Why exporters can be financially constrained in a recently liberalised economy? A puzzle based on Argentinean firms during the 1990s[1]

Paula Español
(EHESS, PSE)*

Abstract

Trade-related characteristics have only been recently started to be included in empirical studies analysing the determinants of the financial constraints faced by firms. A result broadly shared by these studies is that exporting firms tend to be those less financially constrained. In this paper we test this result using panel data built up from quarterly balance sheet information for 74 Argentinean big firms covering the years of the currency board regime (1992-2001). We estimate an investment equation splitting up the sample between exporters and non-exporters. Using three alternative econometric models (random effects, fixed effects and instrumental variables) we find that, contrary to what is commonly stressed in the literature, exporting firms are the ones facing larger financial constraints on investment. We propose an explanation for this original result based on the currency appreciation that follows financial liberalisation processes in emerging countries, particularly in Argentina. We find that such currency appreciation triggers a profit squeeze phenomenon for exportable firms that limits their access to external finance and, as a result, reduces their investment capacity. We conclude that this phenomenon can have serious macroeconomic implications in terms of investment and export performance, and thus in terms of the sustainability of the balance of payments.

Keywords: financial constraint, investment, foreign trade, Argentine.

JEL Classification: E22, O16, O54

Résumé

Nous étudions l'existence d'une contrainte financière sur l'investissement des firmes en utilisant des données de panel sur les bilans de 74 grandes firmes argentines pour 40 trimestres (1992-2001). Nous estimons une équation d'investissement, en partitionnant le panel en deux groupes des firmes, l'un appartenant aux secteurs exportateurs et l'autre aux secteurs non exportateurs. A partir des résultats obtenus avec trois techniques économétriques différentes (effets aléatoires, effets fixes et variables instrumentales) nous montrons que, contrairement à la position généralement adoptée par la littérature, ce sont les firmes des secteurs exportateurs qui subissent une contrainte financière sur la capacité d'investissement, étant l'appréciation réelle de la monnaie au cœur de l'explication du phénomène. De potentielles conséquences macroéconomiques, notamment sur la contrainte externe du pays, donnent d'autant plus d'importance à ce résultat original.

[1] I am greatful to V. Arza, A-L. Baldi, V. Bignon, R. Boyer, R. Breton, Y. Kalantzis, J. Pradelli, M. Rojas-Breu, L. Serino, F. Tripier and many seminar participants (at the Université de Nanterre - Paris X and at PSE) for helpful comments and criticisms. Rermaning errors are mine.

* PSE (Paris-Jourdan Sciences Economiques), Unité mixte de recherche CNRS - EHESS - ENPC – ENS.
48, bd Jourdan 75014 Paris. France.
E-mail : paula.espanol@ens.fr

1. Introduction

A large empirical literature has been developed in the past years concerning financial constraints on firms' investment behaviour. Some studies consider export capacity as a factor that helps overcoming financial constraints, as this leads, among other things, to greater creditworthiness, whereas non-exporting firms are the ones unable to completely finance their projected investment (Ganesh-Kumar, Sen et al. 2001; Tornell and Westermann 2002; Tornell and Westermann 2003). The economic rationale underlying these results is that: (1) foreign exchange revenues constitute a better collateral to borrow in international markets (Tornell and Westermann 2003); (2) selling in international markets is considered as a sign of efficiency and competitiveness (Ganesh-Kumar, Sen et al. 2001), and (3) external markets allow exporting firms to achieve economies of scale and increase sales and profits.

In this paper we aim to test the hypothesis that firms' characteristics related to trade are a determinant of financial constraints in developing countries. Thus, we estimate an investment equation using a panel database built up on quarterly balance sheet information for 74 Argentinean big firms listed in Buenos Aires Stock Market, covering the 1992-2001 period. Using three alternative econometric techniques: fixed effects, random effects and instrumental variables, we obtain an original result: in Argentina, exporting firms are the ones facing larger financial constraints.

Having in mind the Argentinean economy, we can think about some clues to understand this puzzling result, where exchange rates appreciation is at the very heart of the explanation. As a matter of fact, the new macroeconomic context of the 1990s drew large capital inflows, what combined with a price stabilization programme based on fixed exchange rate, provoked currency appreciation as occurred in other economies (Taylor 1998). This change in relative prices initiated a profit squeeze process for exportable firms and weakened their balance sheet (diminishing both sales and assets accounts). As a consequence, not only it reduced internal sources of finance but also increased the probability of bankruptcy, prompting banks to be extremely cautious when granting loans to these firms.

Our study is inscribed within a large empirical literature testing the existence of financial constraints to investment at the firm level[2], whose common outcome is that investment tends to be largely financed with internal resources, i.e. cash flow is a significant variable to explain firms' investment levels. As the literature has been extended to developing countries[3], researchers have been adding

[2] See Athey and Fazzari (1986), Devereux and Schiantarelli (1989), Fazzari and Mott (1986-87), Fazzari et al. (1988), Fazzari and Peterson (1993), Gertler and Hubbard (1989), Gertler and Gilchrist (1994), Gilchrist and Himmelberg (1995), Ndikumana (1999), Mairesse et al. (2001), among others.

[3] See Athey and Laumas (1994), Hermes and Lensink (1998), Gallego and Loayza (2000), Ganesh-Kumar et al. (2001), Fanelli, Bebczuk et al. (2002).

several variables –both at macro and micro levels–to better account for developing countries' specificities. These new variables refer to whether the firm has been recently privatised, its debt currency denomination, liberalisation dummy variables, etc. Nonetheless, all these works remain quite close to the original empirical approach: testing the existence of financial constraint for firms belonging to one particular group.

The paper is organised as follows. In section 2 we develop the econometric model and estimation techniques to be used. In section 3, we describe the database and present some descriptive statistics, and in section 4 we discuss our results. In section 5 we propose some explanations of why exporting firms tend to be the ones facing lager financial constraints, and propose future directions for our research. In section 6 we conclude.

2. Econometric model and method of estimation

2.1 Investment equation

Theoretically, if markets were complete and there was no radical uncertainty about the future, the amount of external finance a firm could find would be related to the actualised value of its future profits and it would not be any link between financial markets and the investment behaviour of firms (i.e. there would not any difference in opportunity cost of using internal or external finance). Therefore, internal source of finance would not play any role when firms bring their investment projects, *à la* Modigliani-Miller. However, markets are not perfect, uncertainty about the future is predominant and thus some firms cannot reach the desired level of external finance and find themselves limited to invest – i.e. firms' investment is financially constrained when "a windfall increase in the supply of internal funds […] results in a higher level of investment spending" (Bond and Van Reenen 2003: 58). Actually, market failures have been incorporated in an orthodox framework, by introducing asymmetric information in the borrower-lender relationship (Stiglitz and Weiss 1981).

