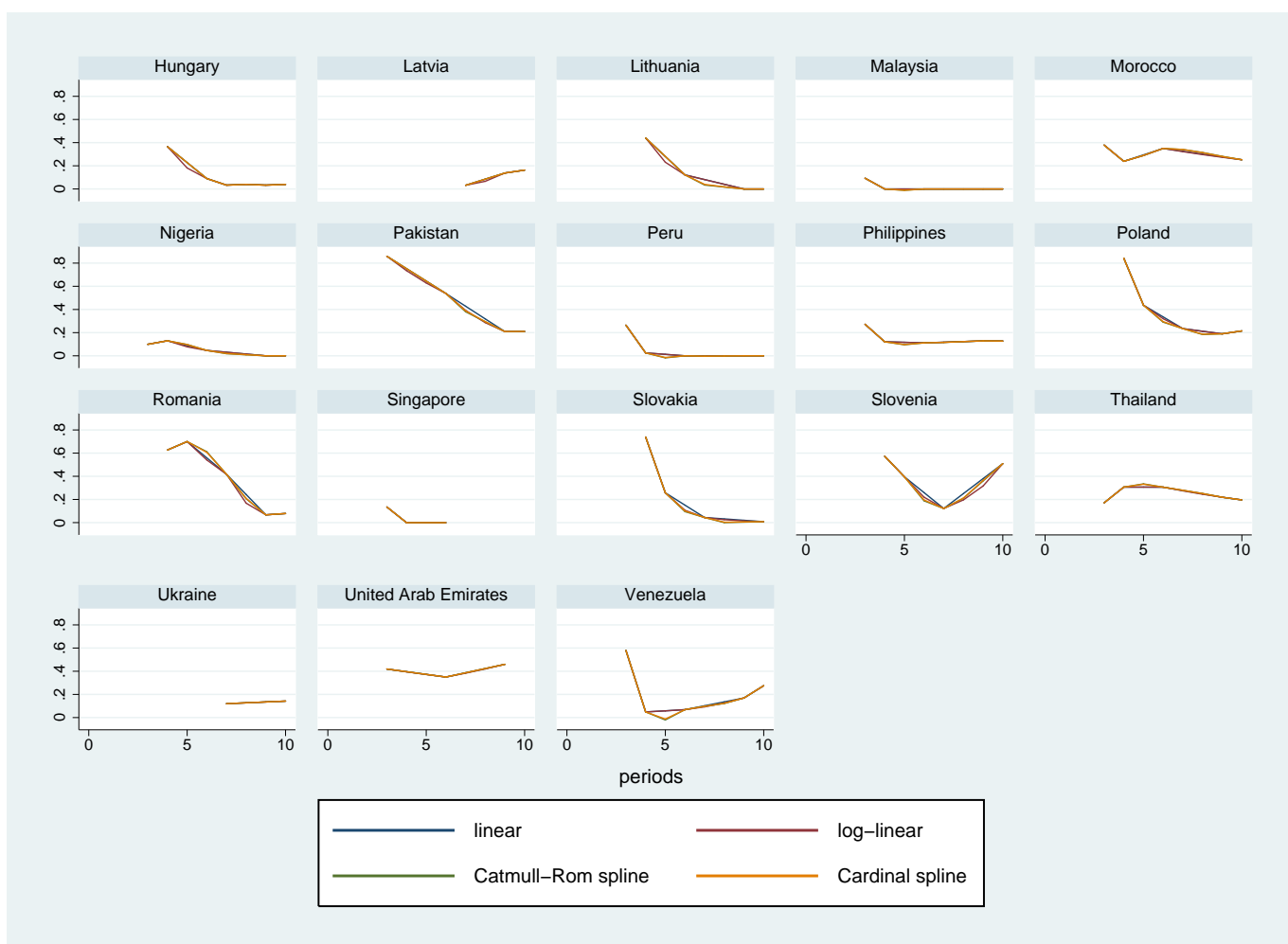


Figure 17: Share of SOBs (linear, log-linear, Catmull-Rom spline, and Cardinal spline interpolations) - T=1 (1988), 2 (1990), ... 9 (2004), 10 (2006)

| Variable                           | Mean    | Std. Dev. | Min.    | Max.     | N   |
|------------------------------------|---------|-----------|---------|----------|-----|
| fdiout                             | 0.124   | 0.458     | 0       | 4.575    | 378 |
| nfa                                | 0.148   | 0.292     | -1.062  | 2.223    | 382 |
| gdp                                | 213.682 | 364.041   | 3.933   | 4007.942 | 399 |
| defl                               | 109.352 | 139.809   | 0       | 1535.24  | 400 |
| gdpr                               | 4.59    | 14.193    | 0.07    | 101.568  | 351 |
| reer                               | 90.026  | 30.723    | 4.98    | 262.927  | 359 |
| r                                  | 24.454  | 47.692    | 0.192   | 509.835  | 361 |
| w                                  | 508.725 | 552.146   | 20.607  | 2755.502 | 253 |
| ky                                 | 0.241   | 0.068     | 0.069   | 0.46     | 394 |
| k                                  | 57.522  | 129.843   | 0.674   | 1719.087 | 393 |
| kr                                 | 0.595   | 1.128     | 0.011   | 12.655   | 369 |
| s                                  | 0.316   | 0.713     | -1.868  | 8.529    | 388 |
| tfpg                               | 0.631   | 2.968     | -14.403 | 10.766   | 382 |
| cp                                 | 0.163   | 1.485     | -1.864  | 5.3      | 375 |
| fdicsts                            | 3.937   | 5.827     | 0.049   | 47.144   | 286 |
| rw                                 | 5.505   | 1.617     | 2.878   | 8.543    | 400 |
| dcprs                              | 0.472   | 0.385     | 0.013   | 1.705    | 386 |
| crgovSOEs                          | 0.142   | 0.164     | 0.006   | 0.982    | 386 |
| crpubpriv                          | 0.235   | 0.163     | 0.006   | .953     | 381 |
