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30/11//2017
N° 2018/04

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ABSTRACT

This paper studies the effects of the capital controls imposed by Chile between 1991 and 1998, i.e. the Chilean encaje, on firms' production, investment and exporting decisions. We use a general equilibrium model with heterogeneous firms and financial constraints to illustrate the mechanism by which capital controls on inflows affect firm-level dynamics and international trade. We find that capital controls on inflows depress the local economy due to the credit restriction, reducing aggregate production, investment and domestic sales. This reduced level of domestic activity increases the firm's incentives to export, increasing both the level of exports and the share of exporters. Most of these effects are exacerbated for firms in more capital-intensive sectors. Using data from the Chilean Encuesta Nacional Industrial Anual (ENIA) we empirically corroborate the conclusions and insights of the theoretical model.

CONTROL DE CAPITALES Y DESEMPEÑO DE LA FIRMA: EL CASO DEL ENCAJE CHILENO

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CAF - Documento de trabajo N° 2018/04
30/11/2017

RESUMEN

Este paper estudia el efecto del encaje chileno, un control a la entrada de capitales impuesto por Chile durante el período 1991-1998, en las principales decisiones de las firmas. En particular, nos centramos en los efectos en la producción de la firma, la inversión y la decisión de exportar. Usamos un modelo de equilibrio general con firmas heterogéneas y restricciones financieras para ilustrar el mecanismo por el cual los controles de capital afectan la dinámica de la firma y el comercio internacional. Nuestros resultados muestran que el encaje deprime la economía local debido a las restricciones de crédito, reduciendo la producción agregada, la inversión y las ventas locales. Esto incentiva a algunas firmas a aumentar sus exportaciones, incrementándose las exportaciones totales y la proporción de firmas que exportan. Estos efectos se ven exacerbados en el sector que es más intensivo en capital. Finalmente, usamos datos de la Encuesta Nacional industrial Anual para corroborar empíricamente los resultados del modelo.

Capital Controls and Firm Performance: The Effects of the Chilean Encaje

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November 30, 2017

Abstract

This paper studies the effects of the capital controls imposed by Chile between 1991 and 1998, i.e. the *Chilean encaje*, on firms' production, investment and exporting decisions. We use a general equilibrium model with heterogeneous firms and financial constraints to illustrate the mechanism by which capital controls on inflows affect firm-level dynamics and international trade. We find that capital controls on inflows depress the local economy due to the credit restriction, reducing aggregate production, investment and domestic sales. This reduced level of domestic activity increases the firm's incentives to export, increasing both the level of exports and the share of exporters. Most of these effects are exacerbated for firms in more capital-intensive sectors. Using data from the Chilean *Encuesta Nacional Industrial Anual (ENIA)* we empirically corroborate the conclusions and insights of the theoretical model.

Keywords: Capital controls, firm dynamics, financial frictions.

JEL codes: F12, F41, O47

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1 Introduction

Financial frictions are one of the main deterrents to firm growth, allocative efficiency and productivity (Rajan and Zingales (1998), Midrigan and Xu (2014)). Thus, the introduction of capital controls, by hampering firms' access to external financing has a detrimental effect on firms and the overall economy. While many economists remain skeptical about controls on capital outflows, the idea of restricting capital inflows to reduce market volatility and help stabilize the economy has grown in popularity, among both academics and policymakers (Edwards (1999), Bianchi (2011), Ostry et al. (2010), Blanchard and Ostry (2012)). Then, despite the potential benefits of capital controls on inflows from a macroeconomic perspective, it is necessary to develop a more thorough understanding of its microeconomic consequences.

This paper studies the effects of the *Chilean encaje*—i.e., a 30 percent unremunerated reserve requirement (URR) imposed by Chile between 1991 and 1998—on firms' production, investment and exporting decisions. Financing requirements and access to financing capital vary from one firm to another, depending on the firm's and the industry's characteristics. Due to technology and market conditions, firms in certain industries have a higher dependency on external financing, while other firms rely more on capital intensive technologies, making their financing requirements more stringent. Furthermore, smaller firms typically find it more difficult to access financial markets. This inherent heterogeneity in firms' financial needs and access to financial markets shapes the effect of capital controls on firms' financing, generating inefficiencies in the allocation of resources across firms. Moreover, such inefficiencies in resource allocation can have sizable negative effects on the overall efficiency of the economy. In this study, we seek to disentangle the effects of capital controls on firms' decisions and, in consequence, on aggregate variables such as productivity, output and exports.

We use a general equilibrium model with heterogeneous firms to illustrate the mechanism by which the URR affects firm-level dynamics and international trade. In the model, heterogeneous entrepreneurs differ in their idiosyncratic productivity and operate in sectors with different capital-intensities. Entrepreneurs can save or borrow, but they face a collateral constraint. In this framework, which follows closely Leibovici (2016), we introduce an URR on capital inflows. Unlike the collateral constraint, the friction introduced by the URR affects all firms that rely on external borrowing by increasing the effective interest rate on loans. This deters capital accumulation and affects the firm's decisions on production. The model shows that the introduction of the capital control reduces firms' investment and sales on domestic market. However, firms increase their sales in the foreign markets and the share of exporters increases. Additionally, we find that these effects are heterogeneous depending on sectoral capital intensity as firms that rely on more capital intensive technologies have more stringent financing requirements.

Then, we use data from the Chilean *Encuesta Nacional Industrial Anual (ENIA)* to empirically corroborate the insights and intuition obtained from the model. We find that aggregate exports increase, although this effect becomes negative for high levels of capital intensity. Furthermore, a more granular analysis of the data shows that this result is entirely driven by the behavior of already exporting firms, that now export more when their capital intensity is low and less if their capital intensity is high, while there is no change in the exports behavior for previously non-exporting firms. The probability of exporting is also only affected when the firm was already an exporter. Additionally, and consistent with the results of the numerical exercise, the empirical analysis shows that the URR significantly reduces aggregate investment and that this effect is stronger for higher levels of capital intensity. This pattern again is exacerbated when we consider exporting firms.

This study is related to three strands of the literature. First, our paper relates to the empirical literature on the microeconomic consequences of capital controls and, in particular, of the *Chilean encaje*. In line with our results, a growing body of research shows that capital account restrictions are detrimental to firm financing, investment and productivity. Alfaro et al. (2017) find a decline in cumulative abnormal returns for Brazilian firms following the imposition of capital controls in 2008-2009, and that this effect is stronger for smaller, non-exporting and more financially dependent firms. Larraín and Stumpner (2017) focus on Eastern European countries and find that capital account liberalization increases aggregate productivity through a more efficient allocation of capital across firms. Bekaert et al. (2011) demonstrate that the easing of capital controls positively affects capital stock growth and total factor productivity. Desai et al. (2006) show that multinational firms operating in countries with capital controls overinvest in physical assets and underinvest in financial assets by as much as 40%. For the specific case of the *Chilean encaje*, Forbes (2007) finds that smaller firms experienced significant financial constraints, which decreased with firm size. The results of Edwards (1999) and Gallego and Hernández (2003) also highlight the differential negative effect of the *Chilean encaje* as a decreasing function of firm size. Our paper contributes to this literature by providing a theoretical framework in which to study these mechanisms and by extending the analysis to the trade dimension. Also, we are the first study how industry's capital intensity shapes the effects of capital controls.

