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Speculative and Entrepreneurial Behaviour: a Study of Micro-Economic Sustainability in Argentina During the 1990s

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Abstract

This paper sheds light on microeconomic sustainability after complete financial liberalisation was implemented in Argentina during the 1990s. Inspired by Keynes and Minsky, we estimate an investment model that accounts for financial constraints using panel data for Argentina during the 1990s. The main conclusion of the study is that there was an increase in speculative behaviour which was unconnected to entrepreneurial behaviour based on investment in fixed assets. Over the decade, the number of speculative firms increased. Moreover, these firms increased their debt burden, particularly with financial institutions. However, they did not use these funds to invest in fixed assets.

Introduction

Financial market liberalisation has been the most controversial policy among those included in the agenda of the Structural Adjustment Plans developed in the late 1980s for Latin American countries. On the one hand, it was claimed that financial liberalisation would promote domestic financial development, which would enhance efficiency in credit allocation. Credit would thus be better directed to productive activities, which in turn would contribute to long-term growth. On the other hand, it was also suggested that financial liberalisation could motivate short-term speculative behaviour, which would boost financial fragility, thus increasing the risk of financial (and currency) crises.

This paper contributes to this debate. However, it is not our intention to evaluate the benefits/drawbacks of financial liberalisation, which would require more data. Rather, our goal is to analyse firms' financial and investment behaviour in an economy that has undertaken complete financial liberalisation. In particular, we analyse to what extent microeconomic behaviour may have contributed to long-term sustainability.

Our case study is of Argentina after the financial liberalisation carried out in 1992 in the context of the Convertibility Plan. We aim to answer two main questions: 1) How and why did speculative behaviour evolve after financial liberalisation? 2) What was the relation (if any) between speculative and entrepreneurial behaviour?

We use Minsky (1982, 1986) to create a taxonomy that classifies firms according to their degree of speculative behaviour. As far as we are aware, this is the first time that Minsky's taxonomy has been used empirically at a micro-level of analysis. We apply this taxonomy to a panel of firms

listed on the Buenos Aires Stock Exchange to investigate the evolution of speculative behaviour over the period 1992-2001. In parallel, we discuss Keynes' distinction between speculative and entrepreneurial behaviour, and frame the discussion empirically using an investment model that considers financial constraints.

The main conclusion of the study is that there was an increase in speculative behaviour in Argentina during the 1990s, which was unconnected to an entrepreneurial form of behaviour based on investment in fixed assets. The results therefore cast doubt on the long-term sustainability of the chosen growth path of Argentina during the 1990s, at a microeconomic level of analysis.

The article is organised into five sections. Section 2 contextualises the discussion by presenting a short description of the macroeconomic situation of Argentina during the 1990s. Section 3 develops our theoretical framework based on Keynes (1936) and Minsky (1975, 1982, 1986). Section 4 presents the methodology, which includes both the operationalisation of Minsky's taxonomy and the discussion of the investment model that accounts for financial constraints using that taxonomy. Section 5 first presents some descriptive statistics that characterise the evolution of financial behaviour for firms included in our panel, and then the results of the econometric estimation of the investment model. Finally, Section 6 sets out the conclusion.

2. Argentina's new institutional and economic context

This study covers the period 1992-2001, which is delimited by two major economic crises: hyperinflation in 1990 and the peso crisis of 2001. The limits were chosen so as to include the period under the Convertibility Plan after financial liberalisation.

In April 1991 the Convertibility Plan was launched. This plan was created under the Structural Adjustment Programmes which largely respected the spirit of what was known as the Washington Consensus. The major economic reform was the implementation of a currency-board regime and, particularly important to our study, the Basel agreements on financial liberalisation were fully observed (e.g. there were no restrictions on capital movement and Foreign Direct Investment was given equal treatment).

The Convertibility Plan succeeded in controlling inflation and in stabilising the national currency. The economic establishment, both nationally and also internationally, celebrated these policy reforms. As a result, the country soon received an increased level of capital inflow and the GDP grew at an annual cumulative rate of 3.2% (with some years of 8% growth rate).

Such a process of growth and financial liberalisation was accompanied by macroeconomic financial fragility and vulnerability, which was claimed to be at the heart of the explanation for the 2001 crisis (Fanelli, 2002, Frenkel, 2003a, b). A large and increasing foreign debt was one key feature of Argentina's financial fragility, with *private* foreign debt rising at a higher rate. Moreover, some authors suggest that financial fragility was also related to currency and maturity mismatches between liabilities and assets (Fanelli, 2002: 32-39).

In this paper we support this vulnerability hypothesis, but from a microeconomic point of view. We conclude that firms' financial behaviour was increasingly speculative during the convertibility period, which on the one hand weakened firm balance sheets and on the other hand prevented them from adopting a more entrepreneurial longer-term behaviour based on productive investment.[1]

3. From Keynes to Minsky: a theoretical framework to analyse firms' speculative and investment behaviour

The finding that there was an increase in speculative activity in Argentina after financial liberalisation can find theoretical support from the main ideas of Minsky. He argues that speculative behaviour is a structural feature of market economies, with financial markets being a clear source of intrinsic economic instability (Minsky, 1975: 128). He suggests that the normal dynamics of a capitalist system increase financial opportunities, which in turn enhance speculative behaviour by firms. This happens essentially due to two main factors.

Firstly, during booms there is a widespread undervaluation of risks from both firms asking for loans and banks offering them. Consequently, the economy goes through a rapid indebtedness process, which accentuates financial fragility and increases the debt-investment ratio[2].

Secondly, since banks "are in business to maximise profits" and "their profits result from charging for funds they make available" (Minsky, 1986: 229-30), they are greedy for agents' liquidity. In the aftermath of a recession, firms recompose their balance sheets and enjoy an increased ratio of cash flow to debt. This excess of firms' liquidity appeals to banks, which are then particularly willing to provide firms with fresh funds.