| corru                              | 3.998   | 1.705     | 0.4     | 9.35     | 319 |
| SOEs                               | 0.354   | 0.259     | 0       | 0.9      | 157 |
| SOBs                               | 0.32    | 0.274     | 0       | 1        | 174 |
| Linear interpolation:              |         |           |         |          |     |
| SOEs                               | 0.259   | 0.239     | 0       | 0.9      | 256 |
| SOBs                               | 0.301   | 0.253     | 0       | 1        | 276 |
| ecolib                             | 5.601   | 1.177     | 3.097   | 9.050    | 205 |
| leg                                | 5.446   | 1.372     | 1.76    | 8.529    | 358 |
| Log-linear interpolation:          |         |           |         |          |     |
| SOEs                               | 0.263   | 0.24      | 0       | 0.9      | 251 |
| SOBs                               | 0.317   | 0.251     | 0       | 1        | 257 |
| ecolib                             | 5.59    | 1.179     | 3.097   | 9.050    | 205 |
| leg                                | 5.436   | 1.379     | 1.76    | 8.529    | 358 |
| Catmull-Rom Spline interpolation : |         |           |         |          |     |
| SOEs                               | 0.322   | 0.257     | 0       | 0.9      | 180 |
| SOBs                               | 0.294   | 0.254     | 0       | 1        | 257 |
| ecolib                             | 5.593   | 1.186     | 3.097   | 9.050    | 169 |
| leg                                | 5.451   | 1.394     | 1.76    | 8.529    | 351 |
| Cardinal Spline interpolation :    |         |           |         |          |     |
| SOEs                               | 0.322   | 0.257     | 0       | 0.9      | 180 |
| SOBs                               | 0.295   | 0.254     | 0       | 1        | 257 |
| ecolib                             | 5.593   | 1.186     | 3.097   | 9.050    | 169 |
| leg                                | 5.45    | 1.392     | 1.76    | 8.529    | 351 |

Note: Here N is the number of observations and not the number of countries.

