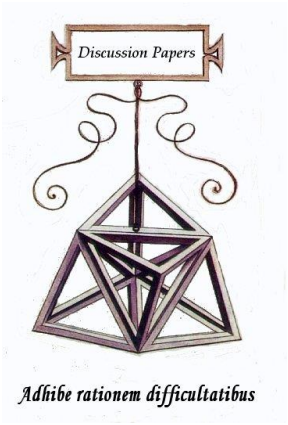
Discussion Papers
Collana di
E-papers del Dipartimento di Economia e Management – Università di Pisa



Valeria Arza, Elisa Giuliani, Federica Nieri

DRIFTING ON A CALMA CHICHA AFTER COUNTLESS STORMS: How macroeconomic uncertainty affects firms' decisions to innovate in emerging countries

Discussion Paper n. 251

2019

Discussion Paper n. 251, presentato: **Dicembre 2019**

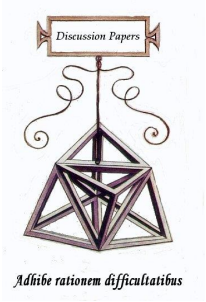
Indirizzi degli Autori:

Valeria Arza
CENIT/UNSAM, Investigadora CONICET, Roque Sáenz Peña 832 2do piso 1035
Ciudad de Buenos Aires, Argentina

Elisa Giuliani
Responsible Management Research Center, Department of Economics & Management
University of Pisa, Via Ridolfi 10, 56124, Pisa, Italy
E-mail: elisa.giuliani@unipi.it

Federica Nieri (**corresponding author**)
Responsible Management Research Center, Department of Economics & Management
University of Pisa, Via Ridolfi 10, 56124, Pisa, Italy
E-mail: federica.nieri@for.unipi.it

Si prega di citare così:
Arza V., Giuliani E., Nieri F., (2019), DRIFTING ON A CALMA CHICHA AFTER COUNTLESS STORMS: How macroeconomic uncertainty affects firms' decisions to innovate in emerging countries", Discussion Papers del Dipartimento di Economia e Management – Università di Pisa, n. 251 (http://www.ec.unipi.it/ricerca/discussion-papers).



Valeria Arza, Elisa Giuliani, Federica Nieri

DRIFTING ON A CALMA CHICHA AFTER COUNTLESS STORMS: How macroeconomic uncertainty affects firms' decisions to innovate in emerging countries

Abstract

Emerging economies are subject to macroeconomic fluctuations and policy swings which generate firms' uncertainty about the future behavior of key macroeconomic variables. Drawing on the theory of irreversible investments, we focus on innovation and suggest that macroeconomic uncertainty may be a core factor explaining why firms in developing countries struggle to innovate. Using micro data on Argentinean firms during the 1990s, we find that this is particularly the case for firms performing below their aspirations as they fear losses more than potential gains, and for domestic firms, which, as opposed to subsidiaries of multinationals, cannot diversify their risk internationally.

Keywords: Macroeconomic uncertainty; innovation; emerging countries; Argentina

JEL: O31, D81, F23

INTRODUCTION

Innovation has always attracted a great deal of interest among development scholars and economists, because it is through learning and the generation of new knowledge that countries are expected to grow economically and to prosper socially (Romer, 1956, 1990). Innovation has different *loci*, but firms are certainly an important one. The study of firm-level technical change and innovation in developing and emerging countries is of course not new. A wealth of empirical research has been conducted since at least the early 1980s demonstrating that the acquisition of machine-embodied technologies from advanced countries would have not been sufficient to spark economic growth in developing or emerging countries, while firms in such countries would have needed to build their own technological capabilities (Dahlman, Ross-Larson, & Westphal, 1987; Fransman, 1982; Katz, 1984; Lall, 1992). More importantly, those studies revealed that – however imperfect it may have been – technical change was also taking place 'at least the most industrialised of the peripheral economies' (Bell, 1984: 203).

Nowadays, there is no doubt that certain firms in certain developing or emerging countries have managed to catch up technologically to become global leading innovators. Companies like the Chinese Huawei, the Brazilian Natura or the Indian Tata Motors are among the well-known recent examples of global innovators from once lagging behind countries. Yet these successful examples tell the story of the tip of the iceberg, while we know much less about the struggles most other firms have to face when they operate in such contexts, which IB scholars often qualify as weak institutional environments (Hoskisson, Eden, Lau, & Wright, 2000). This is important because, despite their catching up, most developing and emerging economies still face considerable hurdles when it comes to develop frontier innovations. For instance, while according to the European Union (EU) Industrial R&D Investment Scoreboard, China and India have been among the world top Research & Development (R&D) investors in the period 2007-2016 together with Europe and North America, most other developing and emerging countries still lag considerably behind in this respect (Petralia, Balland, & Morrison, 2017). For instance, Brazilian firms spend four times less on R&D compared to U.S. companies, while Argentina R&D expenditures on GDP is 0.533 about one fourth and one fifth of how much is spent in the European Union and the US respectively (OECD, 2016).

Against this background, our work seeks to understand the reasons why firms in emerging/developing countries *struggle* to innovate, which is also why they fail to be at the frontier of

technological knowledge. More specifically, we examine the factors interfering with firms' decisions to invest in innovation through the acquisition of capital goods and investments in R&D,[1] which in the context of this research we consider to be irreversible investments for their degree of risk and uncertain outcomes. We draw on the theory of irreversible investments (Dixit & Pindyck, 1994) to investigate how these decisions are affected by firm's uncertainty about the future state of affairs. Uncertainty is a subjective construct, a sentiment or perception. It implies that actors cannot anticipate the future because they do not have the basis to allocate probabilities (Stirling, 2003) about a set of possible outcomes of macroeconomic variables relevant for their investments. We claim that such perceptions of uncertainty are socially constructed, that is, they largely depend on the historical context where firms have been embedded in the past.[2]

In our baseline hypothesis, we predict that innovative investments will be negatively affected by macroeconomic uncertainty, which, following earlier research (e.g. Byun & Jo, 2018; Desbordes, 2007; Kredler, 2005; Li & Li, 2010), we measure in terms of sector-level unpredictable volatility of profits, imports and exports. We next examine the extent to which this hypothesis is modified by the performance of firms relative to their industry peers, which we consider to influence firm-level perceptions of risks and the extent to which they are keen to tolerate potential losses against potential gains (Audia, Brion, & Greve, 2015; Kahneman & Tversky, 1979). We predict that, in the context of developing/emerging economies, the negative relationship between macroeconomic uncertainty and investments in innovation will be more negative for poor performers than for high performers.[3] Finally, we explore the extent to which domestic firms differ from subsidiaries of foreign multinational enterprises (MNEs) in the way to which they react to macroeconomic uncertainty.

[1] We will refer here broadly to 'investments in innovation' to refer to acquisition of capital goods and investments in R&D. We acknowledge that this is a caveat, given the differences between these two decisions: the former refers to investments that contribute to the production capacity of firms, while the latter are more likely to support the accumulation of technological capabilities (Bell & Pavitt, 1993). For these reasons, while treating these two decisions under the same umbrella term in our theoretical development, we keep them separate in the empirical analysis and discuss the results accordingly.

[2] We note that there is a difference between macroeconomic instability and uncertainty. Instability refers to when key macroeconomic indicators change frequently and policy switches are recurrent; uncertainty is a subjective concept which is related to individual's sentiments and is present when one actor perceives its environment to be uncertain or she/he feels unable to predict the future behavior of key economic variables in the near future. Clearly, individuals can feel uncertain even in the absence of instability, because uncertainty is subjective and socially constructed, while instability is objective and trackable through indicators.

[3] We refer to poor performers as firms which have performance lower than industry average and vice versa for high performers.

We investigate these issues in the specific spatio-temporal context of Argentina in the 1990s. In Argentina, macroeconomic instability is an uncontestable historical fact (see Fanelli, 2002; Spiller & Tommasi, 2003) and this makes it an almost natural experimental setting to investigate firms' innovative decisions under uncertainty. To do so, we focus on the 1990s because this was an historical period where instability was meant to be under control thanks to the Convertibility Plan and the adoption of Washington Consensus' prescriptions, which kept macroeconomic indicators (e.g. exchange rate and prices) fairly stable, and revitalized the economy also through unprecedented foreign direct investment (FDI)inflows. We maintain that the legacy of historical instability characterizing Argentina (i.e. the fact that firms have either being operating in such a context in the past or are otherwise acquainted with the frequent policy switches and changes characterizing Argentina) will be influencing entrepreneurs and economic decision makers' perceptions of uncertainty to the point that it will condition their decisions to innovate even in a period when macroeconomic instability was deemed to be mitigated by the current policies – i.e. a period of dead calm (or *calma chicha* in Spanish). Our study covers the period 1992-2001 and is based on micro-data on Argentinean manufacturing firms, largely based on innovation surveys as explained in the methodological section. Our econometric analyses show that there is a negative relationship between macroeconomic uncertainty and innovative investments, especially for poorly performing and domestic firms and limitedly to investments in capital goods. Instead results are less conclusive when it comes to R&D, marking important differences across these two types of investments and the extent to which they react to macroeconomic uncertainty across different types of firms.