Second, our study relates to the literature on productivity, misallocation and financial frictions. This literature typically uses a heterogeneous-firms model to study and quantify how policies or other factors can generate low TFP due to input misallocation across heterogeneous units (Hopenhayn and Rogerson (1993) is an early example). In a model with sectors that differ in their degree of financial dependence, Buera et al. (2011) show that financial frictions can significantly distort the allocation of productive factors. Midrigan and Xu (2014) propose a model with one traditional and one modern productive sector where financial frictions in the shape of debt constraints distort technology adoption decisions and create misallocation. Moll (2014) finds that persistence in the TFP shock implies slower transitions but lower losses from misallocations on the steady state when financial frictions in the shape of collateral constraints are present. Chen and Irarrázabal (2015) provide suggestive evidence that financial development might have been an important factor explaining growth in output and productivity in Chile between 1983 and 1996 is provided in . Along these lines, our framework incorporates financial frictions in the form of collateral constraints. Capital controls worsen these frictions by effectively working as a tax on foreign liabilities.

Third, our analysis relates to a number of papers that study how financial frictions influence the extensive and intensive margins of exports. Under this approach, our paper fits within the trade literature following Melitz (2003). In this type of model, heterogeneous firms have to pay a sunk fixed cost to be able to export, and the presence of financial frictions distorts the export decision and the efficient allocation of resources. Caggese, A. and V. Cuñat (2013) find that financial constraints reduce productivity gains from trade by 25%. Kohn et al. (2016) introduce a working capital requirement on top of borrowing constraints and show that financial frictions force firms with low internal funds to produce below their optimal scale, limiting their output and profits and the overall allocation of resources. In Leibovici (2016), which is the closest to our theoretical approach, industries differ in their dependence on external finance and financial frictions generate a large effect on international trade across industries but a negligible impact at the aggregate level.[1] We contribute to this literature by studying how capital controls—in particular, the *Chilean encaje*—affected trade, productivity and resource allocation in Chile by distorting firms decisions. This mechanism has not yet been considered in the literature.

This paper is organized as follows. Section 2 describes how the encaje worked in Chile. In Section 3 we describe the model while Section 4 presents the calibration and the numerical results. In Section 5 we present the data and the empirical evidence. Finally, we conclude in Section 6.

2 The Chilean encaje

The resumption of capital flows to emerging market economies led to a new wave of inflows to Chile starting in 1988. This surge in capital inflows exerted upward pressure on the real exchange rate, created symptoms of overheating and made the trade-off between different macroeconomic objectives increasingly difficult and costly. As a response, in 1991 the Chilean authorities established capital controls in the form of an unremunerated reserve requirement (URR) on some types of inflows. The URR aimed at enhancing the effectiveness of monetary policy, i.e., to be able to raise local interest rates to contain inflationary pressures while, at the same time, avoiding an exchange rate appreciation and reducing the vulnerability resulting from the build up of speculative short-term flows.

Specifically, the URR was an obligation to hold an unremunerated fixed-term reserve at the central bank, equivalent to a fraction of capital inflows in certain categories. Hence it was equivalent to a tax per unit of time that declined with the permanence or maturity of the affected capital inflow. This tax equivalence was made more explicit by its alternative form: foreign investors were allowed to pay the central bank an up-front fee instead of depositing the unremunerated reserve fraction with the central bank.[2]

As Table (1) shows various features of the URR were altered during its existence which, together with changes in the foreign interest rate, modified the cost of the URR, measured as its tax equivalent, throughout time, see Figure 1. The coverage of the URR in practice

[1] Other related papers are Chaney (2016), Brooks and Dovis (2015), Manova (2013), and Gross and Verani (2013).

[2] In Section 3 we provide a detailed derivation for the tax equivalent of the *Chilean encaje*

was rather partial and authorities made great effort to cover loopholes that allowed to evade the control. Trade credits were exempt from the URR as well as FDI. In 1995 the control extended to include ADRs and in 1996 the rules on FDI were tightened to exclude speculative capital. But besides these attempts still some firms found ways to avoid the restrictions (Nadal-DeSimone and Sorsa (1999)).

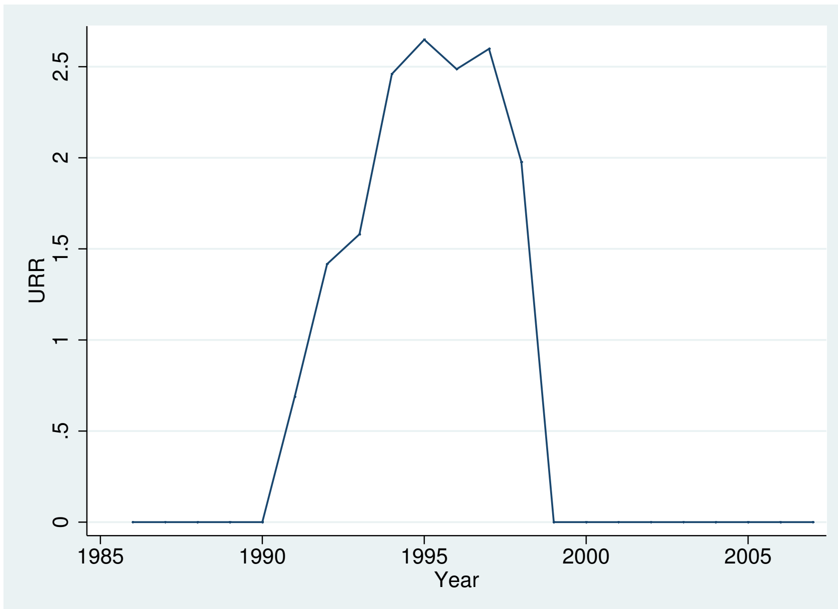


Figure 1: The *Chilean encaje*

An indirect measure of how binding the URR was for capital inflows to Chile is provided by the total amount collected as deposits. At its peak in August 1997, the URR implied a total equivalent to 2,9 percent of Chile's 1997 GDP, or 30 percent of that year's net capital inflows. During the 1991-1998 period the total equivalent reserve deposit attained an average of 1,9 percent of GDP.

In terms of the objectives behind the imposition of the URR, the empirical evidence suggests that the introduction of the URR increased the interest rate differential (although without a significant long-run effect) and had a small effect on the real exchange rate. Its more persistent and significant effect seemed to be on the composition of capital inflows, which was tilted towards a longer maturity (see De Gregorio et al. (2000), Soto (1997), Gallego and Hernández (2003))). However there does not seem to be any significant effect on the total amount of capital inflows to the country. But the effects of the URR were not confined to the macroeonomic sphere. Thus, in the following pages we focus in analyzing the firm-level consequences of the *Chilean encaje*.