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[1] This claim supports the contention that firms' behaviour was largely over-defensive during the 1990s, as has been put forward, in the case of Latin America, by Cimoli and Katz (2003), and for Argentina, in particular, by Arza (2005). Furthermore, Lo Vuolo (2003) has argued that firms in Argentina were particularly prone to following speculative strategies during the Convertibility period, possibly motivated by the newly created, and widely available, financial opportunities.

[2] In practice, financial crises were preceded by a process of deep indebtedness .It is worth noting that "'over-lending' and 'over-borrowing' were basically *endogenous* market failures of [international] over-liquid and under-regulated markets" (Palma, 1998: 804).

Therefore, boom periods trigger an expansion of the supply of funds, which in certain circumstances could boost speculative activities. Our contention is that this likely increase in speculative activity is bound to have real consequences for the economy and might feed into an unsustainable economic process. We support this hypothesis using Keynes' distinction between speculative and entrepreneurial behaviour. If speculation prevents entrepreneurship, then growth will not have real support.

Keynes understood speculation as "the activity of forecasting the psychology of the market" (Keynes, 1936: 158). In fact, Chapter 12 of Keynes's *General Theory* is devoted to explaining the intrinsic difference between speculative and entrepreneurial behaviour, since they imply two different logics. Speculators are interested in foreseeing the future price of assets and aim to reproduce their liquid assets at the expense of the wealth of others. Entrepreneurs are more concerned with the evaluation of future profitability attached to current investment (i.e. evaluation of "prospective yields"), and aim to create new wealth by investing productively.[3]

Speculative behaviour is short-term by nature. It is also highly flexible and opportunistic: it does not commit to any particular activity; it is by definition 'unrooted'. Therefore, where *Speculators* have the slightest suspicion that macroeconomic conditions are changing (whether well-founded or not), they will not hesitate to switch activities. In contrast, entrepreneurs are embedded in their course of action. Their behaviour cannot change dramatically: it is 'path dependent'[4].

These differing levels of commitment to their activities plus the important difference in functions – speculation based on re-distribution of wealth and entrepreneurship based on production of wealth – justify the claim of this paper that there was an increase of speculative behaviour in Argentina during the 1990s, which to some extent prevented entrepreneurial behaviour. This situation triggered the adoption of a growth path that was unsustainable *also* from a microeconomic point of view.

Theoretically, we justify the validity of this claim using the Keynes-Minsky framework. From Minsky we expect an increase in speculative opportunities in Argentina during the 1990s due to the newly established macroeconomic policies. From Keynes we expect this increase in speculation to militate against entrepreneurial behaviour (Keynes: 1936: 159). Empirically, we rely on Minsky, who operationalised the concept of speculation at the firm level by relating prospective yields to payment commitments (Minsky, 1982: 20-24, 1986: 203-207).[5]

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[3] This is also in line with Schumpeter's (1939: Ch 3 Vol 1) definitions of financial and entrepreneurial functions.

[4] These ideas follow Carlota Perez's very interesting discussion on the functions of financial and production capital and their roles in technological revolutions (Perez, 2002).

[5] As already mentioned in the introduction, although the Minsky framework has been used to analyse the increase in speculation in developing countries at a macroeconomic level, both theoretically and empirically (See for instance

4. Methodology

4.1 The Minsky Taxonomy

Conceptualisation

We use Minsky (1982, 1986), to classify firms into *Hedge*, *Speculative*, and *Ponzi* types. According to the author, for *Hedge* finance to exist "cash in must exceed payment commitments" (Minsky, 1982: 20). *Speculative* finance occurs when the "firm can fulfil its payment commitments only as it runs down its monetary assets or succeeds in placing new debts" (Minsky, 1982: 22). Therefore, firms engaged in *Speculative* finance are highly dependent on the full functioning of financial markets and are very sensitive to changes in the interest rate. Finally, there is a particular kind of *Speculative* finance, called *Ponzi* finance, which is even more vulnerable to changes in interest rates as such firms cannot validate their liability in most cases.

Accordingly, we apply *Hedge* finance to those situations where cash flows are sufficient to cover payment commitments (defined as short-term liabilities plus interest payments due to these liabilities[6]) and *Speculative* when they are insufficient. *Ponzi* finance is a special category within *Speculative* finance and involves those situations where cash flows are insufficient to even cover interest commitments.

Operationalisation

In order to classify firms in every period, we use a five-period moving average on quarterly information for cash flows and short-term liabilities and interest rates. The following equations define the taxonomy per quarter period:

First, if

$$\sum_{m=-2}^{2} CF_{t+m} - \sum_{m=-2}^{2} \frac{STD_{t+m}}{5} - \sum_{m=-2}^{2} ir \times STD_{t+m} \geq 0$$

Arestis and Glickman, 2002, Foley, 2003, Kregel, 1998, Palma, 2000, Schroeder, 2002), we are not aware of any other study that used a Minskyan approach at a microeconomic level.

[6] We did not include long-term liabilities or interest commitment on long-term debt because further assumptions for using the data empirically were required (e.g. when was the debt borrowed?, what was the interest rate at that time?, how did firms commit to repaying the main capital and the interest?, etc.). By considering only the short-term, we may be under-estimating the importance of *Speculative* and *Ponzi* finance.

then the firm adopts a *Hedge* finance in quarter t.

Second, if

$$\sum_{m=-2}^{2} CF_{t+m} - \sum_{m=-2}^{2} \frac{STD_{t+m}}{5} - \sum_{m=-2}^{2} ir \times STD_{t+m} < 0$$

but

$$\sum_{m=-2}^{2} CF_{t+m} - \sum_{m=-2}^{2} ir \times STD_{t+m} \geq 0$$

then the firm adopts a *Speculative* finance in quarter t.