THEORY

It has never been easy to innovate in developing countries. Up until the 1990s, mainstream economists were very fond of the idea that such countries could catch up by simply acquiring machine-embodied technologies from advanced countries (for a discussion see Grossman & Helpman, 1994), which in turn meant that international trade and FDI were seen as industrialization short-cuts (for critiques to these approaches see e.g. Nelson & Pack, 1999; Perez & Soete, 1988). Development scholars, who heavily criticized this view, soon clarified that such recipes were inappropriate: if on the one hand openness to international sources of knowledge and technologies was important, on the other, to be able to manage, upgrade, and improve upon such imported technologies, firms in such countries needed to build their own domestic technological

capabilities (Bell, 1984). These ideas, which were promoted by development scholars in the early 1980s and sometimes popularized through Cohen and Levinthal (1990) idea of absorptive capacity, sparked a generation of studies seeking to identify the pitfalls of developing countries' innovative systems and calling for public policies to strengthen the innovative capacity of developing/emerging countries' domestic firms and their networks formed with actors located within or beyond their home countries (e.g. Bell & Albu, 1999; Corredoira & Mcdermott, 2014; Fu, Pietrobelli, & Soete, 2011; Giuliani, Pietrobelli, & Rabellotti, 2005; Mcdermott, Corredoira, & Kruse, 2017; Narula & Dunning, 2010).

Many such studies were grounded into the idea that innovation can neither occur overnight, nor be 'something which firms choose and 'buy-in' from outside.' (Bell & Albu, 1999: 1718). Rather, innovation grows out of boundedly rational decision makers (Simon, 1955) operating in a context of imperfect information, it involves trial-and-errors, far-from-equilibrium interactions, and it often necessitates path dependent and risky knowledge accumulation processes yielding uncertain returns (Dosi, 1997; Dosi, Freeman, Nelson, Silverberg, & Soete, 1988; Nelson & Winter, 1982).

Uncertainty characterizes most markets, but it is especially a problem in most developing/emerging countries where inefficient institutional settings also come with historically high macroeconomic instability (Acemoglu, Johnson, Robinson, & Thaicharoen, 2003), which makes it difficult for individuals to forecast the variables relevant to their future plans. Such contexts may be characterized by an intrinsic lack of confidence by individuals in general and business-decision makers in particular in the stability of economic relevant variables, which we term macroeconomic uncertainty and it is just one of the several weaknesses characterizing developing/emerging countries, which have attracted a great deal scholarly interest.

IB scholars have shown how some of the emerging economies' companies have in fact been able to turn such disadvantages into advantages (Cuervo-Cazurra & Genc, 2008; Madhok & Keyhani, 2012), by expanding operations or exploiting market opportunities in similarly-disadvantaged countries. As compared to advanced country MNEs, these firms are considered to be more at ease working in inefficient markets or weak institutional environments that are similar to those of their home country. In some cases, they have demonstrated to be particularly effective in innovating at the bottom of the pyramid, because of their superior knowledge about the needs and reachability of such undeserved markets (Lee & Hung, 2014; Prahalad, 2004), and some studies show that they have even managed to trickle these innovations up to richer countries

(Govindarajan & Ramamurti, 2011). In other cases, IB scholars have ventured to theorize that such home country weakness do actually constitute a motivation for emerging economies' firms to use international expansion as a springboard to acquire the critical resources that they lack, and to reduce their vulnerability to their home country institutional and market constraints (Luo & Tung, 2007). Indeed, such perspectives have been functional to explain the new breed of emerging giants, that is, world-class companies from developing and emerging economies that have displayed unprecedented growth rates and have sometimes demonstrated to be at the frontier of technological knowledge and innovation (see e.g. Khanna & Palepu, 2004).

This wave of optimism, however, has done little to explain the persistence of large pockets of technological backwardness in most developing/emerging economies. Though IB scholarship has been very good at examining why and how emerging giants or emerging country MNEs thrive, it has payed relatively less attention on what happens to the rest of their home economies, especially to smaller domestic firms, and on whether and how their innovative behaviors differ from those of foreign MNEs operating in their own country. One important area of neglect has been the response of developing/emerging country's firms to changes in the macroeconomic environment. Within and beyond the IB community, scholars have been largely preoccupied about the failures characterizing the home country – e.g. coordination failures, weak Intellectual Property Rights enforcement; limited incentives for R&D; insufficient policies to attract foreign investors, etc., while they have been relatively less alert about the behavioral decisions of firms and how they react to macroeconomic uncertainty.

Some earlier research has looked into the impact of macroeconomic uncertainty on MNEs' entry strategies and divestments, or on firm value (e.g. Aizenman & Marion, 2004; Buckley, Chen, Clegg, & Voss, 2018; Cuypers & Martin, 2010; Desbordes, 2007; Lee & Makhija, 2009), but not very much into the extent to which it influences innovative decisions by developing/emerging country firms. Because most such countries are often affected by highly unstable and uncertain macroeconomic contexts, understanding how firms take decisions about their innovative processes in such volatile environments can be relevant to both inform theories about innovation in emerging countries and, more importantly, to refine current policies.

Hypotheses

As a baseline hypothesis, we argue that higher macroeconomic uncertainty will decrease the probability and extent to which firms will invest in innovation. We consider two types of investments: the acquisition of a

capital goods and R&D investments. Investment in capital goods and in R&D are both non-liquid and to a large extent irreversible (Pindyck, 1988): they involve sunk costs that can neither be easily recovered nor can they be used for a different purpose. For this reason we would expect macroeconomic uncertainty to negatively affect both.

In light of this, we draw on the theory of irreversible investments (Caballero & Pindyck, 1996; Gilchrist & Williams, 2005; Kasahara, 2004; Pindyck, 1988; Pindyck & Solimano, 1993) to argue that when firms cannot predict the near-future manifestations of variables that might affect returns from their projects, they might opt not to invest or to reduce their investments. Because individuals and organizations will seek to avoid uncertainty, in a context of historical macroeconomic instability, firms will seek to postpone innovative behaviours and adopt strategies that reduce the risk of non-survival when they are uncertain about the future manifestation of key variables. Accordingly:

Hypothesis 1 (baseline): The higher the macroeconomic uncertainty, the lower will be the probability and the extent to which firms in emerging economies invest in innovation.

Next, we claim that the effect of macroeconomic uncertainty will be different and depend on firms' performance relative to their industry peers. To argue this, we augment our theoretical framework by taking insights from the behavioral theory of the firm (Cyert & March, 1963) and more specifically from performance feedback theory (Audia & Greve, 2006; Greve, 1998, 2003; Posen, Keil, Kim, & Meissner, 2018), which assumes that decision makers are boundedly rational and take decisions in a context of limited cognition (Simon, 1955). Hence, to overcome their limitations, they learn from their performance relative to some benchmark according to which they set their aspirations (Greve, 1998). We follow the approach used in earlier research and suggest that in dynamic environments characterized by high levels of uncertainty and frequent change typical of emerging countries, comparison with industry peers provides a stronger motivation for change (Audia, Brion, & Greve, 2015; Gooderham & Grøgaard, 2013), than comparison with firms' own historical performance track record. Standard interpretations of performance feedback theory would suggest that firms are more inclined to take risks when their performance is lower than industry average because this will allow to satisfy their aspirations of being better performers in the future (Audia & Greve, 2006; Greve, 1998, among many others).

In this paper we modify the behavioral assumption of this standard view, and suggest that a context characterized by historic macroeconomic instability and a legacy of unpredictable fluctuations of markets and business climate will interfere with the extent to which firms are keen to take risks to improve their performance and therefore the extent to which they value potential gains over potential losses (Kahneman & Tversky, 1979). We thus suggest that, in this context, poor performers will be more, rather than less, risk-averse, because they will seek to prioritize their survival over their heightened performance. High performers, in contrast, will be less preoccupied about their losses as they will have slack resources to navigate through turbulent times. As macroeconomic uncertainty increases, we expect poor performers to invest less in innovation than strong performers, because the former will feel the pressure of growing uncertainty much more than the latter, and value their potential losses more than their potential gains, thus we expect poor performers to be more risk averse than high performers. Hence:

> *Hypothesis 2: The negative baseline relationship between macroeconomic uncertainty and (probability and extent of) innovative investments will be less negative for firms performing better than their industry average.*

Finally, we suggest that the baseline hypothesis (i.e. Hypotheses 1) will work differently for domestic firms and subsidiaries of foreign MNEs. Although we acknowledge that there is wide heterogeneity in firms' innovative strategies within each of these groups (Birkinshaw & Fry, 1998; Kuemmerle, 1997; Marin & Bell, 2006), we follow earlier IB research (e.g. Un, 2016) and trust that there is some merit in comparing domestic and foreign companies especially in emerging/developing countries, where foreign MNEs are often one important vehicle of technology transfer and innovation because of their international internal and external networks (Bartlett & Ghoshal, 1989). We consider that subsidiaries of foreign MNEs will have two motivations for being, on average, less risk averse than domestic firms when it comes to deciding about innovative investments in the presence of macroeconomic uncertainty. First, because of their internationality: decision makers at the MNE subsidiary will know that they can diversify the risk via the MNE's direct investments elsewhere (Rugman, 1976) and this will deflect their perception of risk when investing in innovations in uncertain conditions. Second, because of their foreignness (Hymer, 1976; Kostova & Zaheer, 1999; Zaheer, 1995), they will have reinforced motivations to enact a 'wait-and-see' strategy for investments already planned (Clarke & Liesch, 2017), rather than rush off to divest or phase out investments in

innovation when the business outlook becomes more uncertain. In so doing, they may seek to minimize host country audiences' criticisms over their commitments (or lack thereof) in innovative activities, and ensure that they preserve or strengthen their legitimacy in that context. We expect that both internationality and foreignness will mitigate foreign firms' fear of future losses and enhance motivations for investing in the case of uncertainty, marking a difference with domestic firms.