Table 1: Main changes in the URR administration

Jun-1991	20% URR introduced for all new credit Holding period (months)=min(max(credit maturity, 3),12) Holding currency=same as creditor Investors can waive the URR by paying a fix fee (Through a repo agreement at discount in favor of the central bank) Repo discount= US$ libor
Jan-1992	20% URR extended to foreign currency deposits with proportional HP
May-1992	Holding period (months)=12 URR increased to 30% for bank credit lines
Aug-1992	URR increased to 30% Repo discount= US$ libor +2.5
Oct-1992	Repo discount= US$ libor +4.0
Jan-1995	Holding currency=US$ only
Sep-1995	Period to liquidate US$ from Secondary ADR tightened
Dec-1995	Foreign borrowing to be used externally is exempt of URR
Oct-1996	FDI committee considers for approval productive projects only
Dec-1996	Foreign borrowing <US$ 200,000 (500,000 in a year) exempt of URR
Mar-1997	Foreign borrowing <US$ 100,000 (100,000 in a year) exempt of URR
Jun-1998	URR set to 10%
Sep-1998	URR set to zero

Source: De Gregorio et al. (2000).

3 Model Description

We use a general equilibrium model with heterogeneous firms to illustrate the mechanism by which the URR might affect firm-level dynamics and international trade. In the model, heterogeneous entrepreneurs differ in their idiosyncratic productivity and operate in sectors with different capital-intensities. Entrepreneurs can save or borrow, but they face a collateral constraint. In this framework, which follows closely Leibovici (2016), we introduce an URR on capital inflows. Unlike the collateral constraint, the friction introduced by the URR affects all firms that rely on external borrowing by increasing the effective interest rate on loans. This deters capital accumulation and affects the firm's decision to export.

Final good producers

There is a measure one in the economy of final-good producers that purchase differentiated varieties from domestic and foreign entrepreneurs and aggregate them to produce a final good. Final-good producers maximize profits subject to a constant elasticity of substitution production function with $\sigma > 1$. Given prices $p_{h,t}(i)$ and p_m charged by domestic and foreign entrepreneurs on their intermediate goods, final-good producers choose the optimum bundle of domestic, $y_{h,t}(i)$, and imported varieties, $y_{m,t}$ so as to maximize final goods production y_t,

$$\max_{y_{h,t}(i), y_{m,t}} \; p_t y_t - \int_0^1 p_{h,t}(i) y_{h,t}(i) di - p_m y_{m,t},$$

subject to

$$y_t = \left[\int_0^1 y_{h,t}(i)^{\frac{\sigma-1}{\sigma}} di + y_{m,t}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma-1}{\sigma}}, \tag{1}$$

where p_t is the aggregate price index of the economy and equation (1) is the production function of final goods.

In the same way, the rest of the world demands the domestic varieties produced by entrepreneurs and sells foreign intermediate goods to domestic final-good producers. Then, the demands faced by domestic producers of intermediate goods are given by:

$$y_{h,t} = \left(\frac{p_{h,t}}{p_t} \right)^{-\sigma} y_t, \text{ and} \tag{2}$$

$$y_{f,t} = \left(\frac{p_{f,t}}{\bar{p_t}^*} \right)^{-\sigma} \bar{y_t}^*, \tag{3}$$

where $\bar{p_t}^*$, $\bar{y_t}^*$, $y_{f,t}$ and $p_{f,t}$ are the exogenously given price level index, the final goods production of the rest of the world, the foreign demand of domestic products and the price charged for them, respectively.

Entrepreneurs

Entrepreneurs want to maximize their lifetime utility by producing and selling intermediate goods to domestic and international markets. Their preferences are given by

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\gamma}}{1-\gamma},$$

where c_t is consumption, γ is the coefficient of relative risk aversion and β is the subjective discount factor. The expectation, $\mathbb{E}_0$, is taken over the realizations of a death shock, which happens with probability ν. At the end of the period, dead entrepreneurs are replaced by a measure ν of newborn entrepreneurs. Every period, entrepreneurs are endowed with a unit of labor that they supply inelastically to other entrepreneurs through the labor market at the equilibrium wage w_t.

Selling goods in the international market is costly. If the entrepreneur wants to export in period $t+1$, it has to pay a sunk export entry cost given by F in period t. F is denominated in units of labor. On top of the entry cost, every period entrepreneurs export they also have to pay an ad-valorem trade cost $\tau > 1$, which requires to ship τ units for every unit that is sold in the foreign market.

At the beginning of their lifespan entrepreneurs receive a fixed transfer of capital from the government $\underline{k}$ and then draw an idiosyncratic productivity parameter z which remains constant throughout their lifetime. z is distributed log-normally with mean μ_z and standard deviation σ_z. Additionally, entrepreneurs operate in sectors that differ in their capital intensity $\alpha \in (0, 1)$. In particular we assume that the technology available to entrepreneurs of type z is also a function of the capital stock, k_t, the amount of labor hired, n_t, and the capital intensity, α:

$$y_{h,t} + \tau y_{f,t} = z k_t^{\alpha} n_t^{1-\alpha}. \tag{4}$$

Every period capital depreciates at a rate δ. In order to increase their stock of capital in the next period, entrepreneurs can invest in the current period x, then, taking into account the death probability, the law of motion of capital is given by

$$k_{t+1} = \frac{1}{1-\nu}[(1-\delta)k_t + x_t]. \tag{5}$$

Financial Markets Entrepreneurs can save or borrow through a one-period risk-free bond at an interest rate of r. However, the effective interest rate $\hat{r}$ they face depends both on r and on whether there are capital controls in place.

The capital controls implemented in Chile took the form of an unremunerated reserve requirement (URR). That is, a fraction μ of each international credit had to be deposited in a non-interest-bearing account at the Central Bank for a certain holding period of months,

h. At the end of the holding period, the Central Bank reimbursed the reserve requirement in the same currency it was deposited in.

In the model, the introduction of the URR makes the effective interest rate faced by entrepreneurs vary depending on whether they want to save or borrow. If they want to save the interest rate remains equal to the risk free interest rate r. Quite on the contrary, if they want to borrow the effective interest rate they face is higher and given by $r + \mu_j$, where μ_j is the tax equivalent of the URR imposed by the capital control. In order to compute μ_j we follow the methodology in De Gregorio et al. (2000)[3]. First, we need to define r_j, the interest rate ignoring risk premia for a j-months investment at which an investor makes zero profits:

$$r_j = r + \mu_j.$$

Then, if the investment period is shorter than the time $k < h$, borrowing abroad US\$1 at an annual rate of r to invest at r_j in Chile for k months, generates the following cash flows:

- At $t = 0$ the entrepreneur can invest $(1 - \mu)$ at r_j.
- At $t = k$ repaying the loan implies the following cash flow: $-(1 + r)^{k/12}$.
- At $t = h$ the reserve requirement is returned generating a cash flow μ.