From an empirical point of view, as just noted in the introduction, an abundant literature has been developed in order to test the existence of financial constraints limiting firms' investment behaviour. Following this empirical work, we propose an investment equation, using cash flow variable as a measure of internal sources of finance. It is worth noting that cash flow is representing firms' financial constraints in a double sense, directly and indirectly. On the one hand, it is a genuine source of liquidity to invest after dividends have been distributed. On the other hand, we consider this variable as a proxy of firm's net worth[4] (i.e. firm collateral), which limits the amount of external finance a firm

[4] Even if cash flow is not the ideal proxy for variation in net worth, as Hubbard (1998: 203) points out, it is the better proxy available for a large number of firms.

can have access to (Bernanke and Gertler 1989). A significant and positive coefficient for this variable should be interpreted as a signal of financial constraints.

For the econometric estimation we use a twofold error term model:[5]

[1]

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha_{cft}\frac{CF_{i,t}}{K_{i,t-1}} * T + \alpha_{cfn}\frac{CF_{i,t}}{K_{i,t-1}} * N + \alpha_q Q_t + \alpha_s \frac{S_{i.t-1}}{K_{i,t-1}} + \alpha_{wk}\frac{\Delta WK_{i.t}}{K_{i,t-1}} + \alpha_d \frac{D_{i,t}}{K_{i,t-1}} + \alpha_{d2}\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \alpha_y YearD_t + u_{i,t}$$

[1b] $u_{i,t} = n_i + \varepsilon_{i,t}$; n_i is the firm specific part of error term and $\varepsilon_{i,t}$ is the unsystematic error

Where:

K	=	Physical Stock (Machinery and Intangible Assets)
I	=	Gross Investment: K_{t-1} - K_t + Depreciation
CF	=	Cash Flows = Profits + Depreciation
Q	=	Tobin's Q
S	=	Total Sales
WK	=	Working Capital (Current Assets – Current Liabilities)
D	=	Total Debt (Current and non Current Liabilities)
YearD	=	Year Dummies to control for macroeconomic shocks
T	=	Exporting firms
N	=	Non-Exporting firms

A common criticism to the extended use of cash flow as the key variable to test the presence of financial constraint is that cash flow can also represent firms' future profitability. To overcome this difficulty, most empirical studies divide the sample of firms' in two sub-samples, and consider one of them to be, at least theoretically, more constrained. Given that there is no reason *a priori* to think that the cash flow considered as a sign of future profitability would have any differential impact in the sub-samples, a higher coefficient should then confirm a situation of financial constraint.

The most common (but not the only) feature to partition the sample is size. It is often argued that smaller firms are in theory more financially constrained as they face greater problems of asymmetric information and agency costs or, in a more Keynesian vein, they are exposed to greater radical uncertainty. In both cases, firms' net worth determines external finance, in particular for negotiating the level and the repayment conditions of the borrowed amount. Since our database contains only large firms, we aim to test other feature than size that would limit investment decisions in Argentina. Therefore, having all firms similar size, we argue that trade-related characteristics of firms are a key element to identify which firms are facing financial constraints (Ganesh-Kumar, Sen et al. 2001; Tornell and Westermann 2002; Tornell and Westermann 2003).

[5] In order to avoid scale problems, all variables are normalised by stock capital of previous period.

In our investment equation, cash flow coefficients should be significant and, according to those authors, if N firms are likely to face larger financial constraints than firms from sector T, we should expect α_{cfn} to be higher than α_{cft}.

Other variables have been proposed to control the effect of future profitability on cash flows. Tobin's Q is one of the most commonly used, since it associates firm's stock-market value with its capital stock value, and thus summarises market anticipations of profitable investment opportunities of firms. Thus, α_q is expected to be significant and positive.

However, Q models have been largely criticised, particularly in emerging countries where stock indexes are often highly volatile and rarely represent firms' future revenues. Indeed, a central problem of Tobin's Q lies on the non equality between Average Q and Marginal Q, especially when financial market imperfections are present (Chirinko 1993; Hubbard 1998) and, as Schiantarelli (1996) points out, when "*stock markets are not efficient and stock prices are driven by fads and fashions*"

Another proxy for future profitability can be given by the level of firms' sales (Chirinko 1993; Fanelli, Bebczuk et al. 2002). Sales variables –in level or variation– are thus added to the investment equation and are considered to explain the past and potential future performance of a firm, as sales accelerator type models suggest: higher levels of sales encourage firms to increase capital goods demand to boost their production capacity in order to meet an enlarged demand (Fazzari and Mott 1986-7; Athey and Fazzari 1987; Fazzari, Hubbard et al. 1988; Ganesh-Kumar, Sen et al. 2001; Arza 2003).

Fazzari and Peterson (1993) also underline the role of working capital in financial constraint empirical analysis. According to the authors, investment projects are generally rather expensive and they require some continuity across time. As a consequence, when facing a negative shock that diminishes internal financial resources, a financially constrained firm would adjust its working capital in order to keep on going its designed investment with minimal stability. Putting it differently, working capital needs to fulfil a "buffer" function to cope with cash flow fluctuations (Fazzari and Peterson 1993: 331). We thus expect α_{wk} to be significant and negative.

The last control variable is related to firms' indebtedness profile. This leverage effect is actually twofold. On the one hand, a higher indebtedness ratio can be considered as a signal of an improved capacity to finance investment, and in this case it will be a positive relation between debt and investment. On the other hand, once firms reach certain threshold, an increase of the indebtedness ratio will have negative consequences, provided that it triggers higher external finance costs due to balance-sheet deterioration (Bernanke and Gertler 1989). Therefore, the possibility of an inverted U-shaped debt curve is captured by two variables: the debt to capital stock ratio and its square. So α_d and α_{d2} should be significant, with positive and negative signs respectively.

Finally, it is worth noting that the non-exporters are less represented in our sample for the first years (cf. database, section 3.1). Therefore, in order to gain in robustness, we propose two alternative investment equations to be estimated for exporting firms, which are largely represented along the period of study.

Equation [2] is the same as equation [1] but without the sample partition, whereas in equation [3], following Devereux and Schiantarelli (1989), we add liquid assets[6] in a investment equation from a Q model framework. According to these authors, liquid assets are likely to represent an easily collateralisable asset and thus a positive and significant coefficient will be an additional proof of financial constraints, given that liquid assets (taken as a collateral) would limit external finance capacity to invest (Devereux and Schiantarelli 1989; Ganesh-Kumar, Sen et al. 2001; Arza 2003). By contrast, in a perfect market world, there would not be any relation between investment and liquid assets, and thus α_{al} will not be significant.

$$[2]\quad \frac{I_{i,t}}{K_{i,t-1}} = \alpha_{cf}\frac{CF_{i,t}}{K_{i,t-1}} + \alpha_q Q_t + \alpha_s \frac{S_{i.t-1}}{K_{i,t-1}} + \alpha_{wk}\frac{\Delta WK_{i.t}}{K_{i,t-1}} + \alpha_d \frac{D_{i,t}}{K_{i,t-1}} + \alpha_{d2}\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \alpha_y YearD_t + u_{i,t}$$

$$[3]\quad \frac{I_{i,t}}{K_{i,t-1}} = \alpha_{cf}\frac{CF_{i,t}}{K_{i,t-1}} + \alpha_q Q_t + \alpha_{al}\frac{AL_{i.t}}{K_{i,t-1}} + \alpha_d \frac{D_{i,t}}{K_{i,t-1}} + \alpha_{d2}\left(\frac{D_{i,t}}{K_{i,t-1}}\right)^2 + \alpha_y YearD_t + u_{i,t}$$

[2b and 3b] $u_{i,t} = n_i + \varepsilon_{i,t}$; n_i is the firm specific part of error term and $\varepsilon_{i,t}$ is the unsystematic error.