Because of these motivations, we argue that the difference between domestic and foreign MNE subsidiaries will influence the negative baseline relationship between macroeconomic uncertainty and (probability and extent of) innovative investments. Thus, we hypothesize the following:

> *Hypothesis 3: The negative baseline relationship between volatility and (probability and extent of) innovative investments will be less negative for subsidiaries of foreign MNEs than for domestic firms.*

METHOD

The context of this research

Investigating the relationship between uncertainty and firms' investment in innovation, with reference also to the distinction of the behavior between MNE subsidiaries and domestic firms, is interesting in the context of Argentinean firms in the 1990s. Argentina has been historically a highly unstable country, with dramatic switches in political orientation and a very volatile macroeconomic outlook (see Fanelli, 2002). Political swings are one of the main characteristics of Argentinean policy-making.[4] Not surprisingly Argentina ranked seventh among a list of 106 countries in terms of variability in macroeconomic policy between 1970 and 1997 (Spiller & Tommasi, 2003). Given this background, Argentina is an ideal context to investigate how economic actors react to macroeconomic uncertainty. In addition, not just the country, but the studied period constitutes an interesting subset. The period under analysis covers the *Convertibility Plan* (1991-2001), which represented the longest macroeconomic regime in the 20th century. The Convertibility Plan itself was defined as a shock programme mostly aimed at changing expectations, formed as the result of previous failed attempts at macroeconomic stabilization, to eventually stimulate investment decisions. The prominent feature

[4] Arza (2009) classified Argentinean economic policy regimes from 1963 to 2003 in 'orthodox' and 'heterodox' depending on whether policy prescriptions largely followed the spirit of the Washington Consensus or not - the keywords being 'macroeconomic discipline', 'market economy', and 'openness to the world' (Williamson, 2002: 2). The study documents nineteen policy swings over the observed period: orthodox cycles lasted about three and a half years on average, while heterodox cycles were much shorter.

of the Plan was to fix the exchange rate with the United States (US) Dollar but it was also aligned to most Washington Consensus' prescriptions. Key macroeconomic variables such as the exchange rates, prices and interest rates were fairly stable. Yet, these changes in the regulatory policy were not sufficient to altogether wash out perceptions of uncertainty about the behavior of key macroeconomic variables, which, based on earlier research (e.g. Bonvecchi & Porta, 2003; Fanelli, 2002), we assume to be due to a legacy of unpredictable policy changes characterizing the Argentinean economy. For instance, over the 1990s there has been a marked difference between the interest rates depending on whether the deposits were nominated in Argentinean Pesos or US Dollars (see Figure 1). If economic actors were fully confident that the currency board regime would have not changed, the interest rates would have been relatively similar over the period, while differences were quite pronounced reflecting this lack of confidence. This distrust proved to be right, since the regime crashed in December 2001, marking the beginning of one of the largest national economic crisis of the country.

Figure 1 about here

In addition, the 1990s was an interesting period to analyze MNEs behavior because FDI inflows were the largest ever. To attract foreign capitals was one of the goals of the Convertibility regime. FDI was needed to relax external constraints which typically occur in the context of economic growth and national currency appreciation. According to UNCTAD statistics (UNCTAD, 2003), between 1990 and 2003, FDI inflows in Argentina were 10 times higher than they were in the 1980s. In particular, FDI inflows increased from US$ 1.6 billion in 1989 to US$ 4.4 billion in 1992, and continued to rise throughout the 1990s reaching a peak in 1999 (US$ 23.9 billion) when the Spanish company Repsol purchased YPF. On many occasions, during the 1990s, annual inward FDI flows were equivalent to more than 2% of GDP and 10% of gross fixed capital formation. While the low interest rates and the bourgeoning pro-FDI policies generated an increase of FDI inflows in most of Latin America in the 1990s, Argentina certainly stood out. As shown in Figure 2, FDI inflows as a proportion of GDP skyrocketed in the 1990s, reaching unprecedented levels in the recent history

of Argentina and being much higher than those of Brazil, Argentina's largest South American Mercosur partner and economy.[5]

Figure 2 about here

Data

To test our hypotheses, we use data from two Innovation Surveys (IS) covering respectively the period 1992-1996 and 1998-2001 and one additional survey for 1997 (called Pilot Survey). The surveys covered the manufacturing sector and were jointly administered by the Argentinean National Institute of Statistics and Censuses (INDEC) and the Secretary of Science and Technology (SECyT). The 1992-1996 IS includes a representative sample of 1,639 firms, while the 1998-2001 IS covers 1,684 firms. The samples were randomly drawn from the population of firms included in the National Economic Census, with a response rate of 70% for the first one, 76% for the second one. The 1997 Pilot Survey includes a sample of 1,047 firms. We exploited these three data sources to build a semi-balanced panel that resulted in a sub-sample of 667 firms.[6] The Argentinean wholesale price index (IPIB, Spanish acronym for *Indice de Precios Internos Básicos*) is used to deflate *all* the nominal variables included in the ISs, which are expressed in 1993 Argentinean Pesos.

Variables

Dependent variables. We measure both the probability and the intensity of firms' investments in innovative activities, by considering two alternative investments: (i) acquisitions of capital goods, which is defined as expenditures on final goods (national and/or imported) used in the production process;[7] and (ii) R&D, measured as expenditures on basic research, applied research and development of products or

[5] According to UNCTAD statistics, over the 1990s, Brazil ranked first in terms of value of FDI inflows.

[6] The use of semi-balanced panel is justified on two grounds: (a) because the volatility measures we are using for this analysis (see the rest of this section) are time-invariant for the whole period and, hence, we need to observe the dependent variables for the whole period, which would not be guaranteed in the case of an unbalanced panel; (b) the volatility is measured at 3-digit levels, and unfortunately firms are linked to a 3-digit industry only in the 1992-1996 IS , while in the other waves the firms were classified at the 2-digit level. Hence, the balanced panel allows us to connect firms' industry to volatility more precisely. To ensure external validity of the semi-balanced panel, we performed chi-squared tests on the annual distribution of firms across sectors, size categories and domestic/foreign between the balanced and the unbalanced panel and found that there were not significant differences in terms of sectors and nationality and just a small difference in terms of size for the 1998-2001 period. Since large firms are usually included in all IS waves, it is to be expected that the sub-sample of the balanced panel will be biased towards largeness. Although significant, the absolute differences are not very important: for the period 1998-2001 the proportion of *large* firms in the balanced sub-sample is 27% and in the full sample is 23%, while the proportion of *small* firms is 51% in the sub-sample against 56% in the full sample.

[7] Information for this variable is only available for 1992, 1996, 1997, 1998 and 2001.

processes. The probability of investment is measured as a dummy variable (*CapitalGoods_Probability; R&D_Probability*) which takes the value of 1 when the firms invests some positive amount, and zero otherwise. The intensity of investments (*CapitalGoods_Intensity; R&D_Intensity*) are measured as the amount of expenditures which are normalised to total employment to control for scale effects and expressed in natural logarithm.

Explanatory variables. To test Hypotheses 1 to 3, we measure macroeconomic uncertainty using sectoral measures of volatility. Based on earlier research (e.g. Byun & Jo, 2018; Desbordes, 2007; Kredler, 2005; Li & Li, 2010), we maintain that firms' perception of uncertainty would differ drastically across sectors because both the degree of exposure to shocks and the capacity to react and absorb them depends on sectoral features, such as (i) the degree of technological diversification: sectors with a greater variety of inputs can mitigate the impact of shocks that affect an individual input (Koren & Tenreyro, 2007); (ii) the degree production diversification, which clearly influences resilience to demand shocks and (iii) the degree of external exposure through imports and exports (Allayannis & Ihrig, 2001; Campa & Goldberg, 1995). This implies that there are inter-sectoral differences in the extent to which firms perceive and are affected by macroeconomic uncertainty. We therefore operationalize macroeconomic uncertainty by considering sectoral information on profits, exports, and imports. Measures of volatility in sectoral profits are taken as a proxy for uncertainty in the production sphere;[8] while measures of volatility in exports and imports are considered as proxying different aspects of uncertainty in the potential demand for firms' products: the former because it indicates something about the (in)stability of international demand, and the latter because it indicates the (in)stability within which competing imports pour into the domestic market.

We used several sources to gather the information needed to calculate our measures of sectoral volatility (i.e. *Export_Volatility; Import_Volatility; Profit_Volatility*). In order to proxy for uncertainty we need to be able to measure unpredictable volatility. Since economic agents predict future outcomes based on historical data, we need to work with the longest timespan possible of sectoral information to create a robust proxy for uncertainty. Information for 1970-1999 comes from the computational Programme of Industrial

[8] We have used value added as an additional variable, but results do not change significantly, so we decided to keep profits as a variable because their dynamics is more directly associated to decision-making processes at the firm-level than is value added.

Dynamics Analysis (PIDA) conducted by United Nations Economic Commission for Latin America and the Caribbean (ECLAC). We extrapolated information from PIDA up-to year 2001 using the Industrial Statistics Database produced by United Nations Industrial Development Organization (UNIDO) and then the database produced by the Ministry for the Economy of Argentina (MEA) to complement data until 2004.[9] Through this merge we obtained a database for exports, imports and profits covering the period 1970-2004 expressed in constant (millions of) US dollars of 1985[10] which was used to build the volatility indicators.