Finally, if

$$\sum_{m=-2}^{2} CF_{t+m} - \sum_{m=-2}^{2} \frac{STD_{t+m}}{5} - \sum_{m=-2}^{2} ir \times STD_{t+m} < 0$$

and

$$\sum_{m=-2}^{2} CF_{t+m} - \sum_{m=-2}^{2} ir \times STD_{t+m} < 0$$

then the firm adopts *Ponzi* finance in quarter t.

Where

CF   =   Cash Flow = Dividends + Depreciation
ir   =   Nominal Lending Interest Rate
STD   =   Short Term Debt

We call this classification the Minsky *finance* taxonomy. As can be seen, this taxonomy allows firms to switch their financial behaviour over time, which is useful for showing to what extent changes in the financial situation are related to macroeconomic changes.

However, in order to analyse differences in long-term investment behaviour across financial typologies during the Convertibility period, we also need to define a *firm* taxonomy that remains

fixed over that historical period. We do this by taking the mode of the Minsky *finance* taxonomy just noted *per firm*, which we call the Minsky *firm* taxonomy. For instance, *Hedge* firms are those that cover their payment commitments using their cash flows in the majority of time periods according to the available information.

4.2 A model of investment behaviour

A rationale for the existence of financial constraints: using the Minsky taxonomy

We estimate an investment equation and compare the role of cash flows for the groups defined in the *Minsky firm* taxonomy.

Investment in new machinery involves a high degree of non-reversibility features (in contrast, for instance, to portfolio investment). Therefore, when deciding whether to invest or not, a firm and its creditor have to balance the latent risk of non-liquidity. This is the reason why cash flows become a relevant source of information. In particular, the more uncertain the context is, the more difficult the calculation of future returns and the more relevant firms' net worth to raise external finance both become (Keynes, 1936); (Kalecki, 1969); Minsky (1975, 1982, 1986).[7]

There is a comprehensive list of empirical studies that have actually found a positive impact of cash flows on investment decisions (see endnote 8, below). This study provides further empirical evidence to support these views. In particular, from a Keynesian point of view, we claim that uncertainty might be the main reason for the existence of financial constraints.

The novelty of our approach is that we acknowledge a relation between uncertainty and financial behaviour. We claim that *Speculative* (and *Ponzi*) firms are more affected by uncertainty and therefore are likely to be more constrained in financial markets.

In fact, the more speculative the firm is, the more vulnerable it becomes to changes in money market conditions. A change in the interest rate could reverse the value of the firm because commitments become larger and the capitalised value of the firms becomes lower. This is valid for *Speculative* and *Ponzi* firms, which have payment commitments that are larger than expected income, but not for the *Hedge* units.

In essence, we are adding new meaning to the traditional Keynesian opposition between speculative and entrepreneurial behaviour. *Speculative* firms are expected to be more constrained in financial markets, therefore, making it unlikely that they will invest in fixed assets. On the one

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[7] From a neoclassical point of view, the opportunity cost of using internal or external funds should be the same (Modigliani and Miller, 1958), and we should not expect any influence of cash flows on investment decisions. Nevertheless, market failures have been incorporated into this theoretical framework, by introducing *asymmetric*

hand, these firms might be fully constrained in their access to long-term credit, thus they might be obliged to use their internal sources of finance for long-term investment. On the other hand, if financial institutions lend on a long-term basis, they might also request certain levels of cash flow as a signal for creditworthiness. *Hedge* firms, however, with less restricted access to external sources of finance to invest in physical assets, could engage in entrepreneurial activities more easily.

The investment equation

In order to test for financial constraints we must estimate an investment equation. The investment equation has adopted three different forms in the empirical literature: Tobin's average Q, the Euler Equation, and accelerator-investment models.

This study uses the latter type of approach for the following reasons. Firstly, using Tobin's Q would be particularly misleading for the present case study on Argentina, where the stock market has been so volatile that equity prices are not necessarily related to any stream of future profits. Indeed, theoretically and empirically, the use of Tobin´s Q has been seriously criticized in the presence of market failures (Chirinko, 1993: 1889, Hubbard and Gertler, 1998: 208) (Schiantarelli, 1996: 74).

Secondly, our assumptions on firms' behaviour contradict the assumptions underlying the Euler equation. These models present demand for capital in a neoclassical perfect capital market, where investment decisions are exclusively driven by the cost of new machinery and the cost of savings. It is our contention that an investment function dependent *only* on the cost of capital and savings *has* to be mis-specified, regardless of the existence of financial constraints.

In contrast, the accelerator-investment model relies on intuitions that are closer to a Keynesian investment function, and therefore provides a more familiar background to performing our empirical analysis. The idea behind the accelerator model is that any investment behaviour will depend on how successfully the firm observes its performance in the recent past, because as sales increase firms might wish to enlarge their production capacity. Thus, the increase in real output or sales is used to control for investment opportunities. Jorgenson concludes that, empirical evidence shows "real output emerges as the single most important determinant in the literature, especially for investment" (Jorgenson, 1971: 1141). This alternative is widely used in the literature, especially for developing countries (Arza, 2003, Athey and Laumas, 1994, Fanelli, Bebczuk, et al., 2002, Ganesh-Kumar, Sen, et al., 2001, Hermes and Lensink, 1998).

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information in the borrower-lender relationship (Stiglitz and Weiss, 1981), and thus cash flows and liquid assets become key variables in determining borrower's access to external finance.

We use cash flows as a proxy for internal funds and test their influence on investment decisions for each different group in the *Minsky firm* taxonomy discussed in Section 4.1. A common criticism of this methodology is that cash flows also account for firm profitability and therefore it might be expected that they will have a significant impact on investment even in the absence of financial constraints (Hoshi, Kashyap, et al., 1991). To address this potential drawback, most of the empirical studies split the sample into sub-samples that are designed to reflect different degrees of asymmetric information or uncertainty.[8] Checks are then made as to whether there are significant differences in the way cash flows determine investment decisions for each group. Unless there are reasons to assume that profitability has a differential impact on investment carried out by each group, empirically the criticism relating to profitability is addressed.