Therefore, the annual rate r_j, at which the investor is indifferent between investing at home and abroad (computing all values as of time h, when μ is returned) is:

$$(1 - \mu)(1 + r_j)^{k/12}(1 + r)^{(h-k)/12} + \mu = (1 + r)^{h/12}.$$

Solving for r_j we find the tax-equivalent of the URR:

$$(1 + r_j)^{k/12} = \frac{(1 + r)^{k/12} - \mu(1 + r)^{(k-h)/12}}{1 - \mu} \equiv (1 + r + \mu_j)^{k/12}.$$

If the investment horizon exceeds one year the investor has to decide whether at the end of the year to maintain the URR in Chile or deposit outside the country. In order to obtain closed forms solutions we assume that the investor deposits outside the country at the risk free

[3] See also Cárdenas and Barrera (1997) and Soto (1997)

interest rate. Under this assumption, the previous arbitrage condition remains the same for longer investment horizons. Using the approximation that $(1+j)^x \approx 1+xj$ the approximate tax-equivalent is found solving the following equation:

$$1 + kr - \mu(1 + (k - h)r) = (1 - \mu)(1 + k(r + \hat{\mu_j})),$$

which yields:

$$\hat{\mu_j} = r\frac{\mu}{1-\mu}\frac{h}{j}$$

Finally, as in Leibovici (2016), entrepreneurs face a collateral constraint: they can borrow up to a fraction $\theta \leq 1$ of the value of the capital stock at the time that the loan is due for repayment.

$$d_{t+1} \leq \theta k_{t+1}. \tag{6}$$

Entrepreneur's Problem

The entrepreneur's problem consists of choosing consumption c, capital in the next period k', how much international debt to issue d' and how much to produce in order to maximize lifetime utility. Then, an entrepreneur with productivity level z that belongs to a productive sector with capital intensity α solves the following dynamic programming problem:

$$V(k, d, e; z, \alpha) = \max_{c,x,n,d',k',p_h,p_f,y_h,y_f,e\in\{0,1\}} \frac{c^{1-\gamma}}{1-\gamma} + \beta(1-\nu)V(k', d', e'; z, \alpha)$$

subject to (2), (3), (4), (5), (6), and

$$pc + px + pd + wn + wF\mathbb{I}_{e=0,e'=1} = w + p_h y_h + p_f y_f + pd'\frac{1-\nu}{1+\hat{r}} - T,$$

where $e = 1$ if the firm exports, $e = 0$ otherwise, T is a lump-sum tax paid to the government and

$$\hat{r} = \left\{ \begin{array}{cc} r + \hat{\mu} & \text{if } d' > 0 \\ r & \text{if } d' \leq 0. \end{array} \right\}$$

To reduce the number of state variables, we follow the methodology in Buera and Moll (2013) and define a new variable $a = k - \frac{d}{1+r}$, which represents the net worth of the entrepreneur. Then, after some rearrangements the previous problem can be written as:

$$G(a, e; z, \alpha) = \max_{c,n,a',k,p_h,p_f,y_h,y_f,e' \in \{0,1\}} \frac{c^{1-\gamma}}{1-\gamma} + \beta(1-\nu)G(a', e'; z, \alpha)$$

subject to

$$pc + pa'(1-\nu) + pk(\hat{r} + \delta) + wn + wF\mathbb{I}_{e=0,e'=1} = w + \frac{p_h^{1-\sigma}}{p^{-\sigma}}y + \frac{p_f^{1-\sigma}}{\bar{p}^{*-\sigma}}\bar{y}^* + pa(1+\hat{r}) - T, \quad (7)$$

$$k(1 + \hat{r} - \theta) \leq (1 + \hat{r})a, \quad (8)$$

$$\left(\frac{p_h}{p}\right)^{-\sigma} y + \tau \left(\frac{p_f}{\bar{p}^*}\right)^{-\sigma} \bar{y}^* = zk^{\alpha}n^{1-\alpha}. \quad (9)$$

Notice that this last problem is identical to the first one, but now there is only one continuous endogenous state variable, a, instead of two, k and d. This simplifies the numerical solution of the model. The idea is that the entrepreneur can choose net worth, which is the sum of capital and debt, intertemporally, and at the beginning of each period, he chooses how to divide net worth between debt and capital. As the entrepreneur is not subject to shocks (except for the survival shock, which is irrelevant for the decision on how to assign net worth to capital and debt), this decision can be made at the end of period t or beginning of period $t+1$ indistinctively.

3.1 Recursive Equilibrium

For a given value of the interest rate $\hat{r}$, a recursive stationary competitive equilibrium of this economy consists of prices $\{w, p\}$, policy functions $\{c, n, k, p_h, p_f, y_h, y_f, a', e'\}$, lump-sum taxes T, value functions v and g and a measure $\phi : \mathcal{S} \rightarrow [0, 1]$ over entrepreneurs' states such that

1. Policy and value functions solve the entrepreneurs' problem;

2. Policy functions solve the final good producers' problem;

3. The government budget constraint is satisfied: $p\nu\underline{k} = T$

4. Labor market clears: $\int_{\mathcal{S}}[n(s) + F\mathbb{I}_{\{e=0,e'(s)=1\}}]\phi(s)ds = 1$

5. Markets for domestic varieties clear: $y_h(i) = y_h(s)$ if $s_i = s$

6. Final goods market clears: $\int_{\mathcal{S}}[c(s) + x(s)]\phi(s)ds + \nu\underline{k} = y$

7. The measure ϕ is stationary

4 Calibration and Numerical Analysis

In this section we solve numerically the model and present the main results. We calibrate the model to match key features of the Chilean economy during the period 1990-1991, before the introduction of the URR. This serves as our benchmark economy, in which firms are subject to collateral constraints but do not have to pay a tax-equivalent amount $\hat{\mu}$ for the international debt contracted.

Then, we introduce the URR, recompute the general equilibrium of this economy, and perform a comparative statics analysis to assess in detail the interaction between firm performance (domestic sales, exports, investment and productivity) and the URR.

Predetermined parameters

We follow the standard values used in the literature to set several of the parameters of the model. As is standard, we choose a CRRA utility function with a coefficient of relative risk aversion γ equal to 2 and we set the subjective discount factor β equal to 0.96. The elasticity of substitution across varieties σ is set to 4; and the rate of depreciation δ is set to 0.06. We fix the α for the high capital intensity sector at 0.69 while the α of the low capital intensity sector is fixed at 0.13. We set the interest rate to 6%, to match the average real interest rate in Chile over the period. The exogenous exit rate of firms ν is set to 0.1 to match the average exit rate of firms in the sample.