We followed prior studies (Aizenman & Marion, 2004; Desbordes, 2007; Ramey & Ramey, 1995) and we computed sector volatility as the standard deviation over the period 1992-2001 of the residuals of the first-order autoregressive processes (AR(1)). Estimating AR(1) processes over the whole period 1970-2004 controls for past behaviour of the relevant variable, therefore the residuals of these processes consist of that part of the manifestation of the variable that cannot be 'expected' based on past performance. Analysing the variability of these residuals is expected to account for the 'unexpected shocks' or 'unpredictable variability' which triggers the perception of uncertainty about the future.

To test our Hypothesis 2 about the moderation of firms' relative performance on the baseline hypothesis we include the variable *Performance,* measured annually as the difference between firm's labour productivity (firm's sales over its employment) and sectoral (2-digit) labour productivity re-scaled to millions of 1993 pesos.[11] We use this measure to account for firms' social aspirations and use firms operating in Argentina and in the same sector as the relevant group against which firms compare their own performance records.

To test our Hypotheses 3, we include in the analysis the variable *MNE* that takes the value 1 if the firm's capital stock has at least 10% participation of foreign capital, and 0 otherwise.[12]

Control variables. We control for firm's size (*Size*) measured as firm's total employment, both permanent and temporary workers; the square of this variable ($Size^2$) accounts for the non-linearity in the

[9] We only use information on exports and imports from UNIDO, for profits extrapolate values of 1999 from PIDA using growth rates on sales from MEA, since there was no information on profits or value added.
[10] Imports and exports are given in current US dollars, but deflated using the US wholesale price index and both variables are then expressed in constant (millions of) US dollars of 1985.
[11] Sectoral labour productivity was constructed using all information available from the innovation surveys (unbalanced panel).
[12] Ownership of 10% or more of firm voting power by resident from another economy is evidence of a long term relationship and a significant degree of influence on the management of the enterprise and has been standardly considered as FDI. The same variable was used in previous Argentinean studies regarding FDI (Chudnovsky, Lopez, & Rossi, 2008).

relation between size and investment (Katz, 1984; Pavitt, Robson, & Townsend, 1987). We also control for firms' cumulative capabilities including in the analysis the one variable that accounts for firm's knowledge resources (*Skills*), proxied as the ratio between professional workers and total employment and another to account for firms' experience, defined as the number of years since the foundation of the firm (*Age* to which we add the squared term Age^2 to account for non-linearities).

Finally, we include year dummies (*Time*) to control for macroeconomic shocks; and sectoral controls (*Industry*).

Investment Models

We use a semi-balanced panel of firms, with a Random Effects (RE) or a Fixed Effects (FE) model according to the results of the Hausman test (Wooldridge, 2010).

Since indicators of volatility are time-invariant (i.e. the same score of volatility applies to the whole cohort of the analysis) the explanatory power of these variables is cross-sectional. For this reason, FE models have to be estimated in two steps: the FE components were estimated in the first step using all time-variant information (i.e. *MNE*, *Performance*, *Size*, $Size^2$, *Age*, Age^2, *Skills*, and *Time*). In a second step, those FE components, weighted by their standard deviations, were regressed on the time-invariant information (i.e. *Export_Volatility*, *Import_Volatility*, *Profit_Volatility*). This is performed when the Hausman test is rejected, otherwise RE models are more efficient, and therefore preferred over FE models.

RESULTS

Table 1 presents descriptive statistics and correlations matrix. We tested for multicollinearity among the variables by calculating variance inflation factors, which were well below the rule-of-thumb threshold value of 10 for all variables.

Table 1 about here

Table 2 contains the results for the main test of Hypothesis 1, which predicted that macro-uncertainty (i.e. export, import and profit volatility) causes firms to invest less in innovation, distinguishing between investment in capital goods and investment in R&D. The Hausman test was rejected for the models having *CapitalGoods_Intensity*, *CapitalGoods_Probability* and *R&D_Intensity* as dependent variables. In these cases, we estimated two-step FE models. The coefficients presented in Table 2 – Models 1-9, are the effect

of regressors on the FE components of the dependent variables. The Hausman test was not rejected for *R&D_Probability*, so in the case the coefficients are those resulting from the RE models.

Our results provide support to Hypothesis 1 about the negative relationship between macro-economic uncertainty and investments in innovation, but mostly with reference to investment in capital goods. We find that *Export_Volatility*, *Import_Volatility* and *Profit_Volatility* negatively affect *CapitalGoods_Probability* (respectively β = -0.09 p =0.003, Model 7; β = -0.32 p =0.000, Model 8; β = -0.87 p =0.000, Model 9), which means that a one-unit increase in our measurement of *Export_Volatility* (or *Import Volatility or Profit_Volatility*) is associated with 0.09 (or 0.32 or 0.87) standard deviations of the FE component of the probability to invest in capital goods. In the case of *CapitalGoods_Intensity* we found support to our Hypothesis 1 for *Profit_Volatility* (β = -1.60 p =0.000, Model 3) indicating that a one-unit increase in *Profit_Volatility* is associated with a severe reduction of 1.60 standard deviation of the FE component of the capital goods intensity.

In the case of R&D, we only find support to Hypothesis 1for *Import_Volatility* on *R&D_Intensity* (β = -0.91 p =0.003, Model 5). Contrary to our expectations, *Export_Volatility* positively affects *R&D_Intensity* (β = 0.31 p =0.000, Model 4) which therefore does not provide support to our hypothesis.

Table 2 about here

Hypothesis 2, which predicted that *Performance* moderates the relationship between macro uncertainty and innovative investment, is tested in Models 13-24 reported in Table 3. The Hausman test was rejected for the models having *CapitalGoods_Intensity*, *CapitalGoods_Probability* and *R&D_Intensity* as dependent variables. In these cases, we estimated two-step FE models. The coefficients presented in Table 3 – Models 13-21, are the effect of regressors on the FE components of the dependent variables. The Hausman test was not rejected for *R&D_Probability*, so in the case the coefficients are those resulting from the RE models.

We find support for this hypothesis for specific types of volatility measures on both types of investments. In capital goods, the hypothesis is supported for *Import_Volatility*, where the interaction term is positive and significant (β = 3.15, p = 0.057, Model 14 for *CapitalGoods_Intensity*; β = 1.39, p = 0.002,

Model 20 for *CapitalGoods_Probability*). These results are also shown graphically in Figure 3c and 3d.[13] Similarly, when we account for *Export_Volatility*, the interaction term with *Performance* is positive and significant for *CapitalGoods_Intensity* (β = 4.43, p =0.000; Model 13). As can be seen in Figure 3a the effect of volatility on *CapitalGoods_Intensity* is negative for those that perform below the mean and fairly positive for high performers, meaning the hypothesis is supported.

In terms of R&D the moderation term is positive and significant in the case of the effect of *Import_Volatility* on *R&D_Probability* (β = 0.78, p = 0.041, Model 23 – Figure 3e), which also supports Hypothesis 2. Also, the moderation effect exists for this type of investment but it is opposite to the expected in the case of *Export_Volatility* (β = -0.56, p =0.001, Model 22). In that case, the effect of is negative for higher performers (Figure 4a). In relation to *R&D_Intensity* there is evidence of a moderation effect of performance in the direction stipulated by Hypothesis 2 in the case of *Export_Volatility*. The coefficient of the interaction term is positive and significant on *R&D_Intensity (*β = 3.75, p =0.002, Model 16 - Figure 3b).

Finally, when we account for *Profit_Volatility*, our Hypothesis 2 is never supported. We note that in Model 24 - *R&D_Probability* being the dependent variable - the interaction term is negative and significant (β = -1.04, p = 0.036). Figure 4b illustrates this result graphically.

Table 3 about here

Figure 3 about here

Figure 4 about here

Hypothesis 3 predicted a positive moderating role of *MNE* on the main relationship and is tested through models 25-36 shown in Table 4. The Hausman test was rejected for the models having *CapitalGoods_Intensity*, *CapitalGoods_Probability* and *R&D_Intensity* as dependent variables. In these cases, we estimated two-step FE models. The coefficients presented in Table 4 (Models 25-33) are the effect of regressors on the FE components of the dependent variables. The Hausman test was not rejected for *R&D_Probability*, so in this case the coefficients are those resulting from the RE models.

[13] We use the mean value of the moderator and one standard deviation above and below the mean value to denote high and low levels respectively.

Hypothesis 3 is very much supported for all measures of capital goods and for all measures of volatility, with the only exception of Model 26 (*Import_Volatility* on *CapitalGoods_Intensity*). For all the others combinations the moderation term behaves as expected (i.e. on *CapitalGoods_Intensity* see Model 25: $\beta = 3.40$, $p = 0.000$; and Model 27: $\beta = 4.32$, $p = 0.000$, for exports and profits' volatility respectively, and on *CapitalGoods_Probability* see Model 32: $\beta = 1.63$, $p = 0.000$; Model 32: $\beta = 0.49$, $p = 0.006$; and Model 33: $\beta = 1.38$, $p = 0.000$, for measures of exports, imports and profits' volatility respectively). As can be seen in Figures 5a, b, c, e, and f, the effect of volatility is negative for domestic firms and positive for MNEs.