Table 10: Descriptive statistics

|  | OLS                         | FE                         | OLS                      | FE                      | OLS                        | FE                         | OLS                        | FE                         |
|--|-----------------------------|----------------------------|--------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
|  | D.lfdiin                    | D.lfdiin                   | D.lfdiin                 | D.lfdiin                | D.lfdiin                   | D.lfdiin                   | D.lfdiin                   | D.lfdiin                   |
| LD.lfdiin  | 0.331***<br>[0.068]         | 0.203*<br>[0.113]          | 0.422***<br>[0.099]      | 0.244<br>[0.168]        | 0.248***<br>[0.064]        | 0.030<br>[0.077]           | 0.314***<br>[0.080]        | 0.006<br>[0.104]           |
| D.ky   | -0.987<br>[0.619]           | -0.582<br>[0.963]          | -1.765*<br>[0.945]       | -2.281*<br>[1.226]      | -1.107*<br>[0.584]         | -1.100*<br>[0.629]         | -1.290<br>[0.816]          | -1.410<br>[0.873]          |
| D.lgdpr  |                             |                            |                          |                         | -0.159<br>[0.105]          | -0.276**<br>[0.134]        |                            |                            |
| D.lreer  |                             |                            |                          |                         | 0.121<br>[0.131]           | 0.098<br>[0.141]           |                            |                            |
| D.r  | 0.002<br>[0.001]            | 0.001<br>[0.002]           | -0.003<br>[0.004]        | -0.002<br>[0.005]       | -0.001<br>[0.002]          | -0.001<br>[0.002]          | 0.002<br>[0.002]           | -0.001<br>[0.002]          |
| D.lw   | -0.115<br>[0.087]           | -0.266*<br>[0.136]         | 0.088<br>[0.117]         | 0.028<br>[0.178]        |                            |                            | -0.056<br>[0.097]          | -0.035<br>[0.115]          |
| <b>D.lcrpubpriv</b>                                | <b>-0.159***</b><br>[0.057] | <b>-0.220**</b><br>[0.087] |                          |                         | <b>-0.108**</b><br>[0.051] | <b>-0.053</b><br>[0.058]   | <b>-0.155**</b><br>[0.064] | <b>-0.002</b><br>[0.078]   |
| <b>D.lcrpubpriv<sub>instru.ecolib</sub></b>        |                             |                            | <b>-0.095</b><br>[0.216] | <b>0.119</b><br>[0.284] |                            |                            |                            |                            |
| <b>D.lcrpubpriv × lsoe<sub>instru.ecolib</sub></b> |                             |                            |                          |                         |                            |                            | <b>-0.080**</b><br>[0.039] | <b>-0.076*</b><br>[0.043]  |
| LD.corru   | -0.012<br>[0.057]           | -0.077<br>[0.096]          | 0.032<br>[0.090]         | -0.004<br>[0.114]       | -0.013<br>[0.041]          | -0.015<br>[0.043]          | -0.058<br>[0.064]          | -0.100<br>[0.075]          |
| D.lleg   |                             |                            |                          |                         | <b>0.689***</b><br>[0.187] | <b>0.810***</b><br>[0.213] |                            |                            |
| D.fdicsts  | 0.006<br>[0.016]            | 0.069<br>[0.044]           | -0.016<br>[0.020]        | 0.045<br>[0.046]        | -0.005<br>[0.014]          | -0.004<br>[0.029]          | -0.001<br>[0.018]          | 0.025<br>[0.033]           |
| Constant   | <b>0.114***</b><br>[0.029]  | <b>0.192***</b><br>[0.052] | 0.037<br>[0.043]         | 0.135*<br>[0.076]       | <b>0.082***</b><br>[0.023] | <b>0.133***</b><br>[0.030] | <b>0.118***</b><br>[0.034] | <b>0.210***</b><br>[0.044] |
| 10.years   | -0.043<br>[0.054]           | -0.010<br>[0.089]          | -0.025<br>[0.081]        | -0.118<br>[0.108]       | 0.003<br>[0.047]           | -0.021<br>[0.049]          | -0.034<br>[0.089]          | -0.078<br>[0.094]          |