Calibrated parameters

We set the iceberg trade cost τ, the productivity dispersion σ_z, the sunk export entry cost F, the stringency of the collateral constraint θ, initial net worth $\underline{a}$ and the fraction of firms

Table 2: Parameter Values

Predetermined parameters			Calibrated parameters		
β	Discount factor	.96	τ	Iceberg trade cost	3.25
γ	Risk aversion	2	η	Fraction of α_h firms	.37
σ	Substitution elasticity	4	σ_z	Productivity dispersion	.44
δ	Depreciation rate	.06	F	Sunk export entry cost	1.49
α_h	High capital intensity	.69	θ	Collateral constraint	.12
α_l	Low capital intensity	.13	$\underline{\alpha}$	Initial net worth	3.7
r	Interest rate	.06			
ν	Death rate	.10			

that belong to the high-capital intensity sector to match six moments in the data, which are (1) the share of forms that export; (2) the average sales of exporters divided by average sales of non-exporters; (3) the average sales of firms age five years divided by average sales of firms at age one year, among new firms that survive for at least five years; (4) aggregate exports as a fraction of total sales; (5) aggregate credit as a fraction of value added and (6) the aggregate capital stock divided by the wage bill. All target moments are computed using the Chilean Encuesta Nacional Industrial Anual (ENIA) for the period 1990-1991, except aggregate credit that is computed from the total value of outstanding credit in the manufacturing sector, as reported by the Superintendencia de Bancos e Instituciones Financieras de Chile. We chose the 1990-1991 time period for the calibration because capital controls were only implemented in mid-1991 and, arguably, did not affect reported data from these years.

Table 2 summarizes the parameter values. Table 3 shows the moments in the data and the results in the calibrated model economy. As we can observe from the table both moments of the data and the model are close, which gives us confidence that we are capturing the main features of the economy.

4.1 Firm-level responses to the introduction of the URR

In this economy, firms are born with a fixed stock of net worth into one of two sectors that differ in their capital intensity. When a firm is born, after receiving the transfer of net worth, it draws a productivity level z from a lognormal distribution. This productivity level is kept constant until the firm dies. The firm then decides how much to produce this period, whether

Table 3: Moments

Moment	Data	Model
Share of firms that export	.215	.221
Average sales (exporters/non-exporters)	8.53	8.42
Average sales (age 5 / age 1)	1.28	1.36
Aggregate exports / sales	.206	.208
Aggregate credit / Value added	.195	.199
Aggregate capital stock / wage bill	7.24	7.30

to start exporting next period or not, and how much to invest in next period's capital. The firm finances investment through internal and external funds. Absent any financial frictions, it immediately jumps to its long-run desired level of capital by contracting debt with the rest of the world. Given a collateral constraint, the firm gradually augments the level of capital until it reaches its long-run level. Other than investment, firms use external funds to finance access to international markets and working capital. Column (1) of Table 4 shows steady state moments in the model economy with no URR. We call this the benchmark case.

Capital controls, by reducing the availability of funds and increasing the costs of financing, affect firms' performance. In the model, capital controls are introduced as a higher effective interest rate paid by the firms when they contract debt. This triggers several responses at the firm level. Moreover, general equilibrium effects arising from the introduction of capital controls also affect firms' decisions. Columns (2) and (3) of Table 4 show the percentage change with respect to the benchmark case once the URR is introduced considering two alternative values of URR, low and high, respectively. We choose the URR's values to match the average effective URR on loans of 6-month maturity, URR high: $\hat{\mu} = 0.605$, and 12-month maturity, URR low: $\hat{\mu} = 0.33$.

Since credit is more costly, firms use it less to finance capital and thus investment is discouraged. Credit is reduced by 7.55% and 19.2% for the low and high URR, respectively. Capital is reduced by 1.59% with the low URR and 3.38% with the high URR. The change in the credit conditions and the reduction in capital generates a decrease of the total output by 3.82% and 6.31% for the low and high URR, respectively. So, the URR affects the domestic economy. Total output decreases because entrepeneurs face a tighter credit constraint and, in steady state, they demand less goods for consumption. As final good producers face a

Table 4: Results - Aggregate

Variable	No URR (level)	Low URR (Δ%)	High URR (Δ%)
Total Product	3.58	-3.82	-6.31
Capital	6.89	-1.59	-3.38
Credit	.523	-7.55	-19.2
Total Sales	2.17	-1.78	-3.69
Domestic Sales	1.69	-3.71	-6.11
Exports	.477	5.03	4.85
Share of firms that export	.221	3.08	5.35
Aggregate exports / sales	.208	6.34	10.1
Imports	.644	-6.88	-13.2

lower demand for their goods, both imports and domestic sales from entrepreneurs are lower. Our results show that domestic sales fall by 3.71% and 6.11% with the low and high URR, respectively. Total sales, the sum of domestic sales and exports, also falls driven by the reduction in domestic sales. However, total exports increase comparing to the benchmark case. Entrepreneurs face lower demand for their domestic products and increase their exports in order to partially offset this lower demand. Therefore, on one hand, the URR makes credit more expensive, making the decision of export more costly. But on the other hand, it encourages exports because the lower demand for domestic goods prompts entrepreneurs to increase sales in the foreign market. The final effect on exports is positive. In fact, the ratio of aggregate exports over sales increases. Finally, the share of firms that export also is higher with both the low and high URR.

Tables 5 and 6 show the same moments but for firms pertaining to the high-capital intensity and low-capital intensity sectors, respectively.[4]

Comparing Tables 5 and 6, it is immediate to see that the introduction of the URR affects relatively more firms that operate in the high-capital intensity sector (with α_H). Total and domestic sales fall more sharply than for firms that operate in the low-capital intensity sector. Capital decreases more in the α_H sector when the high URR is in place. In contrast, in the high-capital intensity sector, the share of firms that export increases more sharply, probably due to the fact that the fall in credit affects them relatively less. (It falls in the

[4]Total product is produced by final goods firms that combine inputs from both low and high capital intensity sectors, so it cannot be reported individually for each one of these sectors. Similarly, imports are not specific to a sector, so they are not reported in Tables 5 and 6.

Table 5: Results - α_H sector

Variable	No URR (level)	Low URR ($\Delta\%$)	High URR ($\Delta\%$)
Capital	16.9	-1.56	-3.49
Credit	1.36	-7.12	-18.3
Total Sales	4.33	-1.86	-4.23
Domestic Sales	3.33	-4	-6.55
Exports	.991	5.34	3.57
Share of firms that export	.359	4.95	9.37
Aggregate exports / sales	.229	7.33	8.15

Table 6: Results - α_L sector

Variable	No URR (level)	Low URR ($\Delta\%$)	High URR ($\Delta\%$)
Capital	1.02	-1.89	-2.34
Credit	.035	-17.4	-39.9
Total Sales	.906	-1.57	-2.20
Domestic Sales	.729	-2.93	-4.93
Exports	.177	4.01	9.03
Share of firms that export	.140	.279	.694
Aggregate exports / sales	.196	5.67	11.5

high-capital intensity sector by 7.12 and 18.3 for the high and low URR as opposed to the low-capital intensity sector where it falls a 17.4% and 39.9%, respectively).

5 Empirical Analysis

In this section we develop an empirical strategy to estimate the testable implications derived from the model. The empirical analysis requires three key ingredients: measures of firm performance, a proxy for the URR, and control variables at the firm and country level.