The hypothesis is only partially supported for investments in R&D. When the dependent variable is *R&D_Probability* the moderation effect is positive, but low in the case of *Import_Volatility* ($\beta = 0.33$, $p = 0.006$, Model 35) and *Profit_Volatility* ($\beta = 0.49$, $p = 0.04$, Model 36). This is also illustrated in Figures 5d and 5g.

When the dependent variable is *R&D_Intensity* we find that, contrary to our prediction, the coefficient of the interaction term is negative and significant for all the measures of volatility, namely *Export_Volatility* ($\beta = -0.52$, $p = 0.000$, Model 28), *Import_Volatility* ($\beta = -4.35$, $p = 0.000$, Model 29) and *Profit_Volatility* ($\beta = -5.18$, $p = 0.000$, Model 30) – see Figure 6 (a-c) for an illustration of the negative effects. We address the implications of these results below.

Table 4 about here

Figure 5 about here

Figure 6 about here

DISCUSSION AND CONCLUSIONS

Discussion

All in all, our results support our baseline hypothesis about a negative relationship between macroeconomic uncertainty and investments in innovation, but only with reference to machine-embodied innovations (i.e. investments in capital goods). We find that volatility in profits influences negatively both the probability and intensity of such investments, while the volatility of both imports and exports negatively affects the probability of acquiring capital goods. Results about R&D investments, however, are different. While we do

find some mild support to our baseline hypothesis in the case of import volatility (a proxy for domestic demand uncertainty), which affects negatively the intensity of R&D investments, we do not find conclusive results otherwise. In contrast, we observe that higher fluctuations in export volatility increase, rather than decrease, the intensity in R&D investments. However, in commenting this result we should also consider the interaction terms, as when we account for them, we find that export volatility increases investment only for high (or average) performers, but not for low performers. Similarly, when domestic or foreign firms are considered separately, the relation between export volatility and R&D intensity is also not significant.

The diverging results between investments in capital goods and R&D were not theorized and therefore deserve due consideration here. While it is true that both investments are non-liquid and, to a large extent, irreversible, as they involve sunk costs that can neither be easily recovered nor can they be used for a different purpose, there are also remarkable differences among the two investments, which may provoke potentially different responses to similar stimuli from the macroeconomic context. R&D investment needs persistent behaviour, much more than investment in capital goods. Past decisions have a greater influence on present performance due to learning by doing and the degree of tacitness of the knowledge involved. Although a firm that invests in a capital good will benefit from having invested in other capital goods in the past, the knowledge feedback between the two investments is probably of lower relevance than the one generated among successive R&D investments. Also, the knowledge required to get successful results from putting a machine to work is less tacit and it is possible to understand how a new machinery works without a previous accumulation of capital stock (e.g. by hiring technical assistance or perhaps just acquiring the appropriate manuals). The importance of knowledge accumulation means that R&D investment may be less reactive towards changes in the contextual environment than investments in capital goods because, for the latter, the 'wait and see' behaviour involves less opportunity costs. In addition, R&D is more complex: the ultimate outcome of such decision is nearly intrinsically uncertain. Thus, economic actors would be less able to assess how different contextual conditions (e.g. future interest rates) would impact on R&D productivity than on capital goods' productivity.

It seems to us that because of their very nature, R&D investments may be less affected by actors' perception of uncertainty, while investments in machine-embodied technologies may be more easily postponed and be me more subject to decision makers' own optimistic or pessimistic sentiments' shifts about

their prospects for the future. In that context, it is interesting to note that, as compared to other measures of volatility, export volatility has a positive impact on R&D investments for firms that perform at average or above the average level of the industry, which sparks questions about the impact that export markets have on decision makers. One possibility is that, in line with our theoretical argument, for firms whose performance does not indicate that they are struggling to survive, export volatility prompts them to engage in forward-looking calculations which may lead companies to rush off to progress with their R&D projects, especially near completion projects, before it gets worse.

Considerations about the potential sentiments of decision makers in this particular context, bring us directly to comment further on the results about the moderating role of performance relative to industry. Original behavioral theory of the firm's conceptualizations were purposefully very simplistic (Posen et al., 2018) and suggested that when firms perform below their aspiration levels they engage in problemistic search in a bid to mend their performance shortfalls. Following earlier research, we set the aspiration levels by considering the industry as a reference group, thus emphasizing the social component of aspirations. In our theorizing, we have however modified the standard predictions of the behavioral theory of the firm and performance feedback theory in particular (e.g.Audia & Greve, 2006; Greve, 1998, 2003), by arguing that the context where these firms are accustomed to operate is one of historical turbulence and uncertainty, which prompts us to consider a different cognitive model for decision makers. We predicted that this context, where firms are used to uncertainty, will bring poor performing firms to shift priorities and attention from the search of high performance to survival. Thus, they will value more their potential losses over their potential gains, and they will fear the former more than they will perceive to be praised by the latter. Our results do provide some support to this argument: we find that, as export and import volatility increase, the decline in investments in capital goods is more severe for low performing firms, than for firms that perform better than the industry average. Moreover, we do see that the positive baseline relationship that we find between export volatility and intensity of R&D investments is non positive (it is flat) for poor performers. We also find that, when we account for the moderating effect of performance relative to industry, the baseline relationship between import volatility and probability of R&D investments only remains negative for poor performers and turns up flat for high (and average) performers.

Our results here resonate with research on the relationship between performance shortfalls and risk-taking (Klingebiel, 2018), which draws on threat rigidity (Staw, Sandelands, & Dutton, 1981) and suggests that in threatening and very adverse situations, poor performers are less likely to take risks, while high performers are more keen to take risks to keep on being in a leadership position. In this article, we consider that the legacy of a perennial unstable macroeconomic environment would make firms uncertain about the future and thus shape the behavior of economic decision makers, even in the relative dead calm offered by the Convertibility period in the 1990s. These contextual conditions, we argue, will shift the attention of decision makers and modify their sentiments and cognitions in ways that standard performance feedback theory would have not predicted.

Finally, in line with our predictions, subsidiaries of foreign MNEs and domestic firms react differently to macroeconomic volatility. MNE subsidiaries demonstrate greater resilience: their investments in capital goods are less likely to be affected by increasing macroeconomic uncertainty. We have conjectured that this superiority may be due to MNEs' subsidiaries' internationality and foreignness: the former creates more opportunities for diversifying the risk (Rugman, 1976) and therefore relaxes decision makers' in the presence of uncertainty; the latter may be acting as a concurrent force that urges companies to demonstrate commitment and reliability even in more volatile contexts. While this result was largely expected, some surprising findings are also to be noted. We found fairly consistent results across the three types of volatilities showing that, as they increase, MNE subsidiaries seem to decrease the amount of investments in R&D – although not their decisions to invest in R&D which do not react to macroeconomic uncertainty. So, they may invest in R&D, but modulate their amounts and they do that more than domestic firms, whose amounts in R&D expenditures are only marginally affected by these fluctuations (only negatively and significantly affected in the case of uncertainty about domestic demand i.e. *Import_Volatility*).

Contributions

At the beginning of this article we stated that it has never been easy to innovate for emerging or developing country firms. We agree that some progress has been made over the years, especially in China and other parts of Asia, where technological catching up has been achieved in some sectors (Petralia et al., 2017), and more generally there are examples of firms that have managed to become world-wide technological leaders in spite of– or perhaps thanks to (Luo & Tung, 2007) - the weaknesses of their home countries. Despite these

positive notes, most emerging and developing countries still fail to climb the ladder of technological and economic development and we seek to explain why it may be so, by delving into some of the factors that influence innovative decisions in such contexts. We focus here on macroeconomic uncertainty because many such economies are thorn by perennial policy switches and the unpredictable macroeconomic changes, especially in Latin America which is one of the regions where technological progress has been limited. We argue that these unstable conditions affect the sentiments of economic decision makers and undermine their propensity to take risks by fostering a defensive strategy that lasts also at time of stable macroeconomic conditions.

We believe our study contributes to knowledge about the nature of innovation in the context of emerging economies in two ways. First, by showing that macroeconomic uncertainty influences innovative decisions, but it does so selectively: it largely affects negatively decisions to invest in capital goods, and it strikes down especially poor performers and domestic firms, while high performers and subsidiaries of foreign MNEs seem to be more able to face the uncertainty. We conjecture that firms are uncertain about the sustainability and trustfulness of key macroeconomic variables even in periods of dead calm, that is, when macroeconomic policies seem to be sustainable and guarantee certain stability on main macroeconomic indicators, such as the Convertibility regime in Argentina. This is because economic actors have been subject to historical patterns of macroeconomic instability which make them distrust any policy reform and it is interesting because it tells a lot about the legacy of long periods of macroeconomic instability, which often characterizes emerging or developing countries. The social and historical context feeds firms' perceptions and visions of the world; it permeates economic decision makers' sentiments and remains with them even when the storm has ended, and it would be possible to navigate at full speed.

Thus, one conceptual contribution of this study is that it is not just economic instability what negatively affects investment, but also *perceived* uncertainty since there is a social dimension to be considered when we assess decision makers' individual behavior (see also Keynes, 1936). We therefore suggest that research that seeks to investigate the causes or impediments of innovation in emerging or developing countries pays due consideration to the macroeconomic context and the degree to which uncertainty – either in the present or induced by past macroeconomic instability - affects investments decisions.