| logtime  |                             | -0.006<br>[0.044]          |                          |                         |                            |                            |                            |                            |
| Observations                                       | 172                         | 115                        | 92                       | 92                      | 201                        | 201                        | 115                        | 115                        |
| R-squared  | 0.240                       | 0.241                      | 0.235                    | 0.155                   | 0.205                      | 0.179                      | 0.287                      | 0.137                      |
| Number of countries                                |                             | 32                         |                          | 26                      |                            | 38                         |                            | 32                         |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 11: FDI inflows - OLS and Fixed Effects - first-difference

|  | OLS       | FE       | OLS      | FE       | OLS      | FE       | OLS       | FE       |
|--|-----------|----------|----------|----------|----------|----------|-----------|----------|
|  | lfdiin    | lfdiin   | lfdiin   | lfdiin   | lfdiin   | lfdiin   | lfdiin    | lfdiin   |
| L.lfdiin   | 0.824***  | 0.717*** | 0.821*** | 0.488*** | 0.841*** | 0.690*** | 0.854***  | 0.707*** |
|  | [0.023]   | [0.043]  | [0.034]  | [0.064]  | [0.021]  | [0.037]  | [0.027]   | [0.053]  |
| ky   | 0.150     | -0.048   | -0.851   | -1.020   | -0.200   | -0.465   | 0.319     | -0.881   |
|  | [0.305]   | [0.511]  | [0.516]  | [0.802]  | [0.274]  | [0.469]  | [0.390]   | [0.786]  |
| lgdpr  |           |          |          |          | -0.014   | 0.079    |           |          |
|  |           |          |          |          | [0.017]  | [0.073]  |           |          |
| lreer  |           |          |          |          | -0.033   | 0.032    |           |          |
|  |           |          |          |          | [0.049]  | [0.113]  |           |          |
| r  | 0.007***  | 0.006*** | 0.001    | -0.004   | 0.003*** | 0.000    | 0.008***  | 0.006*** |
|  | [0.001]   | [0.001]  | [0.002]  | [0.004]  | [0.001]  | [0.002]  | [0.001]   | [0.001]  |
| lw   | -0.020    | -0.013   | 0.052    | 0.077    |          |          | 0.013     | -0.034   |
|  | [0.025]   | [0.060]  | [0.036]  | [0.070]  |          |          | [0.030]   | [0.079]  |
| <b>lcrpubpriv</b>                                | 0.025     | -0.089*  |          |          | 0.004    | -0.079*  | 0.016     | -0.132** |
|  | [0.017]   | [0.046]  |          |          | [0.019]  | [0.044]  | [0.020]   | [0.057]  |
| <b>lcrpubpriv<sub>instru.ecolib</sub></b>        |           |          | -0.069   | -0.196   |          |          |           |          |
|  |           |          | [0.088]  | [0.130]  |          |          |           |          |
| <b>lcrpubpriv × lsoe<sub>instru.ecolib</sub></b> |           |          |          |          |          |          | 0.004     | -0.071** |
|  |           |          |          |          |          |          | [0.016]   | [0.033]  |
| L.corru  | 0.089***  | 0.120**  | 0.040    | 0.085    | 0.047*** | 0.033    | 0.062***  | 0.086    |
|  | [0.016]   | [0.048]  | [0.025]  | [0.070]  | [0.014]  | [0.038]  | [0.021]   | [0.053]  |
| lleg   |           |          |          |          | 0.218**  | 0.482*** |           |          |
|  |           |          |          |          | [0.087]  | [0.133]  |           |          |
| fdicsts  | 0.007**   | 0.008    | 0.006    | -0.018   | 0.005    | 0.011    | 0.008*    | -0.002   |
|  | [0.003]   | [0.009]  | [0.006]  | [0.014]  | [0.004]  | [0.008]  | [0.004]   | [0.013]  |
| Constant   | -0.488*** | -0.947** | -0.504** | -1.304** | -0.506** | -1.508** | -0.565*** | -0.738   |
|  | [0.146]   | [0.423]  | [0.234]  | [0.538]  | [0.253]  | [0.607]  | [0.170]   | [0.543]  |
| 10.years   | 0.030     | 0.043    | -0.048   | 0.001    | 0.014    | 0.033    | 0.013     | 0.067    |