For the measures of firm performance and firm control variables, we use the plant-level panel data from the *Chilean Encuesta Nacional Industrial Anual* (ENIA) for the period 1990 to 2007. The ENIA has data on all manufacturer establishment of more than 10 employees. It includes approximately 5,000 observations per year and provides detailed information on establishments' characteristics such as ownership, industry, employment, domestic sales, exports, investment, inputs, assets, etc. We construct capital stock by adding cars, machinery, land and buildings. For the missing values we impute them using investment and the depreciation rate reported. Before 1995 we do not have data on the depreciation rate so we use a standard annual depreciation rate of 10%. To measure productivity at the establishment level we follow the methodology of Levinsohn-Petrin. To deflate the variables we use the 3-digit NAICS code deflator and price of capital provided by the ENIA. Additionally, we use the wholesale price index and fuel price index reported by the *Instituto Nacional de Estadistica* (INE) to deflate the electricity and fuel use, respectively.

Table (7) presents the summary statistics of the main variables at the firm level. Our total sample has 85,920 observations and 11,532 different IDs. The variable *ind_export* takes the value 1 if the firm reports a positive value of exports and 0 otherwise. Approximately 20% of our sample exported during the time of analysis. The mean value of exports for firms that participate in international trade is 5 billion of Chilean Pesos (CLP). Average number of workers is 77, average sales is 3.4 billions of CLP and the average domestic sales is 2.4 billions of CLP.

To the survey data, we also link industrial measures of capital intensity. Capital intensity is measured with investment intensity, which corresponds to the median of the ratio of gross fixed capital formation to value added in the United States for the 1986-1995 period in each industry from UNIDO's dataset. In particular, we use the measure constructed by Braun (2003) with data for all publicly listed US-based companies from Compustats annual industrial files. Table (7) also shows summary statistics for this index which is constructed at the 3-digit industry level.

Our main independent variable of interest is the *Chilean encaje*. As a proxy for the *Chilean encaje* we derive the implied interest rate-equivalent cost that agents face when taking into account the existence of reserve requirements on capital inflows as explained in Section 2 (see De Gregorio et al. (2000) for a detailed derivation). We obtain the relevant information for the derivation of the URR-tax-equivalent such as the reserve requirement as a fraction of credit and the number of months the URR has to be immobilized from the Central Bank of Chile. Finally, we use the Libor interest rate from the Bank of England as a proxy for the risk free interest rate. The URR had a positive value from 1991 to 1998 reaching its peak level in 1995. The variation in encaje during 1991-1998 as well as the years before and after when it was zero allows us to identify the effects on our variables of interest.

We also include a comprehensive set of controls at the firm and country levels. At the firm level, we use fixed capital, total workers, productivity, and expenditure in interests (to proxy for the level of indebtness). Additionally, to account for other changes that might be taking place in the economy, we use standard macroeconomic controls: growth, inflation, real exchange rate, GDP per capita, private credit to GDP, trade to GDP, world growth, the Libor interest rate and the local interest rate. Table (8) shows the summary statistics of the macroeconomic indicators during our period of analysis, 1990-2007.

Our baseline econometric model is:

$$Outcome_{ijt} = \omega_0 + \omega_1 URR_{t-1} + \omega_2 URR_{t-1} * Capital\_Intensity_j + \omega_3 X_{it} + \omega_4 Y_t + A_i + \epsilon_{ijt} \quad (10)$$

where the subscript ijt refers to firm, i, industry, j, and time, t. $Outcome_{ijt}$ refers to the vector of outcome variables of the firm under analysis: exports, domestic sales, decision to export and investment. All our firm level variables are expressed in logs. URR_{t-1} is our main variable of interest lagged one period and $Capital\_Intensity_j$ is the industry level calculation of capital intensity. X_{it} is a set of time varying firm characteristics, Y_t is a set of macroeconomic variables, and A_i is a vector of firm dummy variables that account for firm fixed effects. Firm fixed effects control for endogeneity arising from time-invariant firm characteristics.

The interaction term, $URR_{t-1} * Capital\_Intensity_j$, in Eq. (10) captures the heterogeneity in the impact of the URR on firm performance across different levels of capital intensity. Firms in sectors with higher levels of $Capital\_Intensity_j$ face higher requirements of fixed capital and investment. Then, consistent with the insights from the model, we hypothesize that firms with higher capital intensity should be more negatively affected by the increased cost of capital generated by the URR in those decisions that are more intensive on financing such as investment and exporting.

Gorodnichenko and Schnitzer (2013) find that domestically owned firms are more financially constrained than foreign-owned firms and that this difference helps explain why foreign-owned firms tend to be more productive than domestically owned firms (Aitken and Harrison (1999) and Arnold and Javorcik (2009)). Following this line of reasoning, foreign firms in Chile were probably less affected by capital control as they had other ways to access direct financing from their subsidiaries through more informal flows that were not affected by the regulation (Nadal-DeSimone and Sorsa (1999)). Therefore, we also explore whether the effect of the URR differs when we consider a subsample that only considers firms whose capital is local. In the sample we define national firms as those whose capital is fully domestic, while the exporter vs non-exporter classification depends on whether the firm exported or not the previous period. Tables 9 to 14 in the Appendix present the results of our baseline regression for the whole sample and for a series of subsamples: exporters and non exporters (Tables 10 and 11); national firms (Table 12) and national exporters and non-exporters (Tables 13 and 14).

Additionally, we analyze the magnitude of the impact of the URR on firm performance across different sectors by calculating the partial effect of the URR at different levels of capital intensity. The partial effect of financial openness on private credit is given by:

$$\frac{\partial Outcome_{ijt}}{\partial URR_{t-1}} = \omega_1 + \omega_2 Capital\_Intensity_j \tag{11}$$

where the median value of capital intensity in the sample is 0.0616. Figure (2) presents this effect for the variables that presented a significant coefficient for the interaction: exports, investment, value added and imports for the full sample, for the subsample of national firms and for national exporters.

In line with the insights from the model we find that aggregate exports increase, although this effect diminishes and even becomes negative for high levels of capital intensity. When considering the subsamples we find that these effect are heterogeneous. For national firms the coefficient is marginally smaller implying a less-positive/more-negative effect. But the comparison between exporters and non exporters is quite revealing as it shows that both groups are affected very differently by the encaje. Tables 10 and 13 show that all the action at the aggregate level is driven by the behavior of already exporting firms, that now export more when their capital intensity is low and less if their capital intensity is high, while there is no change in the exports behavior for previously non-exporting firms. The probability of exporting is also only affected, again depending on the level of capital intensity, when the firm was already an exporter.

The positive effects for firms with low capital intensity could be associated to the effect already explained in the theoretical model: as the URR depresses the domestic economy, firms find it more profitable to resort to the external market in spite of the higher financing cost. However, firms in sectors with high capital intensity, probably due to their higher financing needs, reduce their exports. In terms of the data, however, domestic sales do not present any reaction to the introduction of the URR. The other plausible, empirical, explanation for the higher exports has to do with the URR loopholes: as export credits were exempted from the URR this could have created incentives to increase exports to obtain external financing.