Our approach follows this methodological remedy. We split the sample into sub-samples according to the *Minsky firm* taxonomy, thus analysing whether different patterns of financial behaviour also show different degrees of financial constraints when investing in physical assets.

4.3 Model and Estimation Method

The general model of investment behaviour is defined as:

$$[1] \quad \frac{I_{i,t}}{K_{i,t-1}} = \alpha_1 \frac{\Delta S_{i,t}}{K_{i,t-1}} + \alpha_2 \frac{S_{i,t-1}}{K_{i,t-2}} + \alpha_3 \frac{D_{i,t}}{K_{i,t-1}} + \alpha_4 \left(\frac{D_{i,t}}{K_{i,t-1}} \right)^2 + \alpha_5 \frac{CF_{i,t}}{K_{i,t-1}} +_t \alpha_6 YearD_t + u_{i,t}$$

The model of investment behaviour to test for the existence of financial constraints becomes:

[2]

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha_1 \frac{\Delta S_{i,t}}{K_{i,t-1}} + \alpha_2 \frac{S_{i,t-1}}{K_{i,t-2}} + \alpha_3 \frac{D_{i,t}}{K_{i,t-1}} + \alpha_4 \left(\frac{D_{i,t}}{K_{i,t-1}} \right)^2 + \alpha_{5a} \frac{CF_{i,t}}{K_{i,t-1}} * H + \alpha_{5b} \frac{CF_{i,t}}{K_{i,t-1}} * S + \alpha_{5c} \frac{CF_{i,t}}{K_{i,t-1}} * P +_t \alpha_6 YearD_t + u_{i,t}$$

with $u_{i,t}$ being the error term which is twofold:

$$[3] \quad u_{i,t} = n_i + \varepsilon_{i,t}$$

n_i is the part that varies across cross-section while $\varepsilon_{i,t}$ is the unsystematic error

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[8] The first studies of the subject divided the sample according to *retained earnings* (Fazzari, Hubbard, et al., 1988, Gertler and Hubbard, 1988). Since then there have been a variety of sample sub-divisions: *size (*being one of the most popular), *group, nationality, age, outward orientation, quoted shares or financial behaviour.* To name a few: Hoshi et al., (1991); Gertler and Gilchrist, (1993, 1994); Athey and Laumas, (1994); Jaramillo et al., (1996); Hermes and Lensink, (1998); Ganesh-Kumar et al., (2001); Estwood and Kohli, (1999); Devereux and Schiantarelli, (1990), Fanelli et al., (2002); Ganesh-Kumar et al., (2001); Arza, (2003); and Español (2005).

Where

K   =   Physical Stock (Machinery and Intangible Assets)
I   =   Gross Investment: K_{t-1} - K_t + Depreciation
S   =   Total Sales
D   =   Total Debt
CF   =   Cash Flow = Dividends + Depreciation
YearD   =   Year Dummies
H   =   *Hedge* firms
S   =   *Speculative* firms
P   =   *Ponzi* firms

According to the theoretical arguments discussed above, we expect:

α_1: control for investment opportunities: if the "traditional" *accelerator mechanism* is present this coefficient should be significant and positive.

α_2: control for past performance: should be significant and positive if better-off firms invest proportionally more than the average of their size-group (as sales are normalised by fixed assets).

α_3 and α_4: control for leverage: we estimate a quadratic relationship, expecting an inverted U-shape; for low values of leverage we expect a positive impact, while the opposite should be expected for large values of leverage, therefore α_3 should be positive while α_4 should be negative.

α_5: main explanatory variable: should be significant and positive if firms are constrained. Firms are considered constrained when they need to rely on their *internal* sources of funding to encourage new investments. α_5 splits into α_{5a} for *Hedge* firms; α_{5b} for *Speculative* firms; and α_{5c} for *Ponzi* firms in Equation 2. Given that *Speculative* and *Ponzi* firms are more subject to uncertainty, we expect α_{5b} and α_{5c} to be significant and positive.

α_6 : Year dummies to control for macro-shocks.

5. Empirical results

5.1 Data

The database was built from balance sheet information of most firms listed on the Buenos Aires Stock Exchange.[9] After discarding banks and financial institutions we remain with an unbalanced panel of 74 firms over 40 quarter periods. We work with quarterly information for the Convertibility period after the Basel Agreements (1992q1 until 2001q4). The economic census was carried out for the year 1993, and for that year our sample represented about 4% of total sales. However, our sample size increases over time as can be seen in Table 1.

We do, however, acknowledge that our sample is not entirely representative of the population of Argentinean firms given that large firms and concentrated industrial sectors are over-represented on the Buenos Aires Stock Exchange. Therefore, it would be imprudent to extrapolate our conclusions with respect to the entire gamut of Argentinean firms, given that that the sample used is not representative of the population of firms. This is so, notwithstanding that we use econometric models that control for fixed assets to analyse the relation between speculative and entrepreneurial behaviour. Instead, we claim that our conclusions on speculative and entrepreneurial behaviour are valid for a group of firms that, given their dominant position in the market, would either reflect or impose "market sentiments" in Argentina with a likely impact on general behaviour.

The data are expressed in real terms ($ 1993)[10] and the data analysis presented in this empirical section controls for outliers in all variables in equation 1 using the Hadi (1992) method at 1%.

5.2 Firm financial behaviour: descriptive statistics

During the Convertibility period Argentina followed an indebtedness process that, according to some authors, increased financial fragility and therefore was largely unsustainable (Fanelli, 2002, Frenkel, 2003a, b, Hausmann and Velasco, 2003). In this section we present descriptive statistics from our micro-database focusing on firms' financial behaviour, that suggest the existence of long-term unsustainability also at the micro-level.