|  | [0.052]   | [0.051]  | [0.079]  | [0.070]  | [0.046]  | [0.046]  | [0.090]   | [0.083]  |
| Observations                                     | 209       | 209      | 121      | 121      | 240      | 240      | 152       | 152      |
| R-squared  | 0.938     | 0.801    | 0.918    | 0.698    | 0.942    | 0.766    | 0.948     | 0.846    |
| Number of countries                              |           | 36       |          | 29       |          | 38       |           | 35       |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 12: FDI inflows - OLS and Fixed Effects - level

|  | OLS<br>lnfa         | OLS <i>diff.</i><br>lnfa | FE<br>lnfa           | FE <i>diff.</i><br>lnfa | OLS<br>lnfa          | OLS <i>diff.</i><br>lnfa | FE<br>lnfa          | FE <i>diff.</i><br>lnfa | OLS<br>lnfa          | OLS <i>diff.</i><br>lnfa |
|--|---------------------|--------------------------|----------------------|-------------------------|----------------------|--------------------------|---------------------|-------------------------|----------------------|--------------------------|
| L.lnfa                                     | 0.905***<br>[0.032] | 0.085<br>[0.070]         | 0.361***<br>[0.065]  | -0.008<br>[0.079]       | 0.963***<br>[0.038]  | 0.462***<br>[0.108]      | 0.458***<br>[0.089] | 0.260***<br>[0.079]     | 0.947***<br>[0.034]  | 0.067<br>[0.090]         |
| lgdpr                                      | 0.099**<br>[0.042]  | 0.008<br>[0.293]         | 0.070<br>[0.184]     | -0.340<br>[0.357]       | 0.148***<br>[0.048]  | -0.134<br>[0.434]        | 0.116<br>[0.291]    | 0.326<br>[0.343]        | 0.133***<br>[0.046]  | 0.237<br>[0.359]         |
| lreer                                      | 0.074<br>[0.184]    | 0.264<br>[0.320]         | -0.178<br>[0.271]    | 0.412<br>[0.359]        | -0.112<br>[0.235]    | 0.122<br>[0.600]         | -0.607<br>[0.431]   | -0.596<br>[0.457]       | 0.010<br>[0.216]     | -0.194<br>[0.556]        |
| ky   | -1.586**<br>[0.742] | -3.962**<br>[1.522]      | -1.382<br>[1.108]    | -2.901*<br>[1.740]      | -1.746**<br>[0.832]  | -4.981**<br>[1.923]      | -2.252<br>[1.527]   | -2.321*<br>[1.304]      | -1.625**<br>[0.783]  | -3.918**<br>[1.703]      |
| s  | -0.221<br>[0.196]   | 0.130<br>[0.375]         | 0.563<br>[0.423]     | -0.078<br>[0.403]       | -0.541**<br>[0.260]  | 0.645<br>[0.555]         | 0.689<br>[0.735]    | 0.307<br>[0.312]        | -0.432*<br>[0.254]   | 0.306<br>[0.598]         |
| r  | -0.002<br>[0.004]   | -0.006<br>[0.005]        | -0.008*<br>[0.005]   | -0.008<br>[0.006]       | -0.003<br>[0.006]    | -0.004<br>[0.018]        | -0.011<br>[0.011]   | -0.036***<br>[0.013]    | 0.000<br>[0.004]     | -0.007<br>[0.006]        |
| rw   | 0.086**<br>[0.035]  | 0.032<br>[0.038]         | -0.019<br>[0.037]    | 0.018<br>[0.040]        | 0.107**<br>[0.043]   | 0.039<br>[0.047]         | 0.014<br>[0.050]    | 0.007<br>[0.027]        | 0.102***<br>[0.037]  | 0.020<br>[0.045]         |
| <b>lcrpubpriv</b>                          | -0.016<br>[0.056]   | 0.196<br>[0.126]         | 0.393***<br>[0.105]  | 0.082<br>[0.142]        |                      |                          |                     |                         | 0.019<br>[0.058]     | 0.276*<br>[0.144]        |
| <b>lcrpubpriv</b> <sub>instru.ecolib</sub> |                     |                          |                      |                         | -0.126<br>[0.513]    | 1.677<br>[1.124]         | 1.194<br>[0.918]    | 1.020<br>[0.672]        |                      |                          |
| lcrpubpriv × lsoe <sub>instru.ecolib</sub> |                     |                          |                      |                         |                      |                          |                     |                         | 0.008<br>[0.095]     | 0.839***<br>[0.271]      |
| lleg                                       |                     |                          |                      |                         |                      |                          |                     |                         | 0.159<br>[0.197]     | -1.359*<br>[0.758]       |