The numerical exercise has also shown that both credit and capital are reduced when the URR is introduced. Consistent with these results the empirical analysis of the whole sample and national firms shows that, in spite of a small positive effect on investment when capital intensity is low, the URR significantly reduces investment and the effect is stronger for higher levels of capital intensity. This pattern again is exacerbated when we consider exporting firms. Probably the previous results on exports helps to explain the increased sensitivity of exporters' investment to the URR.

5.1 Robustness Checks

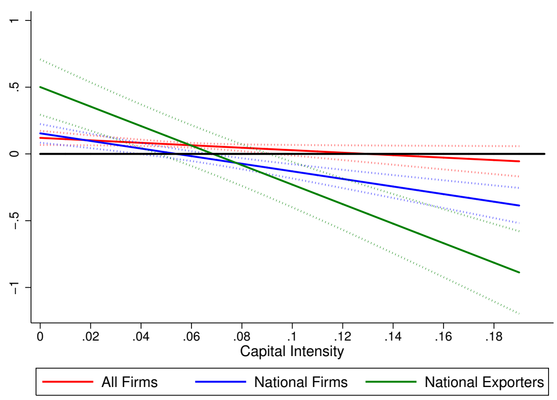
This section checks the robustness of our main results to including time fixed effects. The macro variables in our baseline regression helps us to control for the aggregate level developments. However, there might be unobservables at the aggregate level that could be correlated with URR inducing biases in our estimation. To ensure that macro level variables are not biasing the results Tables 15 to 17 present our baseline regression including time-fixed effects. The disadvantage of this approach is that now we can only observe the effect of the URR interacted with the capital intensity variable while we miss the direct effect of the URR. However, the coefficients of the interaction maintain the sign and significance levels than they had when the time-fixed effects was not included suggesting that our baseline regression does a reasonable job at cleaning the aggregate factors.

6 Conclusions

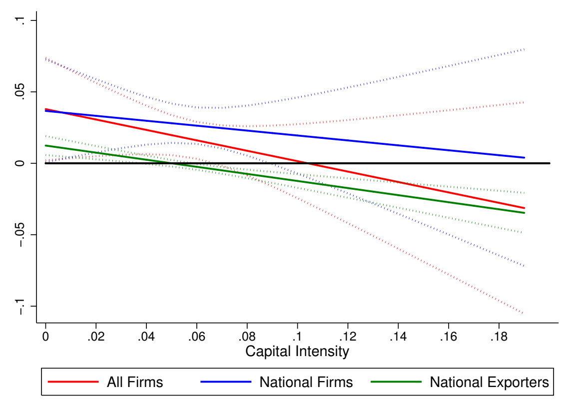
This paper studies the effects of the capital controls imposed by Chile between 1991 and 1998, i.e. the *Chilean encaje*, on firms' production, investment and exporting decisions. We use a general equilibrium model with heterogeneous firms and financial constraints to illustrate the

Figure 2: Percentage change in firm's outcomes by level of capital intensity

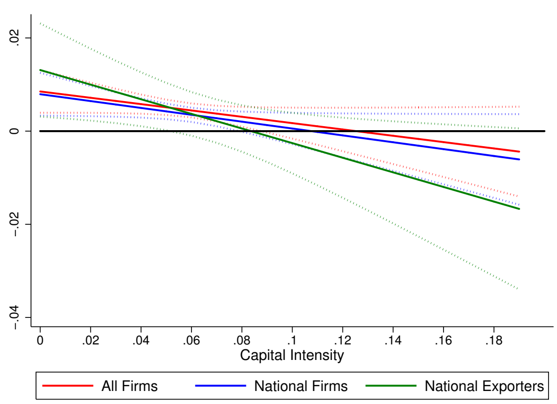
(a) Exports



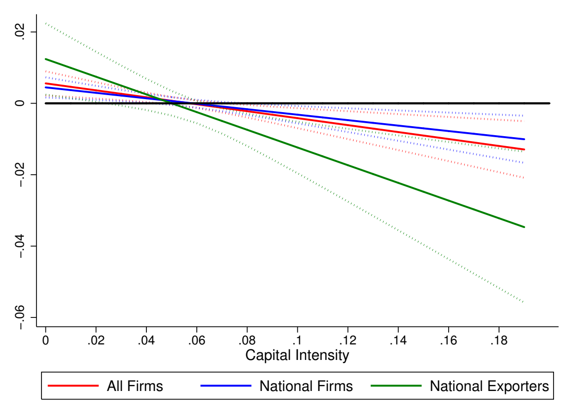
(b) Domestic Sales



(c) Decision to Export



(d) Investment



mechanism by which capital controls on inflows affect firm-level dynamics and international trade.

Firms finance investment through internal and external funds. In our model, firms differ in their productivity and capital intensity and this heterogeneity shapes their desired long run level of capital and their exporting strategy. Absent any financial frictions, they immediately jump to its long-run desired level of capital by contracting debt with the rest of the world. Given a collateral constraint, the firm gradually augments the level of capital until it reaches its long-run level. Other than investment, firms use external funds to finance access to international markets and working capital.

Capital controls, by reducing the availability of funds and increasing the costs of financing, affect firms' performance. In the model, capital controls are introduced as a higher effective interest rate paid by the firms when they contract debt. This triggers several responses at the firm level: lower domestic sales and lower levels of investment. However, total exports and the share of firms that export increase. The more tight credit conditions depress the domestic economy so firms increase their exports to substitute for the lower demand of their goods. Additionally, we find that these effects are exacerbated for firms in more capital-intensive sectors. Finally, using data from the Chilean *Encuesta Nacional Industrial Anual (ENIA)* we empirically corroborate the implications and insights of the theoretical model.

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Appendix

Table 7: Summary Statistics: Firm Level Data

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Investment (in billion of CLP)	85,920	0.240	5.717	-9.933	788.9
Fixed Capital (in billion of CLP	85,920	2.093	29.74	0	5,717
Total Workers (#)	85,920	77.67	163.1	0	5,745
ind_export (dummy variable)	85,920	0.200	0.400	0	1
TFP	85,920	10.03	1.429	1.121	19.68
Capital Intensity (index)	85,920	0.0613	0.0202	0.0181	0.196
Expenditure in interests (in billion of CLP)	85,920	4.906	4.673	0	18.24
Sales (in billion of CLP)	85,920	3.393	29.66	0	2,695
Domestic Sales (in billion of CLP)	85,920	2.438	22.25	0	2,695
Exports (if > 0) (in billion of CLP)	15,658	5.143	36.00	1	1,852
Number of id	11,352	11,352	11,352	11,352	11,352