Summarising, our econometric study estimates alternative investment equations suggested by the empirical literature to test the presence of financial constraints affecting exporters, which in all cases will be mainly represented by *cash flows* coefficients being significant and positive.

2.2 Estimation method

We estimate the investment equation using three alternative econometric models: the random effects model (RE-GLS), within fixed effects model (FEW) and instrumental variables (IV). Obtaining good estimators[7] requires testing several hypotheses about the regressors and the error term. If we assume that the firm specific term in error term (n_i) is randomly distributed –i.e. it is not correlated with explicative variables in the investment equation–, then the random effect model will give estimators that are both consistent and efficient.

[6] Liquid Assets variable (LA) represents cash plus short-term commercial papers.

[7] That means estimators consistent (without bias) and efficient (minimal variance).

By contrast, if the firm-specific error term is correlated with any of the independent variables, one needs to use fixed effect models to estimate the investment equation. The Hausman test helps us to chose between RE and FEW estimations. Rejecting the Hausman test imply that the FE model provides regressors with the right properties.[8]

In addition, endogeneity problems[9] might be present. This would be the case when the independent and dependent variables are simultaneously determined or when there is double causality or feedback between them. This can happen for the following variables: investment, cash flow, working capital and sales. In our case for example, investment and working capital might be simultaneously determined or, as well, investment may have an impact on future cash flow of firms. In such a case, good estimators ask for using the instrumental variable model (IV), and this requires finding appropriate instruments that are highly correlated with the independent variables but not with the dependent one –in our equation: variables correlated to the cash flow but not to firms' investment.[10]

Choosing right instrumental variables is a complex task and an accurate instrumentalisation is essential to obtain convergent estimators. Sargan test allows verifying a correct choice of instruments. If we reject the test, IV model is the one properly specified.

3. Data sample and summary statistics

3.1 Database

We work with an unbalanced panel with information from 74 large firms covering 40 consecutive quarters (1992q1-2001q4), the period when Argentina implemented a currency board. The information in the database is that of the balance sheets of non-financial firms listed in Buenos Aires' Stock Exchange *–Bolsa de Valores de Buenos Aires–* complemented with additional balance-sheet information published by the firms themselves[11].

Our sample classification between exporters and non-exporters is determined by whether a firm commercialises its products in foreign markets. Since balance sheets in Argentina do not directly include exports information but only the sector activity of each firm, we split up the sample between tradable and non-tradable. Tradable sectors basically refer to manufacturing and agricultural

[8] It is worth noting that FE models are preferable in our empirical work, since they correct for potential problems that could appear when working with unbalanced panel data (Green 2003 : 293; Sevevestre 2002).

[9] Different models have been proposed to deal with endogeneity problems: Arellano and Bond (1991) and Andersen and Hsiao (1981). Our IV estimation follows the last one.

[10] According to whether we choose RE or FE models, our instrumental variables model will be IVRE or IVFE correspondingly. As usual, the instrumentalisation is carried out adding lags of independent variables, sectoral dummies and all other independent variables of the investment equation. In our case, instrumental variables have up to five lags what is reasonable given that we work with quarterly.

[11] According to our knowledge, our database is the best source of balance sheet information since it contains a large proportion of total listed firms in domestic stock market (107 firms).

production, while non-tradable sectors cluster real services and construction[12]. However, in the particular case of our database, tradable firms are easily associated with exporters since we work with large quoted firms, which are those more likely to export. We actually confirm the validity of this statement in additional sources of information[13].

It is worth noting that exporting firms are over-represented in the sample, partly due to our deliberate exclusion of financial and banking institutions since we are not focusing our study in those kind of firms. However, the difference between the two groups diminishes with time (cf. appendix, table 3.1).

The empirical analysis is carried out excluding outliers (at 1%) for key variables: investment, cash flow, debt, sales and working capital, whereas all data is deflated using the producer price index (1993 $), published by the Argentinean Ministry of Finance.

Before proceeding, it is worth noting that although our sample of firms is not representative of the entire population of Argentinean enterprises, we claim that if the large firms quoted in the stock market are financially constrained, other firms would likely suffer similar constraints.

3.2 Descriptive Statistics

Table 2.2 summarises some characteristics of the firms from the sample used in our econometric work (cf. annexe). In the first place, we can see that the profit rate, which is defined as the cash flow to capital stock ratio, is larger for exporters than that for non-exporters; whereas there are no significant differences between the groups in relation to capital accumulation (investment to capital stock ratio). Secondly, exporting firms show a weaker indebtedness profile: not only they have larger debt to capital stock ratios but also their debts tend to be dominated by short-term liabilities (short-term debt over total liabilities). Finally, distributed profits are higher in non-exporting firms, and the same occurs with the ratios of both sales and working capital to capital stock.

Figures 2.1, 2.2, 2.3 and 2.4 show time-series for some key variables (cf. annexe). As we can see, non-exporters obtained a higher profit rate all through the decade. In terms of investment behaviour, the figures show that exporting firms outperformed non-exporting ones during the first years of analysis, although this difference disappeared in the final years when both groups had very low values of capital accumulation. Finally, we can see that exporters continuously had a higher ratio of debt over capital stock and, contrary to the rest of the sample, they could never overcome their short-term liabilities profile.

---

[12] The exact classification is as follows. *Tradable Sectors are*: agricultural product, oil extraction and mining, food production and tobacco, textile industry and shoes production, wood and paper; chemistry and plastic, minerals and metals, still and iron, machinery, automobile industry. *Non-tradable sectors*: services; gas electricity and water; construction.

[13] We checked it using the ECT (Encuesta Nacional sobre la Conducta Tecnológica de las Empresas Industriales Argentinas – INDEC) and firms´ published information, as well.

4. Econometric Results

Tables 4.1, 4.2 and 4.3 present our results using the three alternative techniques. The Random Effects model allows us to control for some firms' specific characteristics, what is not possible with the Fixed Effects model. For instance, we tested whether the firm belongs to a conglomerate, whether it is owned by foreign capital or whether it is listed in the New York Stock Exchange. Since these dummy variables were not significant and results showed no major differences, results in the table do not include them.[14]

Our Tables include Hausman and Sargan tests as well, which allowed us to select the most appropriate estimation. The rejection of the first test indicates that the FE models must be chosen, while the rejection of the second one confirms the correct instrumentalisation of endogenous variables. It is worth noting that since our results tend to hold through all estimation techniques, we count with an indirect sign of the robustness of them.