Figure 1 shows the proportion of *Hedge* and *Speculative* (including *Ponzi*) *finance.* As can be seen, except for a slight increase in the proportion of *Hedge* firms in 1997, the proportion of

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[9] There are a relatively small number of firms listed (107) and not all of them with balance-sheet information available. It is worth noting that micro data are not publicly available for Argentina and therefore there are not many empirical studies on firms' behaviour for this country.

[10] We used the Argentinean wholesale price index (IPP) to deflate nominal variables.

Hedge/Speculative finance remains more or less stable until the end of 1997. From the beginning of 1998 the proportion of *Hedge* finance declined persistently. This period corresponds to the beginning of the recession that would finish with a financial and currency crisis in 2001.

Figure 2, which is based on the Minsky *firm* taxonomy, shows that since the beginning of the decade there had in fact been an increase in the leverage for all firms.. Given the low starting values, this positive trend could be justified and should also be welcome. However, there is a threshold above which any further increase in the leverage cannot be recommended if a firm seeks financial security. Leaving aside the somewhat involved answer to the question of what this value should be, we highlight the fact that at the beginning of 1998 (a recessionary year), both *Speculative* and *Hedge* firms had a debt burden of around 80% of their net worth (see also Table 2). From then onwards, *Speculative* firms increased their debts at a higher rate than *Hedge* firms. It is worth noting that these results are not necessarily related to a higher burden of interest commitments rooted in an increase of the nominal lending rate, since interest rates were more or less the same until the beginning of the crisis in 2001 (Figure 3).

Besides the leverage indicator, we can analyse three other indicators of financial behaviour.

Maturity: We can see from Table 2 that short-term debt represents the largest proportion of total debt, and from Figure 4 we can confirm that this was especially the case for *Speculative* firms (Table 3). In terms of the evolution of maturity, although still remaining at high levels, the first half of the decade appears to show a shorter-term focus than the second half. This could indicate that there were some minor improvements in terms of maturity, at least until the end of 2000, when the financial crisis was imminent.

Exposure to foreign currency liabilities: In Table 2 we can see a systematic increase in the proportion of foreign debt to total debt (FCD/D) at least until 1996, after which it remained at very high levels (around 72%).[11]

Debt with financial institutions: This increases proportionally more for *Speculative* firms (Figure 5). This was particularly true after the beginning of the recession in 1998, which casts doubt on the safety positions of Argentinean firms' balance sheets on the one hand, and on the capacity of the Argentinean financial system to carry out proper risk management on the other.[12]

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[11] In line with Arestis and Glickman (2002), who defined "super-speculative" according to their degree of currency mismatch, it would be interesting to include currency denomination of debt and assets as one of the factors to evaluate firms' speculative behaviour. Since, in this study, we wanted to focus on Minsky's purest definition of speculation, it remains a very interesting line for further research.

[12] The financial reform in Argentina was used as an example and was at the forefront of academic and policy debate in the 1990s. In this context, many economists were optimistic about the outcome of the capital liberalisation process and the transformation of the domestic financial system, in particular with respect to proper risk-management (Calomiris and Powell, 2000: 40) and the good balance sheet positions of banks (Dornbusch, 2001: 7).

Finally, in Table 2 we also show the evolution of the dependent variable (I/K), which reached its maximum in 1995 and decreased after the recession of 1998. Besides, in Table 3 we can see that *Hedge* firms invested proportionally more than *Speculative* firms, which in turn invested proportionally more than *Ponzi* firms. In terms of leverage, as expected, the *Speculative* and *Ponzi* firms were more indebted and their debt was mainly short-term.

To sum up, this section shows that there was an increase in speculation defined *à la Minsky* during the Convertibility period. Moreover, this group of *Speculative* firms systematically increased their leverage in general and with financial institutions in particular. In terms of debt composition, most of their debt was short-term and denominated in foreign currency, which enhanced a maturity and currency mismatch in balance-sheet positions. *Hedge* firms were also highly indebted, but their debt was longer-term and more diversified: for them financial institutions represented around 20% as against 37% for *Speculative* firms.

5.3 Financial constraints in investment decisions: econometric analysis

Choosing the right model.

As discussed in the methodological section, our sample consists of firms listed on the Buenos Aires Stock Exchange. Thus, given that these firms might enjoy certain unique characteristics, it is necessary to control for fixed effects.

We therefore estimate two Fixed Effects Within Models[13] presented in Table 4: one assumes that all regressors are exogenous (FE), and the other controls for endogeneity (IVFE).

In order to determine the most appropriate model, it is a fundamental requirement to have regard to whether the variables *cash flows* (CF) and *increase in sales* (ΔS) are strictly exogenous. They would not be exogenous if they were correlated with the error term $\varepsilon_{i,t}$ in equation 3. This would occur if they were pre-determined by *investment decisions* (I), the endogenous variable.

There are reasons to argue for a simultaneous determination of investment, cash flows and sales (e.g. the latter two could be signalling economic performance, which might improve as a result of investment decisions). In such a case, *cash flows* (CF) and *increase in sales* (ΔS) will not be exogenous and estimation through fixed effects would render coefficients inconsistent (asymptotically biased) even if it was assumed that there was no autocorrelation. In fixed effect models, the bias is negative and it is more important if T is small (Green, 1997: 640).

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[13] Notwithstanding the methodological discussion above, fixed effect models should also be chosen from a purely empirical point of view. We performed a Hausman test of consistency on a Random Effect estimation of equation 2 which probed the inconsistency of the estimates and directed us to use a Fixed Effect model.

The literature on financial constraints recurrently adopts estimation methods that control for endogeneity. We estimate therefore an Instrumental Variable Fixed Effect model (IVFE), where we instrument for *cash flows* (CF) and *increase in sales* (ΔS).[14] We perform a Sargan test of over identifying restrictions and we contrast the consistency of results using a Hausman test. The results are set out in Table 4.

As can be seen there, IVFE was correctly identified (the Sargan test was passed) and exogeneity of regressors was rejected at the 5% level of significance (the Hausman test was rejected). Therefore, in what follows we will analyse the main results from IVFE estimation in Table 4. The main findings are robust, in the sense that our conclusions do not vary if we select FE instead of IVFE.