Table 8: Summary Statistics: Macroeconomic Indicators 1990-2007

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Libor 12m	18	4.918	1.799	1.364	8.415
Real Exchange Rate	18	489.7	116.1	304.9	691.4
Chilean Interest Rate	18	11.63	7.995	2.400	34.72
Growth	18	0.0556	0.0288	-0.0217	0.120
Inflation	18	0.0177	0.536	-0.626	1.887
GDP per capita	18	4,653	871.0	3,067	6,077
World Growth	18	3.054	1.000	1.369	4.476
Private Credit to GDP	18	0.613	0.107	0.442	0.743
Trade to GDP	18	1.599	0.240	1.188	2.027
Encaje	18	0.881	1.109	0	2.649

Table 9: All Firms

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
l_tworkers	0.841***	0.608***	0.057***	0.011***
	(0.061)	(0.042)	(0.005)	(0.002)
l_fixed_k	0.061***	0.063***	0.004***	0.003***
	(0.014)	(0.012)	(0.001)	(0.000)
ln_tfp	0.138***	0.423***	0.008***	0.004***
	(0.027)	(0.023)	(0.002)	(0.001)
intgas	0.029***	0.020***	0.002***	0.000**
	(0.005)	(0.003)	(0.000)	(0.000)
TCR	0.000	0.001	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)
growth	0.342	-1.324***	0.011	0.038
	(0.589)	(0.404)	(0.054)	(0.027)
pcrdbofgdp	0.828	-0.328	0.040	-0.022
	(0.799)	(0.536)	(0.074)	(0.034)
Tasacaptacion90d_1a	-0.004	0.003	0.000	0.001**
	(0.007)	(0.005)	(0.001)	(0.000)
inflation	0.014	0.013	0.001	-0.001
	(0.015)	(0.011)	(0.001)	(0.001)
trade_gdp	0.208	-0.014	0.020	0.012
	(0.252)	(0.168)	(0.023)	(0.009)
world_growth	-0.011	0.077***	-0.000	
	(0.018)	(0.011)	(0.002)	
gdppc	0.000	-0.000*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Libor_12m	-0.009	-0.009	-0.001	-0.001*
	(0.012)	(0.009)	(0.001)	(0.001)
Encaje	0.159***	0.035	0.012***	0.006***
	(0.050)	(0.028)	(0.004)	(0.002)
Encaje_KI	-1.579*	-0.350	-0.103	-0.097***
	(0.808)	(0.430)	(0.068)	(0.030)
Constant	-3.932***	5.433***	-0.195***	15.965***
	(0.578)	(0.367)	(0.050)	(0.020)
Observations	85,920	85,920	85,920	85,920
Number of id	11,352	11,352	11,352	11,352
Adjusted R-squared	0.023	0.047	0.013	0.006
Firm FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: All Firms: Exporters

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje	0.325***	-0.050	0.016*	0.016***
	(0.120)	(0.040)	(0.009)	(0.006)
Encaje_KI	-3.458**	-0.832	-0.167	-0.275***
	(1.666)	(0.532)	(0.120)	(0.095)
Constant	0.471	8.527***	0.649***	15.660***
	(1.686)	(0.783)	(0.143)	(0.077)
Observations	15,658	15,658	15,658	15,658
Number of id	2,813	2,813	2,813	2,813
Adjusted R-squared	0.033	0.046	0.018	0.026
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: All Firms: Non-Exporters

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje	0.027	0.025	0.003	0.001
	(0.030)	(0.034)	(0.003)	(0.001)
Encaje_KI	0.197	0.257	0.011	-0.014
	(0.486)	(0.544)	(0.045)	(0.016)
Constant	-2.018***	4.875***	-0.174***	16.047***
	(0.465)	(0.399)	(0.043)	(0.013)
Observations	70,262	70,262	70,262	70,262
Number of id	11,010	11,010	11,010	11,010
Adjusted R-squared	0.006	0.047	0.005	0.007
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: National Firms

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje	0.150***	0.034	0.012***	0.004***
	(0.049)	(0.028)	(0.004)	(0.001)
Encaje_KI	-1.544*	-0.162	-0.110	-0.076***
	(0.806)	(0.439)	(0.069)	(0.025)
Constant	-3.653***	5.246***	-0.192***	15.976***
	(0.581)	(0.377)	(0.051)	(0.021)
Observations	80,377	80,377	80,377	80,377
Number of id	11,002	11,002	11,002	11,002
Adjusted R-squared	0.022	0.048	0.013	0.005
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13: National Firms: Exporters

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje	0.315**	-0.026	0.017*	0.012**
	(0.128)	(0.038)	(0.010)	(0.005)
Encaje_KI	-3.425*	-0.695	-0.190	-0.248***
	(1.774)	(0.513)	(0.129)	(0.082)
Constant	-0.206	8.345***	0.626***	15.678***
	(1.919)	(0.878)	(0.166)	(0.084)
Observations	12,916	12,916	12,916	12,916
Number of id	2,575	2,575	2,575	2,575
Adjusted R-squared	0.037	0.041	0.021	0.027
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: National Firms: Non-Exporters

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje	0.025	0.028	0.003	0.000
	(0.028)	(0.034)	(0.003)	(0.001)
Encaje_KI	0.157	0.255	0.004	-0.002
	(0.457)	(0.555)	(0.044)	(0.013)
Constant	-1.762***	4.787***	-0.156***	16.047***
	(0.449)	(0.400)	(0.043)	(0.011)
Observations	67,461	67,461	67,461	67,461
Number of id	10,610	10,610	10,610	10,610
Adjusted R-squared	0.006	0.049	0.005	0.006
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15: National Firms with Time Fixed Effects

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje_KI	-1.033	-0.194	-0.077	-0.066***
	(0.785)	(0.415)	(0.068)	(0.024)
Constant	-3.450***	4.946***	-0.201***	16.017***
	(0.377)	(0.277)	(0.030)	(0.009)
Observations	83,902	83,902	83,902	83,902
Number of id	11,009	11,009	11,009	11,009
Adjusted R-squared	0.026	0.053	0.016	0.005
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 16: National Firms with Time Fixed Effects:Exporters

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje_KI	-3.325*	-0.659	-0.190	-0.242***
	(1.798)	(0.511)	(0.131)	(0.083)
Constant	-2.097*	7.231***	0.313***	15.725***
	(1.154)	(0.682)	(0.089)	(0.048)
Observations	12,587	12,587	12,587	12,587
Number of id	2,523	2,523	2,523	2,523
Adjusted R-squared	0.038	0.046	0.021	0.026
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 17: National Firms with Time Fixed Effects: Non-Exporters

VARIABLES	(1) l_expo	(2) l_domestic_sales	(3) ind_export	(4) l_inv
Encaje_KI	-0.278	0.554	-0.024	0.004
	(0.444)	(0.557)	(0.045)	(0.009)
Constant	-1.089***	4.994***	-0.095***	16.071***
	(0.213)	(0.284)	(0.019)	(0.006)
Observations	58,237	58,237	58,237	58,237
Number of id	9,058	9,058	9,058	9,058
Adjusted R-squared	0.004	0.050	0.003	0.008
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1