As we can see in Table 4.1, the cash flow coefficient is always significant and positive for exporters, while it is negative for non-exporting firms (though not always significant). The effect of lagged sales is significant and positive, working capital is significant and negative and Tobin's Q is significant and positive. Our results suggest that after controlling for future profitability variables, the cash flow of a firm continues to be a crucial determinant of investment suggesting that exporters are more financially constrained. Finally, the table also confirms the presence of an inverted U-shaped curve for indebtedness variables: investment has a positive relation with debt when debt is low, but a negative relation for large debt ratios.

Tables 4.2 and 4.3 summarise the estimation of equations [2] and [3], using the sub-sample of exporters. The fundamental conclusion is that cash flow is always significant and positive, and in both cases results hold after controlling for future profitability, using both lagged sales and Tobin's Q, though this second variable is not robust and usually not significant for IV estimations, i.e. see critics to Tobin's Q in section 2.1. Cash Flow coefficient is higher when we use IVFE, a model that is likely to control for endogeneity problems. In all cases the Sargan test suggests a correct variable instrumentalisation.[15]

In particular, Table 4.2 displays estimations of equation [2], where we can see that, as expected, working capital is significant and negative. This confirms that, as suggested by Fazzari and Peterson (1993), working capital fulfils the role of adjustment variable in order to sustain projected investment

[14] We controlled using sectoral dummies as well, but we do not include the result on tables to make them easily readable.

[15] Following Devereux and Schiantarelli (1989), we estimate equation [3] in first differences and the cash flow coefficient is still significant and positive (with a value of around 0.20). For the sake of simplicity we do not include these results in our tables.

amount by firms. On the other hand, estimation of equation [3] in Table 4.3 shows that liquid assets are positive and significant as well, reinforcing our financial constraint hypothesis. Finally, in both cases, indebtedness coefficient has the expected sign and similar values along all estimations, confirming the changing effect of leverage according to the size of the debt ratio.

In short, our results confirm the presence of financial constraints on exporting firms, given that the cash flow coefficient is always significant and positive, even after controlling for future profitability (as represented by Tobin's Q and lagged sales). Moreover, since liquid assets and working capital are both significant variables (positive and negative respectively), this provides additional support to our hypothesis of frictions in credit market. Finally, leverage effects can be found but with an inverse U-shaped function between indebtedness and investment level.

5. Why exportable firms are more financially constrained in Argentina? Some highlights and macroeconomic evidence

Together with trade liberalisation, Argentina held a currency board regime since 1991 that rapidly gave place to a real exchange rate appreciation (partially caused by large capital inflows during the period). We argue that, in a context of recently liberalised economies with a strong currency appreciation, exportable firms are likely to face deeper financial constraints.

Two elements of this constraint need to be differentiated: a) a negative impact of real exchange appreciation that affects tradable firms (*including* of course *all* exporting firms), because of traditional relative price effects; b) an accentuation of import competition because of trade liberalisation, what is more likely to affect firms that are exposed to competition (i.e. tradable firms that do not export). Since (b) is not the case of the firms analysed in the present article, we will concentrate in the currency appreciation, which affect all tradable firms and include our exporting defined firms.

We can effectively observe the unfavourable evolution of relative prices for tradable firms in figure 5.1, what enhance a process of profit squeeze for those firms[16]. Actually, due to the real exchange appreciation, firms selling tradable goods experienced difficulties to maintain their profitability levels[17] what diminished their cash flows. As a consequence, firms' balance sheet positions

[16] The idea that liberalisation process enhances tradable firms' profit squeeze have been verified by Ros and Lustig (2000) for Mexico, a country that shows several similarities with Argentinean economy during the 1990s, in particular related to the financial liberalisation process and the real exchange rate appreciation.

[17] A complementary support can be found in data presented by Basualdo (2000), where he analyses relative profitability evolution for aggregate production sectors (of first two hundred firms). He observes that industrial sectors had been penalised comparing to service sectors (particularly, recently privatised firms) and holdings (conglomerates of diversified economic activities), both groups enjoy from higher profitability levels. We argue that, if industrial sectors show a remarkably profit deterioration for larger firms (which are likely to be less financial constraints), similar situation can be applied to the rest of Argentinean productive sector.

deteriorated, which negatively affected their access to external finance and worsened their investment capacity. In other words, during the Convertibility period characterised by currency appreciation, firms from tradable sector had to deal with both diminishinginternal funds as well as a more difficult access to external finance (not only in the quantity but also in the conditions to obtain loans from bank).[18]

In practice, a lender takes into account the future profitability of a borrower at the moment of evaluating its future repayment capacity. In a context of real exchange appreciation and profit squeeze for tradable firms, it is logic for banks to perceive a weakness of potential profits and penalise tradable firms with respect to non-tradable ones. Interestingly, we detect this at a macroeconomic level in Argentinean data in Table 5.1, where tradable sectors reduced their weight in bank's credit distribution to the private sector during the 1990s.

Finally, we observe the sectoral evolution of investment as an indirect way of addressing financial constraints questions, using imported capital goods as a proxy for investment.[19] Figure 5.2 confirms our central idea: sector N largely increased their share of capital goods imports, which grew from 50% in 1991 to around 70% at the end of the decade.

6. Conclusions

In this paper we carried out empirical work using an unbalanced panel built on balance sheets of 74 large firms over 40 quarters, covering the Convertibility period in Argentina (1992-2001). We start estimating an investment equation using three different econometric techniques (RE, FEW and IV) obtaining the following result: exporters are more financially constrained, as suggested by the positive and significant value of their coefficient representing internal finance (cash flow estimator). To further explore this puzzling outcome, we estimate a second set of regressions working only with a sample of exporting firms, which confirmes our previous results.

Future research might follow two possible paths. First, our explorative estimation calls for a more detailed study of explanations about larger financial constraints for exporters. Second, the analysis needs to be extended to explore the potential macroeconomic consequences of exportable firms' financial constraints, especially in relation to Argentina's historical external constraints[20].

Indeed, the importance of financial constraints becomes even more important if we take into account the possibility of "financial accelerator" mechanisms (Bernanke and Gertler 1989; Bernanke, Gertler

[18] For broader analysis of peso appreciation consequences over Argentinean economy, particularly related to an "anti-export" bias on firms' investment behaviour, see Bonvecchi and Porta (2003).

[19] This is an often used proxy in Argentina since: a) there is no direct measure of capital stock by sector at a macroeconomic level; b) machinery and equipment goods experienced a drastically trade liberalisation and thus investment during the 1990s has been largely driven by imports.

[20] External constraint notion focuses on Argentinean constant need of foreign exchange inflows in order to reach a sustainable growth path without falling in a balance of payments crisis.

et al. 1996; Bernanke, Gertler et al. 1999). When firms experience important financial constraints, an initial shock tends to be reinforced at a firm level and then propagated to the macro sphere, which leads to a downturn of aggregate investment and production. This propagation phenomenon to the economy as a whole would be deeper the larger is the share of financially constrained firms in the economy. Therefore, investment, production and export at aggregate level will be affected.[21]

As a consequence, stronger financial constraints on exporters would not only reduce investment and production, but also undermine the capacity of the economy to face eventual external shocks.[22] This result is key to the Argentine economy for two reasons: on the one hand, Argentina is a country that has suffered recurrent balance of payments crises in the past fifty years and, on the other hand, the fast growing external debt during the 1990s has seriously tightened its external constraints.