The negative impact of uncertainty on investment decisions in capital goods is if course not new (e.g. Caballero & Pindyck, 1996; Pindyck, 1988; Pindyck & Solimano, 1993), especially in the literature on developing countries (e.g. Kasahara, 2004; Ramey & Ramey, 1995). IB research on MNE strategies has also looked at the impact of uncertainty on entry or ownership strategies (e.g. Aizenman & Marion, 2004; Byun & Jo, 2018; Cuypers & Martin, 2010; Desbordes, 2007; Li & Li, 2010). We enrich this strand of research by focusing on innovation and show how macroeconomic uncertainty influences investments in capital goods and in R&D differently. Our evidence here connects research on the nexus between to uncertainty and investments to the literature on technological capability accumulation in developing countries (e.g. Collinson & Wang, 2012; Dantas & Bell, 2011; Figueiredo, 2011) showing that, while investments in capital goods may suffer from intermissions and cause discontinuities in the processes of production capacity building, such intermissions are less likely in the case of R&D, suggesting that once R&D projects start there is a reward in continuing them, and the uncertain characteristics of the process itself, due to its complexity, make it more complicated to assess how key variables in the macro context could affect rewards. Moreover, we do find that this is particularly true for some firms but not for others, particularly poor performers and domestic firms, demonstrating the importance of considering the heterogeneous nature of companies when assessing the extent to which external pressures influence decisions to invest in innovation.

Implications for policy

One general implication for policy is that when macroeconomic policies change to stabilize the economic fundamentals, their impact on economic decision making might not be so straightforward as predicted by the policy design, especially if we abandon the idea that economic actors are rational. For example, the Convertibility Plan itself was designed as a *shock* programme to signal strong commitment to combat firms' defensive behavior, for instance by preventing inflationary practices. Policy-makers implemented structural changes to the economic system and stuck rigidly to the rules to signal such commitment. Whatever the strength of this kind of policy signal, however, it becomes clear that it cannot cancel all-of-a-sudden the consolidated sentiments of economic decision makers, who in the past have had to face numerous policy switches and abrupt macroeconomic crises and which we claim can interfere with the willingness of firms to take risks. It seems to us, therefore, that changes in macroeconomic policies should not take for granted that economic decision makers will forget their past experiences and react immediately to the new signals. To

address these problems, it could be useful to make specific efforts in the technology and innovation arenas, for example, by developing institutions to support the innovative efforts of domestic firms and, especially, to reduce ambiguity and uncertainty attached to technological activities. The attraction of foreign investors can reinforce policy makers' endeavors of signaling stability, because, though limitedly to capital goods investments, MNE subsidiaries seem to be less affected by uncertainty and therefore they may act as signals for other firms – although our study did not focus on such spillover effects per se.

Limitations and further research

Argentina is a specific case and therefore these results cannot be generalized to all emerging and developing countries, but they certainly can spark thinking about how macroeconomic policies, as well as other economic reforms sometimes suggested or imposed by international donors, can shape decision making over the long term in institutionally fragile contexts – including, but not limitedly to, post-conflict countries. Data limitations are also an issue because we rely on secondary data sources collected in different rounds through non-identical questionnaires, which means that we could only exploit the variables that were consistently collected through the various waves. Moreover, these data fall short in providing alternative measures of performance, and they do not allow for an analysis of industrial dynamics (i.e. firm entry and exit).

REFERENCES

Acemoglu, D., Johnson, S., Robinson, J., & Thaicharoen, Y. 2003. Institutional causes, macroeconomic symptoms: Volatility, crises and growth. *Journal of Monetary Economics*, 50(1): 49–123.

Aizenman, J., & Marion, N. 2004. The merits of horizontal versus vertical FDI in the presence of uncertainty. *Journal of International Economics*, 62(1): 125–148.

Allayannis, G., & Ihrig, J. 2001. Exposure and markups. *Review of Financial Studies*, 14(3): 805–835.

Arza, V. 2009. Macroeconomic instability in Argentina, 1963-2003. *Revista de Economía Política de Buenos Aires*, 5/6: 33–71.

Audia, P. G., Brion, S., & Greve, H. R. 2015. Self-assessment, self-enhancement, and the choice of comparison organizations for evaluating organizational performance. *Advances in Strategic Management*, (November): 89–118.

Audia, P. G., & Greve, H. R. 2006. Less likely to fail: Low performance, firm size, and factory expansion in the shipbuilding industry. *Management Science*, 52(1): 83–94.

Bartlett, C., & Ghoshal, S. 1989. *Managing across borders*. Boston, MA: Harvard Business School Press.

Bell, M. 1984. 'Learning'and the accumulation of industrial technological capacity in developing countries. In F. M. & K. King (Eds.), *Technological capability in the Third World*: 187–209. Palgrave Macmillan, London.

Bell, M., & Albu, M. 1999. Knowledge systems and technological dynamism in industrial clusters in developing countries. *World Development*, 27(9): 1715–1734.

Bell, M., & Pavitt, K. 1993. Technological accumulation and industrial growth: Contrast between developed and developing countries. *Industrial and Corporate Change*, 2: 157–210.

Birkinshaw, J., & Fry, N. 1998. Subsidiary initiatives to develop new markets. *Sloan Management Review*, 39(3): 51–61.

Bonvecchi, C., & Porta, F. 2003. Las condiciones de consistencia micro-macroeconómicas. In B. Kosacoff (Ed.), *Componentes macroeconómicos, sectoriales y microeconómicos para una estrategia nacional de desarrollo. Lineamientos para fortalecer las fuentes de crecimiento económico.* Buenos Aires: IADB-ECLAC.

Buckley, P. J., Chen, L., Clegg, L. J., & Voss, H. 2018. Risk propensity in the foreign direct investment location decision of emerging multinationals. *Journal of International Business Studies*, 49(2): 153–171.

Byun, S. J., & Jo, S. 2018. Heterogeneity in the dynamic effects of uncertainty on investment. *Canadian Journal of Economics*, 51(1): 127–155.

Caballero, R. J., & Pindyck, R. S. 1996. Uncertainty, investment, and industry evolution. *International Economic Review*, 37(3): 641–662.

Campa, J., & Goldberg, L. S. 1995. Investment in manufacturing, exchange rates and external exposure. *Journal of International Economics*, 38(3–4): 297–320.

Chudnovsky, D., Lopez, A., & Rossi, G. 2008. Foreign direct investment spillovers and the absorptive capabilities of domestic firms in the Argentine manufacturing sector (1992-2001). *Journal of Development Studies*, 44(5): 645–677.

Clarke, J. E., & Liesch, P. W. 2017. Wait-and-see strategy: Risk management in the internationalization process model. *Journal of International Business Studies*, 48(8): 923–940.

Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35: 128–152.

Collinson, S. C., & Wang, R. 2012. The evolution of innovation capability in multinational enterprise subsidiaries: Dual network embeddedness and the divergence of subsidiary specialisation in Taiwan. *Research Policy*, 41(9): 1501–1518.

Corredoira, R. A., & Mcdermott, G. A. 2014. Adaptation, bridging and firm upgrading: How non-market institutions and MNCs facilitate knowledge recombination in emerging markets. *Journal of International Business Studies*, 45(6): 699–722.

Cuervo-Cazurra, A., & Genc, M. 2008. Transforming disadvantages into advantages: Developing-country MNEs in the least developed countries. *Journal of International Business Studies*, 39(6): 957–979.

Cuypers, I. R., & Martin, X. 2010. What makes and what does not make a real option? A study of equity shares in international joint ventures. *Journal of International Business Studies*, 41(1): 47–69.

Cyert, R. M., & March, J. G. 1963. *A behavioral theory of the firm*. Englewood Cliffs, NJ Prentice-Hall.

Dahlman, C. J., Ross-Larson, B., & Westphal, L. E. 1987. Managing technological development: Lessons from the newly industrializing countries. *World Development*, 15(6): 759–775.

Dantas, E., & Bell, M. 2011. The co-evolution of firm-centered knowledge networks and capabilities in late industrializing countries: The case of petrobras in the offshore oil innovation system in Brazil. *World Development*, 39(9): 1570–1591.

Desbordes, R. 2007. The sensitivity of U.S. multinational enterprises to political and macroeconomic uncertainty: A sectoral analysis. *International Business Review*, 16(6): 732–750.

Dixit, A. K., & Pindyck, R. S. 1994. *Investment under uncertainty*. Princeton, N.J.: Princeton University Press.

Dosi, G. 1997. Opportunities, incentives and the collective patterns of technological change. *The Economic Journal*, 107(September): 1530–1547.

Dosi, G., Freeman, C., Nelson, R., Silverberg, G., & Soete, L. 1988. *Technical change and economic theory*.

Fanelli, J. M. 2002. Growth, instability and the convertibility crisis in Argentina. *Cepal Review*, 77: 25–43.

Figueiredo, P. N. 2011. The role of dual embeddedness in the innovative performance of MNE subsidiaries: Evidence from Brazil. *Journal of Management Studies*, 48(2): 417–440.

Fransman, M. 1982. Learning and the capital goods sector under free trade: The case of Hongkong. *World Development*, 10(11): 991–1014.

Fu, X., Pietrobelli, C., & Soete, L. 2011. The role of foreign technology and indigenous innovation in the emerging economies: Technological change and catching-up. *World Development*, 39(7): 1204–1212.

Gilchrist, S., & Williams, J. C. 2005. Investment, capacity, and uncertainty: A putty-clay approach. *Review of Economic Dynamics*, 8(1): 1–27.