| cp   | -0.057<br>[0.037]   | 0.009<br>[0.083]         | -0.057<br>[0.056]    | 0.045<br>[0.099]        | -0.071<br>[0.044]    | -0.047<br>[0.099]        | -0.079<br>[0.077]   | -0.041<br>[0.071]       | -0.050<br>[0.039]    | 0.041<br>[0.094]         |
| tjpg                                       |                     |                          |                      |                         |                      |                          |                     |                         | -0.001<br>[0.017]    | -0.010<br>[0.018]        |
| corru                                      | 0.002<br>[0.029]    | -0.394***<br>[0.115]     | -0.265***<br>[0.098] | -0.371***<br>[0.130]    | -0.014<br>[0.105]    | -0.080<br>[0.300]        | 0.025<br>[0.225]    | 0.071<br>[0.190]        |                      |                          |
| 10.years                                   | -0.349**<br>[0.138] | -0.424***<br>[0.144]     | -0.117<br>[0.129]    | -0.398***<br>[0.150]    | -0.401***<br>[0.135] | -0.353**<br>[0.159]      | -0.200<br>[0.143]   | -0.226**<br>[0.092]     | -0.363***<br>[0.137] | -0.402**<br>[0.161]      |
| Constant                                   | -0.370<br>[0.870]   | 0.080<br>[0.053]         | 1.595<br>[1.253]     | 0.099*<br>[0.055]       | 0.552<br>[1.191]     | 0.014<br>[0.080]         | 3.729<br>[2.310]    | -0.081<br>[0.051]       | -0.206<br>[1.052]    | 0.071<br>[0.063]         |
| Observations                               | 233                 | 191                      | 233                  | 191                     | 159                  | 120                      | 159                 | 120                     | 206                  | 165                      |
| R-squared                                  | 0.827               | 0.156                    | 0.343                | 0.146                   | 0.859                | 0.237                    | 0.269               | 0.363                   | 0.842                | 0.160                    |
| Number of countries                        |                     |                          | 39                   | 37                      |                      |                          | 37                  | 35                      |                      |                          |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 13: NFA - OLS and Fixed Effects

|  | FE<br>lnfa          | FE <i>diff.</i><br>lnfa | OLS<br>lnfa          | OLS <i>diff.</i><br>lnfa | FE<br>lnfa          | FE <i>diff.</i><br>lnfa | OLS<br>lnfa          | OLS <i>diff.</i><br>lnfa | FE<br>lnfa          | FE <i>diff.</i><br>lnfa |
|--|---------------------|-------------------------|----------------------|--------------------------|---------------------|-------------------------|----------------------|--------------------------|---------------------|-------------------------|
| L.lnfa   | 0.374***<br>[0.083] | -0.067<br>[0.102]       | 0.957***<br>[0.040]  | 0.479***<br>[0.110]      | 0.473***<br>[0.090] | 0.249***<br>[0.077]     | 0.946***<br>[0.034]  | 0.080<br>[0.090]         | 0.380***<br>[0.082] | -0.071<br>[0.105]       |
| lgdpr  | 0.203<br>[0.218]    | -0.006<br>[0.463]       | 0.164***<br>[0.060]  | -0.205<br>[0.459]        | 0.006<br>[0.308]    | 0.393<br>[0.341]        | 0.131***<br>[0.045]  | 0.098<br>[0.367]         | 0.097<br>[0.219]    | -0.314<br>[0.481]       |
| lreer  | -0.545<br>[0.395]   | 0.063<br>[0.672]        | -0.094<br>[0.241]    | 0.078<br>[0.625]         | -0.489<br>[0.444]   | -0.858*<br>[0.452]      | 0.004<br>[0.217]     | -0.124<br>[0.538]        | -0.470<br>[0.390]   | 0.217<br>[0.658]        |
| ky   | -0.970<br>[1.239]   | -3.222*<br>[1.902]      | -1.858**<br>[0.861]  | -5.123***<br>[1.925]     | -2.449<br>[1.516]   | -1.932<br>[1.257]       | -1.638**<br>[0.783]  | -3.982**<br>[1.695]      | -1.096<br>[1.225]   | -3.053<br>[1.929]       |
| s  | 0.501<br>[0.808]    | 0.329<br>[0.598]        | -0.524*<br>[0.268]   | 0.635<br>[0.558]         | 0.664<br>[0.735]    | 0.342<br>[0.300]        | -0.433*<br>[0.259]   | 0.392<br>[0.598]         | 0.502<br>[0.799]    | 0.312<br>[0.605]        |