References

Anderson, T. W. and C. Hsiao (1981). "Estimation of Dynamic Models with Error Components." Journal of the American Statistical Association **76**(375): 598-606.

Arellano, M. and S. Bond (1991). "Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." Journal of Economic Studies **58**: 227-297.

Arza, V. (2003). "Macroeconomic uncertainty, innovation and financial Constraints in Argentina during the 1990s." Mimeo. SPRU. University of Sussex.

Athey, M. J. and S. Fazzari (1987). "Asymmetric information, financing constraints and investment'." Review of Economics and Statistics **69**(3): 481-487.

Athey, M. J. and P. S. Laumas (1994). "Internal Funds and Corporate Investment in India." Journal of Development Economics **45**: 287-303.

Basualdo, E. (2000). "Concentración y centralización del capital en la Argentina durante la década del noventa". Buenos Aires, FLACSO/Universidad de Quilmes/IDEP.

Bernanke, B. and M. Gertler (1989). "Agency Costs, Net Worth, and Business Fluctuations." American Economic Review **79**(1): 14-31.

Bernanke, B., M. Gertler, et al. (1996). "The Financial Accelerator and the Flight to Quality." Review of Economics and Statistics **78**(1): 1-15.

Bernanke, B., M. Gertler, et al. (1999). "The Financial Accelerator in a Quantitative Business Cycle Framework" Handbook of Macroeconomics. T. e. Woodford, Elsevier. **1**.

Bond, S. and J. Van Reenen (2003). Microeconometric Models of Investment and Employment. Institute for Fiscal Studies. London.

Bonvecchi, C. and F. Porta (2003). "Componentes macroeconómicos, sectoriales y microeconómicos para una estrategia nacional de desarrollo. Las condiciones de consistencia micro/macroeconómicas." Buenos Aires, CEPAL-ONU Buenos Aires-BID 925/OC-AR.

Boyer, R., M. Dehove, et al. (2004). Les crises financières - Analyses et propositions. Paris, La Documentation Française.

[21] Financial accelerator mechanism can become visible in the pro-cyclicity of certain variables, as country risk or credit availability. And this risk premium pro-cyclicity, together with credit procyclicity, are actually at the very heart of several financial crises during the 1990s (Boyer, Dehove and Plihon 2004: 53).

[22] For a detailed analysis of macro-micro interactions, which link notions of competitiveness, sustainability of current account equilibrium and stability of aggregate economic activity, see Fanelli (2003).

In a more general framework for emerging countries, Kalantzis (2005) proposes a theoretical model where financial fragility emerges from the economy productive structure, i.e. the relative size of non-tradable and tradable sectors.

Chirinko, R. S. (1993). "Business Fixed Investment Spending : Mosdeling Strategies, Empirical Results, and Policy Implications." Journal of Economic Literature **31**(4): 1875-1911.

Devereux, M. and F. Schiantarelli (1989). "Investment, Financial Factors and Cash Flow: Evidence from Uk Panel Data." NBER WP No. 3116: 1-41.

Fanelli, J. M. (2003). "Macro-Micro interactions, competitiveness and sustainability. Development Economics and Structuralist Macroeconomics." Essays in Honor of Lance Taylor. A. K. Dutt and J. Ros. Northampton, Massachussetts, Edward Elgar**:** 282-304.

Fanelli, J. M., R. Bebczuk, et al. (2002). "Determinants and Consequences of Financial Constraints Facing Firms in Argentina." Inter-American Development Bank Working Paper #R-453.

Fazzari, S. and T. L. Mott (1986-7). "The Investment Theories of Kalecki and Keynes: An Empirical Study of Firm Datz, 1970-1982." Journal of Post Keynesian Economics **9**(2): 71-187.

Fazzari, S. M., R. G. Hubbard, et al. (1988). "Financing Constraints and Corporate Investment." Brookings Papers on Economic Activity **1**: 141-206.

Fazzari, S. M. and B. C. Peterson (1993). "Working Capital and Fixed Investment: New Evidence on Financing Constraints." The RAND Journal of Economics **24**(3): 328-342.

Gallego, F. and N. Loayza. (2000)."Financial Structure in Chile: Macroeconomic Development and Microeconomic Effects." *Financial Structure and Economic Development- Central Bank of Chile.*

Ganesh-Kumar, A., K. Sen, et al. (2001). "Outward Orientation, Investment and Finance Constraint: A Study of Indian Firms." The Journal of Development Studies **37**(4): 133-149.

Gertler, M. and S. Gilchrist (1994). "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms." Quarterly Journal of Economics **109**(2): 309-340.

Gertler, M. L. and R. G. Hubbard (1989). "Financial Factors In Business Fluctuations." National Bureau of Economic Research Working Paper(2758): 1-59.

Gilchrist, S. and C. Himmelberg (1995). "Evidence on the role of cash flow for investment." Journal of Monetary Economics **36**: 541-572.

Green, W. H. (2003). Econometric Analysis, New Jersey: Prentice-Hall, Inc.

Hermes, N. and R. Lensink (1998). "Banking Reform and the Financing of Firm Investment: An Empirical Analysis of the Chilean Experience, 1983-92." The Journal of Development Studies **34**(3): 27-43.

Hubbard, G. (1998). "Capital-Market Imperfections and Investment." Journal of Economic Literature **36**: 193-225.

Kalantzis, Y. (2005). "Désindustrialisation et crise financière dans une économie émergente." Revue Economique.

Mairesse, J., B. Mulkay, et al. (2001). "Investissement des entreprises et contraintes financières en France et aux Etats-Unis." Economie & Statistique (341-342): 67-84.

Ndikumana, L. (1999). "Debt Service, Financing Constraints, and Fixed Investment: Evidence from Panel Data." Journal of Post Keynesian Economics **21**(3): 455-478.

Ros, J. and N. C. Lusting (2000). "Macroeconomic Consequences and Social Impacts in Mexico during the 1990s." CEPA Working Paper Series I, No. 18. New York**:** 1-37.

Sevestre, P. (2002). Econométrie des données de panel. Paris, Dunod.

Stiglitz, J. and A. Weiss (1981). "Credit Rationing in Markets with Imperfect Information." American Economic Review. **71:** 393-410.

Taylor, L. (1998). "Market crises: Liberalisation, Fixed Exchange Rates and Market Driven Destabilisation." Cambridge Journal of Economics **22(6)**: 663-76.

Tornell, A. and F. Westermann (2002). "Boom-Bust Cycles in Middle Income Countries: Facts and Explanation." NBER Working Paper No. 9219: 1-45.

Tornell, A. and F. Westermann (2003). "Credit Market Imperfections in Middle Income Countries'." NBER Working Paper N° 9737: 1-29.