Regression results

The analysis is performed by normalising the regressors over total stocks of physical assets on the previous period (to eliminate scale effects). Moreover, to eliminate macro shocks we include year dummies in both models.[15]

We find that both the level of sales (the period before) and their change are significant (and positive) determinants of current investment decisions. The latter indicates that the accelerator mechanism works well for our data. The former suggests that firms at the top end of the (normalised) sales distribution would invest more. In other words, it is not just their variation in sales that matters, but also their performance in terms of sales during the previous period.

As we expect, a firm's leverage does have a significant impact on investment; moreover, this relation is not linear. For firms that are not highly indebted, the leverage ratio has a positive impact, however, once the debt equates to double the physical assets then higher leverage prevents firms from investing in fixed assets (see Figure 6).

With regard to the main explanatory variable in Equation 2, i.e. cash flows, as discussed in Section 4, we split the sample according to Minsky categories. Table 4 shows that the coefficient for cash flows is not significant for the *Hedge* group but it is significant for the *Speculative* and *Ponzi* groups. This means that while *Hedge* firms are not constrained, *Speculative* and *Ponzi* firms are.

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[14] We instrument CF and ΔS using two lags of each of them, a second lag for sales over capital, retained earnings, two lags for operative expenditures, two lags expenditures due to sales, twelve sectoral dummies (2 digits ISIC) and all the independent variables included in Equation 1.

[15] Given restrictions of space, Table 4 does not display the coefficients for year dummies, which in any case are not fundamental to the discussion presented here.

As expected, firms that are exposed to higher degrees of uncertainty are more constrained in financial markets. Investment in fixed assets involves some degree of irreversibility, therefore firms that could not adequately foresee their prospective yields had either to use their own funds to finance their long-term projects or to show these funds so as to claim creditworthiness in the long-term.

This result is nevertheless striking in light of our having shown in Section 5.2, that *Speculative* firms (*Ponzi* included) increased their financial debts proportionally more than *Hedge* firms (Figure 5) and in general they showed a higher leverage (Table 3). However, Table 4 shows that they remained constrained for investing in physical assets, which might indicate either the *Speculative* nature of their decisions to borrow or the short-term bias of financial opportunities.

6. Conclusions

Based on Minsky we have developed a taxonomy to classify firms according to their speculative behaviour. We defined *Hedge* firms as those whose prospective yields (proxied by cash flows) were enough to honour their debt liability (measured as short term debt plus interest commitments). Those firms not satisfying the criteria for classification as *Hedge* firms were classified as either *Speculative* or *Ponzi*.

 We found that in Argentina during the 1990s there was a systematic increase in the number of firms adopting a speculative means of financing their activities. Moreover, in comparison to *Hedge* firms, *Speculative* firms obtained higher leverage, had a larger proportion of short-term debt, and their creditors were more highly concentrated in the financial sector. In conclusion, we find, with regard to the first question posed in the introduction, that there was an increase in speculative behaviour during the decade immediately following financial liberalisation.

Our second objective, having regard to Keynes' discussion in Chapter 12 of his *General Theory*, was to analyse the relation between speculative and entrepreneurial behaviour. We considered investment in fixed assets as a manifestation of entrepreneurial behaviour. Using panel data for 74 firms over 40 quarters periods, we estimated an investment equation in a fixed effects model with instrumental variables.

We found that *Speculative* firms used their cash flows to finance their investment in fixed assets, while *Hedge* firms did not. These econometric results are neat, strong and highly significant, and they hold true even after controlling for past performance, profitability and macro shocks. They suggest that *Speculative* firms did not resort to external sources of financing to invest in fixed assets despite having apparently had greater access thereto.

We find this result distressing although not entirely unexpected: *Speculative* firms' motivation to borrow money is not necessarily connected to entrepreneurial behaviour. Certainly, short-term debt is rarely used to finance long-term investment. Furthermore, *Speculative* firms could face reversals of value as a consequence of (important) changes in the interest rate. They are, in effect, more vulnerable to an uncertain macroeconomic climate, particularly if in the money market. Therefore, together with the financial constraints literature, we could predict a tighter situation for these firms in financial markets when coming to finance highly irreversible activities, such as investment in fixed assets.

Our empirical findings suggest a Keynesian answer to the second question: the more speculative the firm, the less entrepreneurial it will be. The novelty here is that we include financial institutions as protagonists to illustrate that speculation and entrepreneurship are unconnected. *Speculative* firms borrow on the basis of a shorter-term outlook. Therefore, in spite of their having loose access to external sources of financing , they are not necessarily encouraged to invest in new machinery.

In terms of policy, our results cast doubt on the benefits of financial liberalisation. In Argentina during the 1990s credit was not necessarily allocated efficiently. Indeed, we claim that the increase in speculation, being unconnected from investment, manifested itself in unsustainable behaviour at the micro level. However, as noted in the Introduction, since panel data is not available before 1992, we have not attempted to engage in a broader assessment of the advantages and disadvantages of such liberalisation.

Whilst analysing *maturity* mismatches, this study has not taken into account *currency* mismatches, which were also crucial to the microeconomic unsustainability that led to the Argentinean crisis of 2001. Further research in this field would be interesting. In particular, our methodology based on the Minsky approach could be extended to define speculation not only in terms of yields/liabilities, but also in terms of currency mismatches in assets and liabilities.