Giuliani, E., Pietrobelli, C., & Rabellotti, R. 2005. Upgrading in global value chains: Lessons from Latin American clusters. *World Development*, 33(4): 549–573.

Gooderham, P. N., & Grøgaard, B. 2013. *International management: Theory and practice.* Edward Elgar Publishing.

Govindarajan, V., & Ramamurti, R. 2011. Reverse innovation, emerging markets, and global strategy. *Global Strategy Journal*, 1: 191–205.

Greve, H. R. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly*, 43(1): 58–86.

Greve, H. R. 2003. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of Management Journal*, 46(6): 685–702.

Grossman, G. M., & Helpman, E. 1994. *Technology and trade*. No. NBER working paper series 4926.

Hoskisson, R. E., Eden, L., Lau, C. M., & Wright, M. 2000. Strategy in emerging economies. *Academy of Management Journal*, 43(3): 249–267.

Hymer, S. 1976. *The international operations of national firms: A study of direct investment.* Cambridge, MA: MIT Press.

Kahneman, D., & Tversky, A. 1979. Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2): 263–292.

Kasahara, H. 2004. Technology adoption under relative factor price uncertainty: The putty-clay investment model. *Society for Economic Dynamics*.

Katz, J. M. 1984. Domestic technological innovations and dynamic comparative advantage: Further reflections on a comparative case-study program. *Journal of Development Economics*, 1–2(16): 13–37.

Keynes, J. M. 1936. *The general theory of employment, interest, and money*. New York: H arcourt, Brace &

World.

Khanna, T., & Palepu, K. G. 2004. *Emerging giants: Building world class companies from emerging markets*. *Harvard Business School*.

Klingebiel, R. 2018. Risk-type preference shifts in response to performance feedback. *Strategic Organization*, 16(2): 141–166.

Koren, M., & Tenreyro, S. 2007. Volatility and development. *Quarterly Journal of Economics*, 122(1): 243–287.

Kostova, T., & Zaheer, S. 1999. Organizational legitimacy under conditions of complexity: The case of the multinational enterprise. *Academy of Management Review*, 24(1): 64–81.

Kredler, M. 2005. *Sector-specific volatility patterns in investment*. No. Economics Working Paper Archive at WUSTL Series Macroeconomics(0501016).

Kuemmerle, W. 1997. Building effective R&D capabilities abroad. *Harvard business review*, 75: 61–72.

Lall, S. 1992. Technological capabilities and industrialization. *World Development*, 20(2): 165–186.

Lee, C.-K., & Hung, S.-C. 2014. Institutional entrepreneurship in the informal economy: China's Shan-Zhai mobile phones. *Strategic Entrepreneurship Journal*, 8: 16–36.

Lee, S. H., & Makhija, M. 2009. The effect of domestic uncertainty on the real options value of international investments. *Journal of International Business Studies*, 40(3): 405–420.

Li, J., & Li, Y. 2010. Flexibility versus commitment: MNEs' ownership strategy in China. *Journal of International Business Studies*, 41(9): 1550–1571.

Luo, Y., & Tung, R. L. 2007. International expansion of emerging market enterprises: A springboard perspective. *Journal of International Business Studies*, 38(4): 481–498.

Madhok, A., & Keyhani, M. 2012. Acquisitions as entrepreneurship: Asymmetries, opportunities, and the internationalization of multinationals from emerging economies. *Global Strategy Journal*, 2(1): 26–40.

Marin, A., & Bell, M. 2006. Technology spillovers from foreign direct investment (FDI): The active role of MNC subsidiaries in Argentina in the 1990s. *The Journal of Development Studies*, 42(4): 678–697.

Mcdermott, G. A., Corredoira, R. A., & Kruse, G. 2017. Public-private institutions as catalysts of upgrading in emerging market societies. *Academy of Management Journal*, 52(6): 1270–1296.

Narula, R., & Dunning, J. H. 2010. Multinational enterprises, development and globalization: Some

clarifications and a research agenda. *Oxford Development Studies*, 38(3): 263–287.

Nelson, B. R. R., & Winter, S. G. 1982. The Schumpeterian tradeoff revisited. *The American Economic Review*, 72(1): 114–132.

Nelson, R. P., & Pack, H. 1999. The Asian miracle and modern growth theory. *The Economic Journal*, 109(457): 416–436.

OECD. 2016. *Stimulating digital innovation for growth and inclusiveness: The role of policies for the successful diffusion of ICT*. *OECD Publishing*.

Pavitt, K., Robson, M., & Townsend, J. 1987. The size distribution of innovating firms in the UK: 1945-1983. *The Journal of Industrial Economics*, 35(3): 297–316.

Perez, C., & Soete, L. 1988. Catching up in technology: entry barriers and windows of opportunity. In G. Dosi, C. Freeman, R. Nelson, G. Silverberg, & L. Soete (Eds.), *Technical change and economic theory*: 458–479. London: Francis Pinter.

Petralia, S., Balland, P. A., & Morrison, A. 2017. Climbing the ladder of technological development. *Research Policy*, 46(5): 956–969.

Pindyck, R. S. 1988. Irreversible investment, capacity choice, and the value of the firm. *The American Economic Review*, 78(5): 969–985.

Pindyck, R. S., & Solimano, A. 1993. *Economic instability and aggregate investment*. No. Nber Working Paper Series No. 4380.

Posen, H., Keil, T., Kim, S., & Meissner, F. 2018. Renewing research on problemistic search - A review and research agenda. *Academy of Management Annals*, 12(1): 208–251.

Prahalad, C. K. 2004. *The fortune at the bottom of the pyramid*. Wharton School Publishing.

Ramey, G., & Ramey, V. A. 1995. Cross-country evidence on the link between volatility and growth. *The American Economic Review*.

Romer, P. M. 1956. A pure theory of local expenditures. *Journal of Political Economy*, 64(5): 416–424.

Romer, P. M. 1990. Endogenous technological change. *Journal of Political Economy*, 98(5): S71–S102.

Rugman, A. M. . 1976. Risk reduction by international diversification. *Journal of International Business Studies*, 7(2): 75–80.

Simon, H. A. 1955. A behavioral model of rational choice. *The Quarterly Journal of Economics*, 69(1): 99–

118.

Spiller, P. T., & Tommasi, M. 2003. The institutional foundations of public policy: A transactions approach with application to Argentina. *Journal of Law, Economics, and Organization*, 19(2): 281–306.

Staw, B. M., Sandelands, L. E., & Dutton, J. E. 1981. Threat rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly*, 26(5): 501–524.

Un, C. A. 2016. The liability of localness in innovation. *Journal of International Business Studies*, 47(1): 44–67.

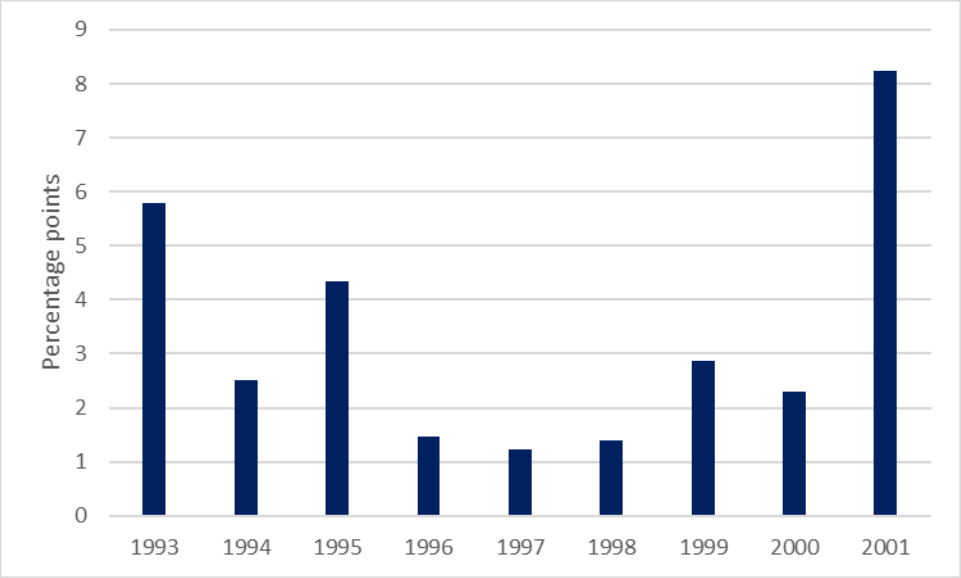
UNCTAD. 2003. *World investment report 2003. FDI policies for development: National and international perspectives.*

Wooldridge, J. M. 2010. *Econometric analysis of cross section and panel data.* Harvard, MA: MIT Press.

Zaheer, S. 1995. Overcoming the liability of foreignness. *Academy of Management Journal*, 38(2): 341–363.