Appendix:
Tables and Figures

Table 3.1: Number of firms on database per year

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	**43**	**47**	**51**	**56**	**58**	**61**	**62**	**64**	**63**	**60**
Exporters	***40***	***42***	***42***	***45***	***45***	***48***	***47***	***44***	***43***	***40***
Non-Exporters	***3***	***5***	***9***	***11***	***13***	***13***	***15***	***20***	***20***	***20***

Table 3.2: Sample Summary Statistics (1992-2001)

	Exporting Firms		Non-Exporting Firms	
	median	mean	median	mean
Cash Flow over Capital Stock	3,6%	4,9%	5,1%	5,4%
Investment over Capital Stock	2,2%	3,2%	2,2%	3,7%
Total Debt over Capital Stock	100%	110%	65%	101%
Short Term Debt over Total Debt	79%	72%	47%	51%
Sales over Capital Stock	31%	43%	14%	31%
Working Capital over Capital Stock	18%	35%	-7%	-4%
Retained Earnings over Cash Flow (*)	0%	16%	0%	22%

(*) The fact that median values of the retained earnings over cash flow ratio are equal to zero gives an idea of the proportion of firms that do not distribute dividend, probably in order to finance investment with internal funds.

Figure 3.1: *Cash Flow* over Capital Stock (median, 1992-2001)

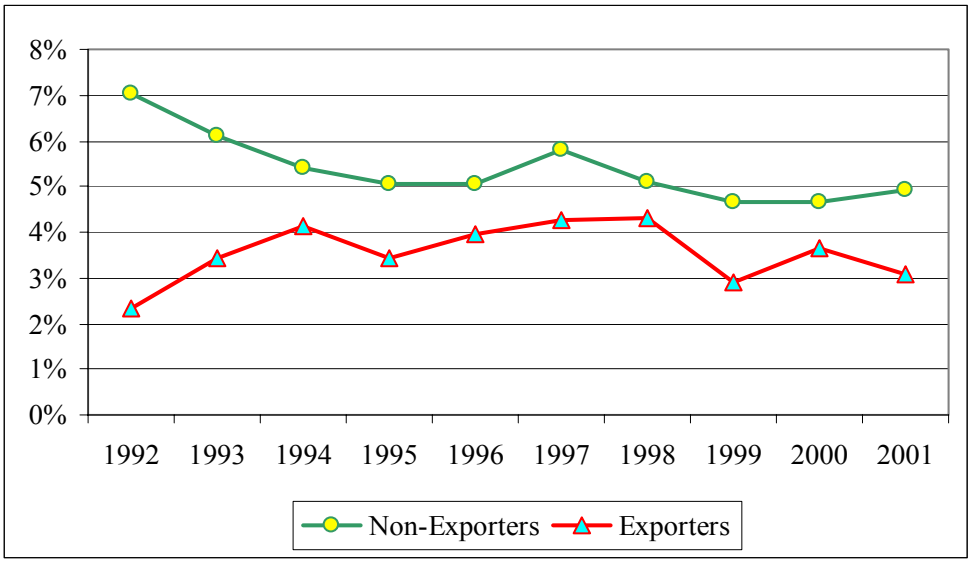


Figure 3.2: Investment over Capital Stock (median, 1992-2001)

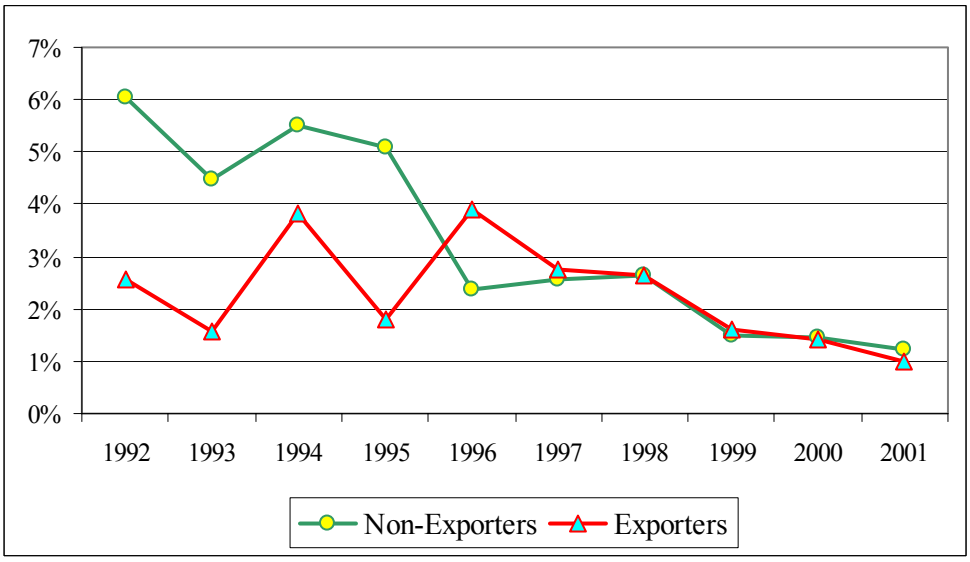


Figure 3.3: Total Debt over Capital Stock (median, 1992-2001)

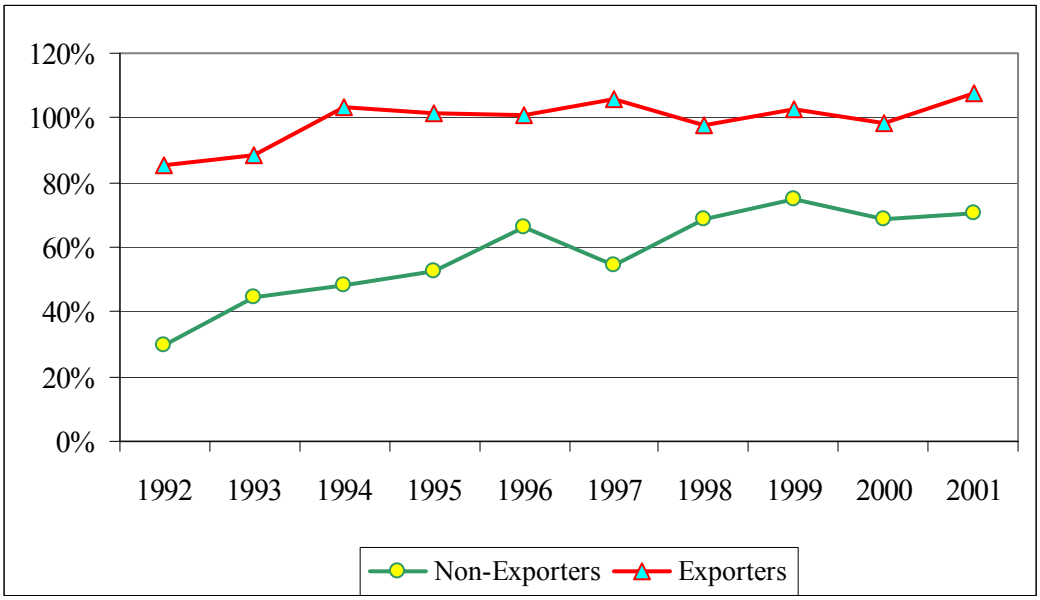


Figure 3.4: Short Term Debt over Total Debt (median, 1992-2001)