Figures and Tables

Table 1: Number of firms of database per year

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total Firms	10	43	47	51	56	58	61	62	64	63	60

Source: Authors' calculation based on The Survey

Figure 1

Proportion of Type of Finance, based on Minsky (1982)
1992q1-2001q4

Source: Buenos Aires Stock Exchange

Figure 2

Total Debt over Net Worth
1992q1-2001q4

Source: Buenos Aires Stock Exchange

Figure 3

Nominal Lending Interest Rate
1992q1-2001q4

Source: IMF Financial Statistics

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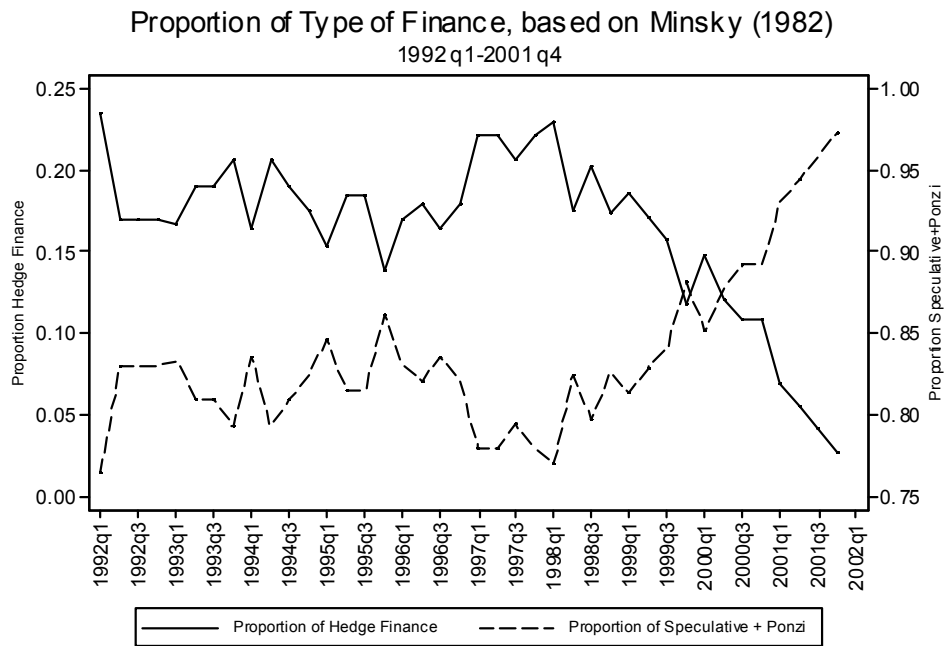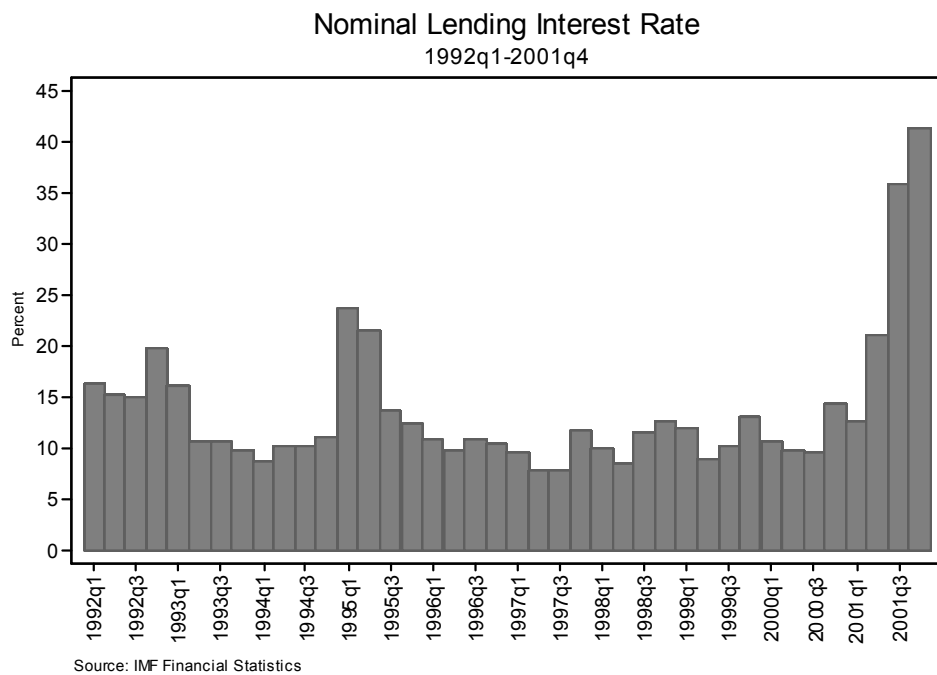
Table 2: Indicators of investment and financial behaviour by year (median)

Year	Median Values				
	D/NW (%)	STD/D (%)	FCD/D (%)	FCD/FCA	I/K (%)
1992	47,34	76,04	39,76	5,25	2,63
1993	56,56	78,96	49,50	3,57	1,65
1994	63,50	77,96	61,15	4,11	3,98
1995	67,08	78,04	67,49	4,98	4,15
1996	66,58	74,13	72,10	4,97	1,98
1997	68,00	72,06	69,64	5,15	2,63
1998	82,36	66,23	72,04	5,87	2,64
1999	88,80	62,47	72,58	5,32	1,56
2000	90,03	62,26	70,17	5,02	1,44
2001	98,75	67,23	74,34	4,15	1,16

Source: Authors' calculation based on The Survey

Table 3: Indicators of investment and financial behaviour by Minsky *firm* taxonomy for the whole period (median)

Minsky firms' Taxonomy	Median Values (1992-2001)				
	Count	D/NW (%)	STD/D (%)	FCD/D (%)	I/K (%)
Hedge	12	61,13	44,07	76,63	2,90
Speculative	46	73,44	77,93	66,46	2,17
Ponzi	16	95,28	67,99	63,47	1,62