| r  | -0.009*<br>[0.005]  | -0.007<br>[0.006]       | -0.002<br>[0.006]    | -0.003<br>[0.019]        | -0.009<br>[0.011]   | -0.038***<br>[0.012]    | 0.000<br>[0.004]     | -0.007<br>[0.006]        | -0.010*<br>[0.005]  | -0.006<br>[0.006]       |
| rw   | 0.010<br>[0.043]    | -0.004<br>[0.046]       | 0.110**<br>[0.044]   | 0.046<br>[0.048]         | 0.012<br>[0.049]    | 0.005<br>[0.026]        | 0.101***<br>[0.037]  | 0.027<br>[0.045]         | 0.007<br>[0.043]    | -0.002<br>[0.047]       |
| <b>lcrpubpriv</b>  | 0.388***<br>[0.119] | 0.187<br>[0.162]        |                      |                          |                     |                         |                      | 0.019<br>[0.057]         | 0.268*<br>[0.140]   | 0.165<br>[0.160]        |
| <b>lcrpubpriv</b> $\times$ <b>instru.ecolib</b>                      |                     |                         | -0.153<br>[0.303]    | 1.968**<br>[0.940]       | 0.850<br>[0.809]    | 0.431<br>[0.545]        |                      |                          |                     |                         |
| <b>lcrpubpriv</b> $\times$ <b>lsoe</b> $\times$ <b>instru.ecolib</b> | 0.426**<br>[0.214]  | 1.003***<br>[0.313]     | 0.081<br>[0.172]     | -0.164<br>[0.474]        | 0.015<br>[0.361]    | 0.218<br>[0.315]        |                      |                          |                     |                         |
| <b>lcrpubpriv</b> $\times$ <b>lsob</b> $\times$ <b>instru.ecolib</b> |                     |                         |                      |                          |                     |                         | 0.047<br>[0.135]     | 0.073<br>[0.217]         | 0.148<br>[0.183]    | 0.301<br>[0.249]        |
| lleg   | 0.116<br>[0.548]    | -2.268***<br>[0.844]    | -0.011<br>[0.320]    | 0.885<br>[1.064]         | 1.038<br>[0.737]    | 0.357<br>[0.708]        | 0.150<br>[0.238]     | 0.282<br>[0.540]         | 0.980***<br>[0.369] | -0.301<br>[0.632]       |
| cp   | -0.044<br>[0.064]   | 0.046<br>[0.109]        | -0.068<br>[0.044]    | -0.059<br>[0.099]        | -0.092<br>[0.077]   | -0.052<br>[0.069]       | -0.045<br>[0.043]    | 0.029<br>[0.093]         | -0.033<br>[0.065]   | 0.024<br>[0.110]        |
| tfpg   | -0.008<br>[0.019]   | -0.013<br>[0.018]       | 0.004<br>[0.021]     | 0.009<br>[0.021]         | 0.009<br>[0.021]    | -0.003<br>[0.012]       | -0.024**             |                          |                     |                         |
| corru  |                     |                         |                      |                          |                     |                         | 0.018<br>[0.056]     | -0.431**<br>[0.168]      | -0.227*<br>[0.136]  | -0.271<br>[0.183]       |
| 10.years   | -0.175<br>[0.140]   | -0.402**<br>[0.166]     | -0.394***<br>[0.141] | -0.358**<br>[0.162]      | -0.165<br>[0.146]   | -0.242***<br>[0.091]    | -0.360***<br>[0.134] | -0.397**<br>[0.159]      | -0.164<br>[0.136]   | -0.393**<br>[0.167]     |
| Constant   | 3.433<br>[2.403]    | 0.111*<br>[0.065]       | 0.682<br>[1.277]     | 0.014<br>[0.080]         | 1.175<br>[2.790]    | -0.086*<br>[0.049]      | -0.109<br>[1.122]    | 0.066<br>[0.064]         | 1.523<br>[1.934]    | 0.118*<br>[0.069]       |
| Observations   | 206                 | 165                     | 158                  | 120                      | 158                 | 120                     | 206                  | 165                      | 206                 | 165                     |
| R-squared  | 0.350               | 0.178                   | 0.860                | 0.243                    | 0.294               | 0.425                   | 0.842                | 0.169                    | 0.361               | 0.164                   |
| Number of countries  | 38                  | 36                      |                      |                          | 36                  | 35                      |                      |                          | 38                  | 36                      |

Standard errors in brackets  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 14: NFA - OLS and Fixed Effects