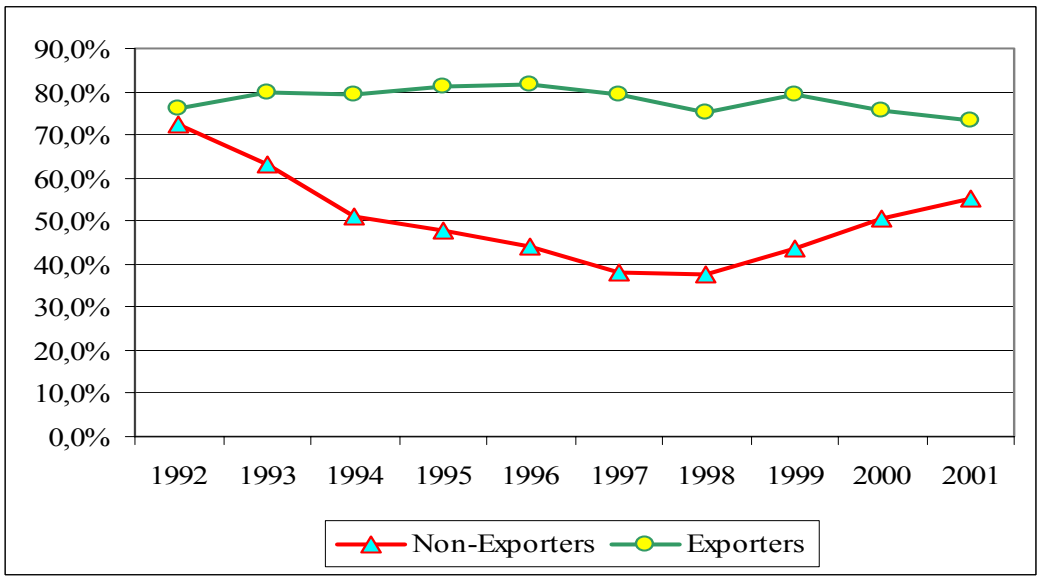


Table 4.1: (a) Equation [1] without Tobin's Q, (b) Equation [1] including Tobin's Q

Dependent Variable	Investment over Capital Stock						Investment over Capital Stock					
Technique	RE		FEW		IVFE		RE		FEW		IVFE	
Independent Variables	Coeff.		Coeff.		Coeff.		Coeff.		Coeff.		Coeff.	
CF over Capital Stock *Exporters*	0,037	***	0,034	***	0,114	***	0,057	***	0,045	**	0,221	***
	(0,010)		(0,010)		(0,046)		(0,021)		(0,023)		(0,815)	
CF over Capital Stock *Non Exporters*	-0,025	***	-0,014	*	-0,024		-0,026	***	-0,016	*	-0,046	**
	(0,005)		(0,008)		(0,022)		(0,006)		(0,009)		(0,022)	
Tobin's Q							0,002	***	0,002	**	0,000	
							(0,001)		(0,001)		(0,001)	
Lag of Sales over Capital Stock	0,029	***	0,030	***	0,095	***	0,023	***	0,026	***	0,090	***
	(0,005)		(0,006)		(0,019)		(0,006)		(0,008)		(0,020)	
Δ Working Capital over Capital Stock	-0,022	***	-0,024	***	-0,051	***	-0,037	***	-0,038	***	-0,047	***
	(0,005)		(0,005)		(0,008)		(0,006)		(0,006)		(0,008)	
Total Debt over Capital Stock	0,016	***	0,026	***	0,037	***	0,019	***	0,028	***	0,031	***
	(0,005)		(0,007)		(0,012)		(0,006)		(0,009)		(0,011)	
Total Debt over Capital Stock, square	-0,004	***	-0,005	***	-0,009	***	-0,005	**	-0,006	***	-0,007	***
	(0,001)		(0,002)		(0,003)		(0,002)		(0,002)		(0,003)	
Number of Observations	2049		2049		1081		1427		1427		1192	
Joined Significance	751,97	***	12,23	***	840,25	***	281,04	***		***	891,65	***
Hausman test	104,3	***					98,12	***				
Sargan Test					20,081						14,254	
P-Sargan Test					*0,128*						*0,285*	
F-Test CF*T=CF*NT	37,57	***	7,93	***	6,91	**	27,96	***	3,76	**	13,7	***

Standard errors appear in parentheses. *** Significant at 1%. ** Significant at 5%. * Significant at 10%.

We instrument cash flow, lagged sales and variation of working capital using four lags of cash flow, three lags of lagged sales, actual working capital and two lags of this variable, two lags of Tobin's Q, two lags of expenditures taken from balance sheet, twelve sectoral dummies and independent variables from investment equation.

Table 4.2 (a) Equation [2] without variation of working capital and without Tobin's Q, (b) Equation [2] without Tobin's Q, (c) Equation [2]

Dependent Variable	Investment over Capital Stock						Investment over Capital Stock						Investment over Capital Stock					
Technique	RE		FEW		IVFE		RE		FEW		IVFE		RE		FEW		IVFE	
Independent Variables	Coeff.		Coeff.		Coeff.		Coeff.		Coeff.		Coeff.		Coeff.		Coeff.		Coeff.	
CF over Capital Stock	0,082	***	0,061	**	0,187	***	0,095	***	0,077	***	0,232	***	0,083	***	0,072	**	0,300	***
	(0,022)		(0,024)		(0,057)		(0,022)		(0,024)		(0,088)		(0,028)		(0,031)		(0,101)	
Lag of Sales over Capital Stock	0,028	***	0,031	***	0,070	***	0,029	***	0,031	***	0,084	***	0,029	***	0,028	***	0,085	***
	(0,006)		(0,007)		(0,015)		(0,006)		(0,007)		(0,009)		(0,007)		(0,009)		(0,023)	
Tobin's Q													0,002	*	0,002	*	-0,002	
													(0,001)		(0,001)		(0,002)	
Δ Working Capital over Capital Stock							-0,027	***	-0,029	***	-0,064	***	-0,038	***	-0,040	***	-0,062	***
							(0,005)		(0,005)		(0,021)		(0,007)		(0,007)		(0,010)	
Total Debt over Capital Stock	0,016	**	0,028	***	0,034	***	0,016	**	0,026	***	0,023	*	0,020	**	0,029	***	0,027	**
	(0,006)		(0,009)		(0,011)		(0,006)		(0,009)		(0,012)		(0,008)		(0,011)		(0,013)	
Total Debt over Capital Stock, square	-0,004	**	-0,007	***	-0,008	***	-0,004	**	-0,007	***	-0,008	***	-0,006	***	-0,008	***	-0,008	**
	(0,002)		(0,002)		(0,003)		(0,002)		(0,002)		(0,003)		(0,002)		(0,003)		(0,003)	
Number of Observations	1596		1596		1280		1596		1596		976		1159		1159		901	
Joined Significance	546,39	***	8,340	***	842,51	***	565,31	***	9,42	***	734,20	***	398,16	***	7,25	***	716,74	***
Hausman test	38,97	**					67,29	***					39,67	**				
Sargan Test					20,72						11,526						10,380	
P-Sargan Test					*0,146*						*0,117*						*0,168*	

Standard errors appear in parentheses. *** Significant at 1%. ** Significant at 5%. * Significant at 10%.

a) We instrument cash flow and lagged sales using four lags of cash flow, four lags of lagged sales, two lags of operational result, two lags of expenditures taken from balance sheet, twelve sectoral dummies and independent variables from investment equation.

b) et c) We instrument cash flow, lagged sales and variation of working capital using four lags of cash flow, three lags of lagged sales, actual working capital and two lags of this variable, two lags of Tobin's Q, twelve sectoral dummies and independent variables from investment equation.