Source: Authors' calculation based on The Survey

Where

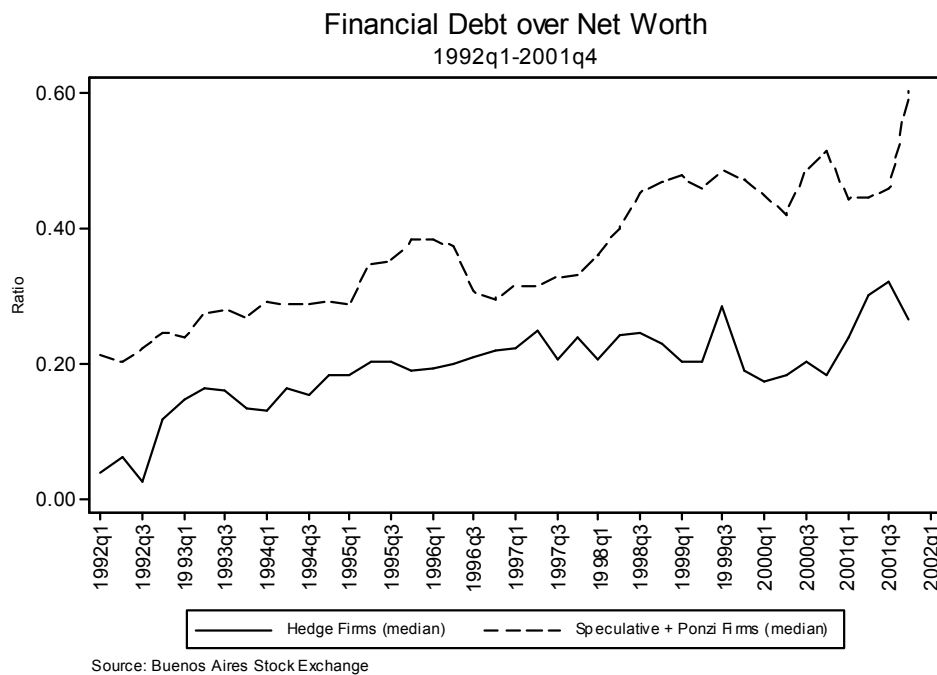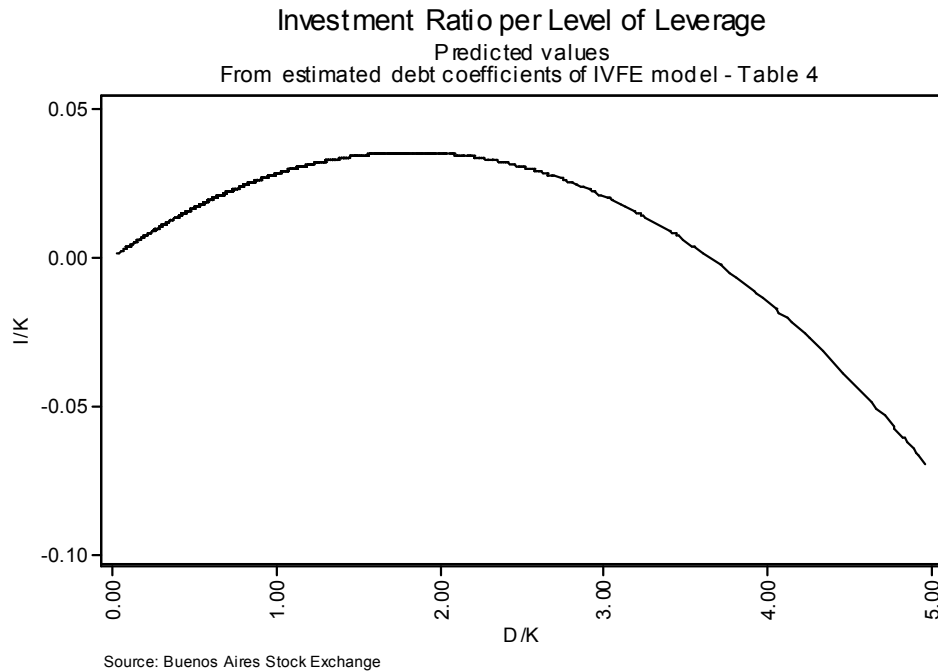|		
K	=	Physical Stock (Machinery and Intangible Assets)
I	=	Gross Investment: $K_{t-1} - K_t$ + Depreciation
NW	=	Net Worth
D	=	Total Debt
STD	=	Short Term Debt
FCD	=	Debt denominated in Foreign Currency
FCA	=	Assets denominated in Foreign Currency

Figure 4

Short Term Debt over Total Debt
1992q1-2001q4

Source: Buenos Aires Stock Exchange

Figure 5

Financial Debt over Net Worth
1992q1-2001q4

Source: Buenos Aires Stock Exchange

Figure 6

Investment Ratio per Level of Leverage
Predicted values
From estimated debt coefficients of IVFE model - Table 4

Source: Buenos Aires Stock Exchange

Table 4: IV and IVFE models on investment equation

Dep Var:	Investment over Physical Capital Stock							
Technique	FE				IVFE			
Ind. Var.	Coef	Std. Error	P	Sig	Coef	Std. Error	P	Sig
Δ Sales over Physical Stocks	0,023	0,010	0,017	**	0,105	0,052	0,042	**
Lag (Sales over Physical Stocks)	0,043	0,007	0,000	***	0,035	0,018	0,052	*
Debt	0,035	0,007	0,000	***	0,039	0,011	0,001	***
Debt Squared	-0,009	0,002	0,000	***	-0,011	0,002	0,000	***
CF over Physical Stocks for HEDGE	-0,007	0,082	0,929		0,030	0,310	0,922	
CF over Physical Stocks for SPECULATIVE	0,056	0,029	0,055	*	0,582	0,142	0,000	***
CF over Physical Stocks for PONZI	0,005	0,039	0,893		0,237	0,110	0,032	**
Number of observations	2054				1712			
Number of groups	74				72			
Obs per group: Minimum	1				1			
Average	28				24			
Maximum	40				39			
Joined Significance	16,4		0,000	***	892,1		0,000	***
Sargan test of overidentifying restrictions					12,9		0,232	
Hausman test of Consistency					26,05		0,038	**

Source: Authors' calculation based on The Survey

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