Table 4.3: (a) Equation [3] without liquid assets, (b) Equation [3] including liquid assets

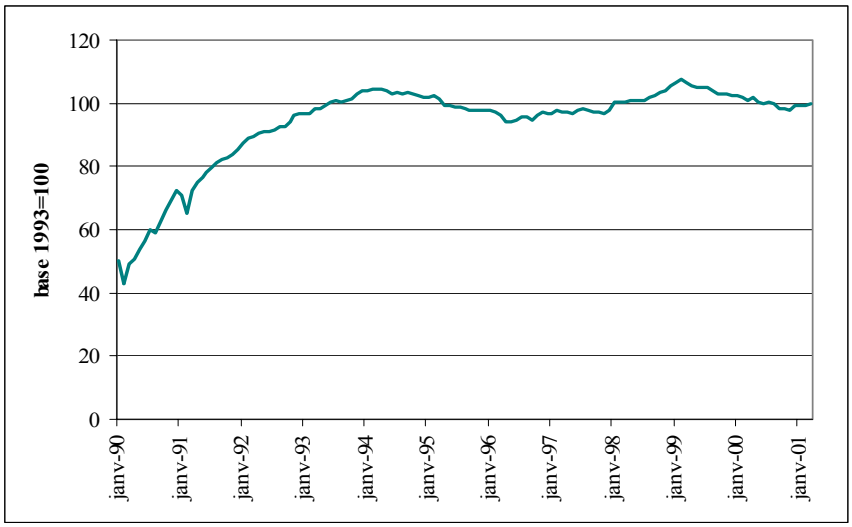
Dependent Variable	Investment over Capital Stock						Investment over Capital Stock					
Technique	RE		FEW		IVFE		RE		FEW		IVFE	
Independent Variables	Coeff.		Coeff.		Coeff.		Coeff.		Coeff.		Coeff.	
CF over Capital Stock	0,082	***	0,057	*	0,270	***	0,096	***	0,070		0,456	***
	(0,027)		(0,030)		(0,071)		(0,027)		(0,030)		(0,076)	
Tobin's Q	0,002	*	0,002	**	0,001		0,001		0,001		-0,001	
	(0,001)		(0,001)		(0,008)		(0,001)		(0,001)		(0,001)	
Liquid Assets over Capital Stock	0,026	***	0,032	***	0,044	***						
	(0,005)		(0,006)		(0,008)							
Total Debt over Capital Stock	0,024	***	0,032	***	0,032	***	0,025	***	0,034	***	0,034	***
	(0,008)		(0,010)		(0,011)		(0,008)		(0,011)		(0,012)	
Total Debt over Capital Stock, square	-0,006	***	-0,009	***	-0,008	***	-0,006	***	-0,008	***	-0,007	**
	(0,002)		(0,003)		(0,003)		(0,002)		(0,003)		(0,003)	
Number of Observations	1169		1169		1097		1169		1169		1101	
Joined Significance	365,48		7,32	***	774,26	***	350,1	***	6,23	***	78,18	***
Hausman test	41,82	***					36,92	**				
Sargan Test					9,609						4,88	
P-Sargan Test					*0,142*						*0,181*	

Standard errors appear in parentheses. *** Significant at 1%. ** Significant at 5%. * Significant at 10%.

a) We instrument cash flow using four lags of cash flow, twelve sectoral dummies and independent variables from investment equation.

b) We instrument cash flow and liquid assets using four lags of cash flow, four lags of liquid assets, twelve sectoral dummies and independent variables from investment equation.

Figure 5.1: Consumption Price Index/ Producer Price Index (*proxy* of Non-tradable Sector Price /Tradable Sector Price)



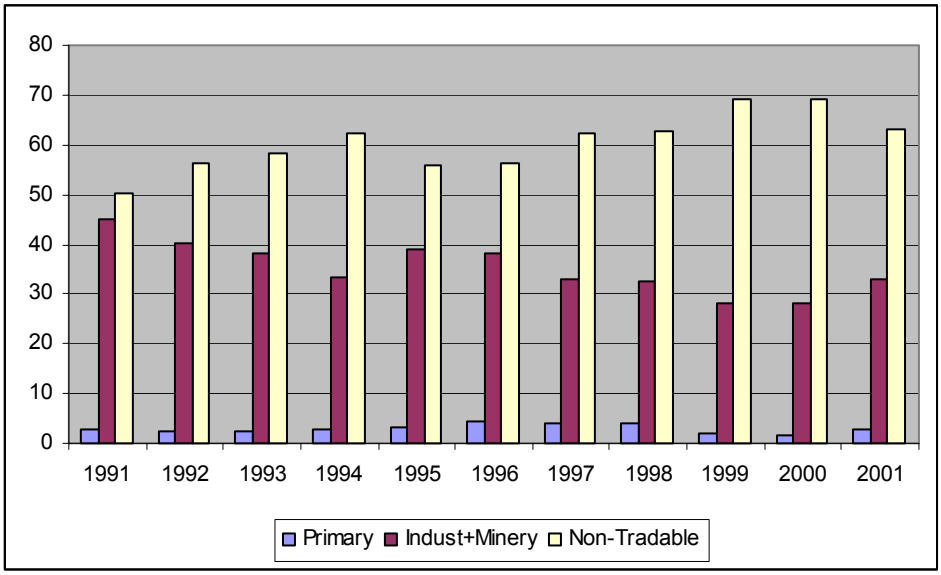
Source: Authors' calculation based on INDEC data, Argentina

Table 5.1: Distribution of bank loans to private sector (excluding household) 1991-2001 (%)

	Primary Production	Manufacuring Industry	Services, Retailed Trade and others
1990	13,8	36,7	49,5
1991	16,7	31,3	52,0
1992	17,4	28,4	54,3
1993	16,3	25,6	58,2
1994	15,3	25,6	59,1
1995	14,8	26,7	58,5
1996	13,4	28,2	58,4
1997	13,5	26,9	59,5
1998	14,0	25,5	60,5
1999	13,9	25,0	61,1
2000	13,9	19,7	66,4
2001	17,3	19,6	63,1

Source: Authors' calculation based on data of Argentinean Central Bank (BCRA)

Figure 5.2: Capital Goods Imports by Sectors (%)



Source: Authors' calculation based on data of Argentinean Ministry of Economy

Non-tradable sectors include: Electricity; Gas and Water; Construction; Retailed Trade, Bank and Insurances; Communications; Health; Research.