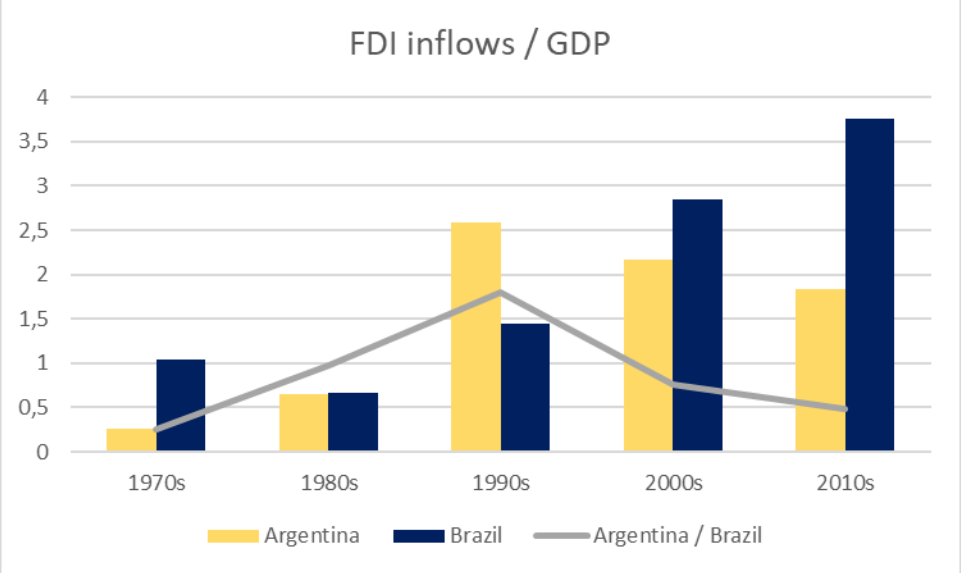
FIGURES

Figure 1. Difference in interest rates on deposits denominated in national and foreign currency



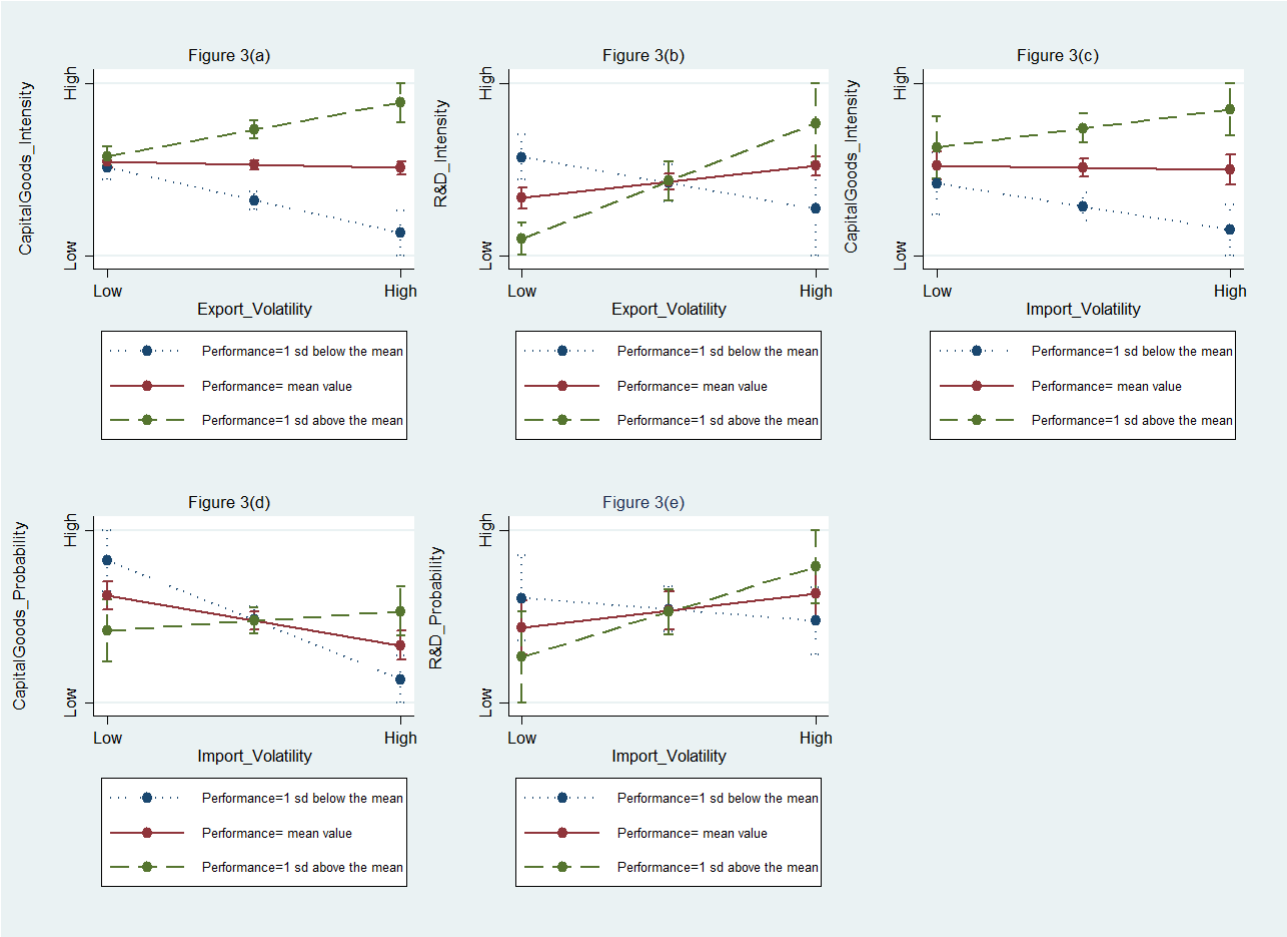
Source: Central Bank Argentina

Figure 2. Foreign Direct Investment inflows as a proportion of GDP, 1970-2017



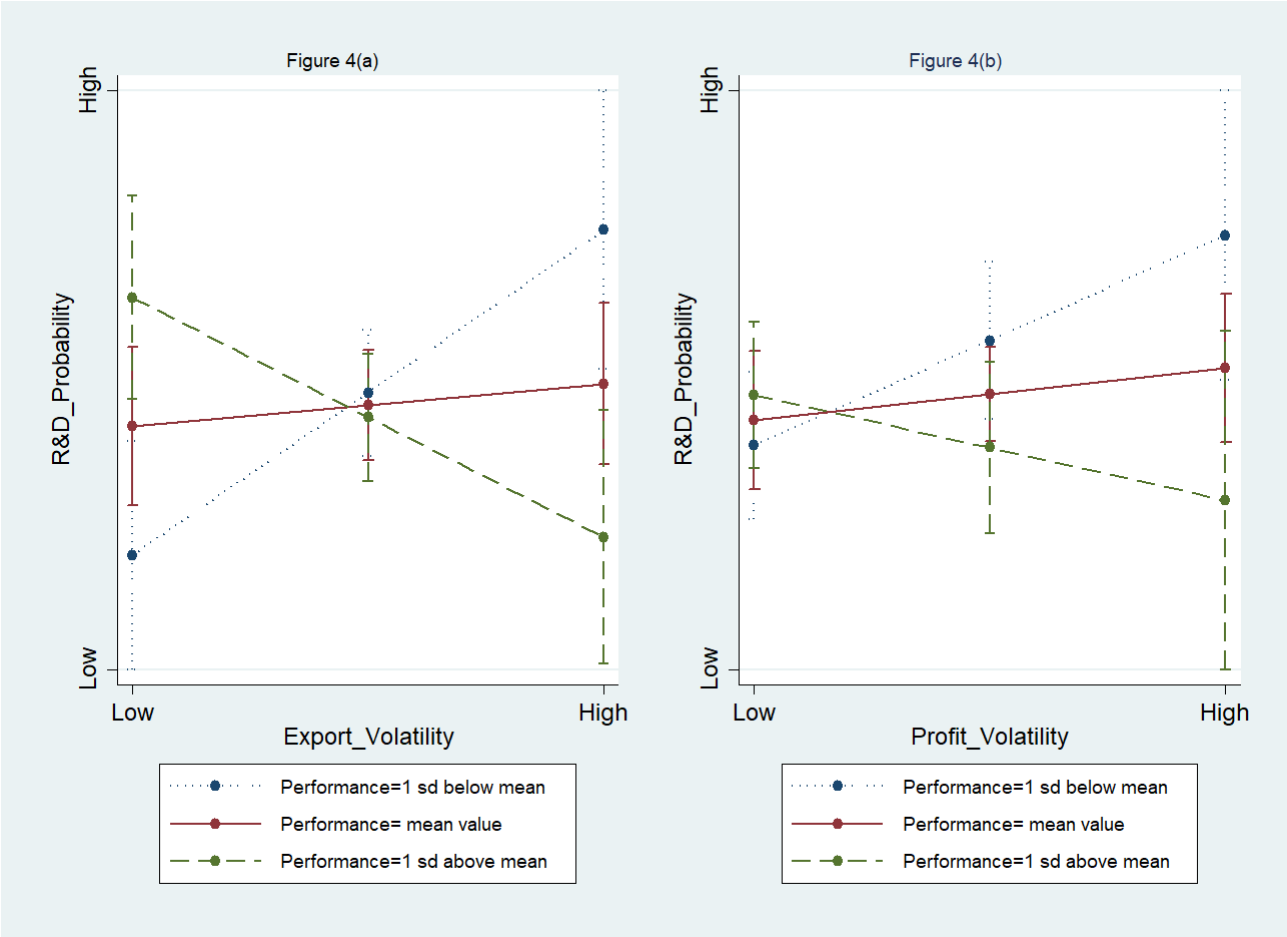
Source: World Development Indicators
Note: Data for Argentina starts in 1970 and for Brazil in 1975. For both countries last data available is 2017.

Figure 3. Moderating effect of firm's performance on the baseline relationship



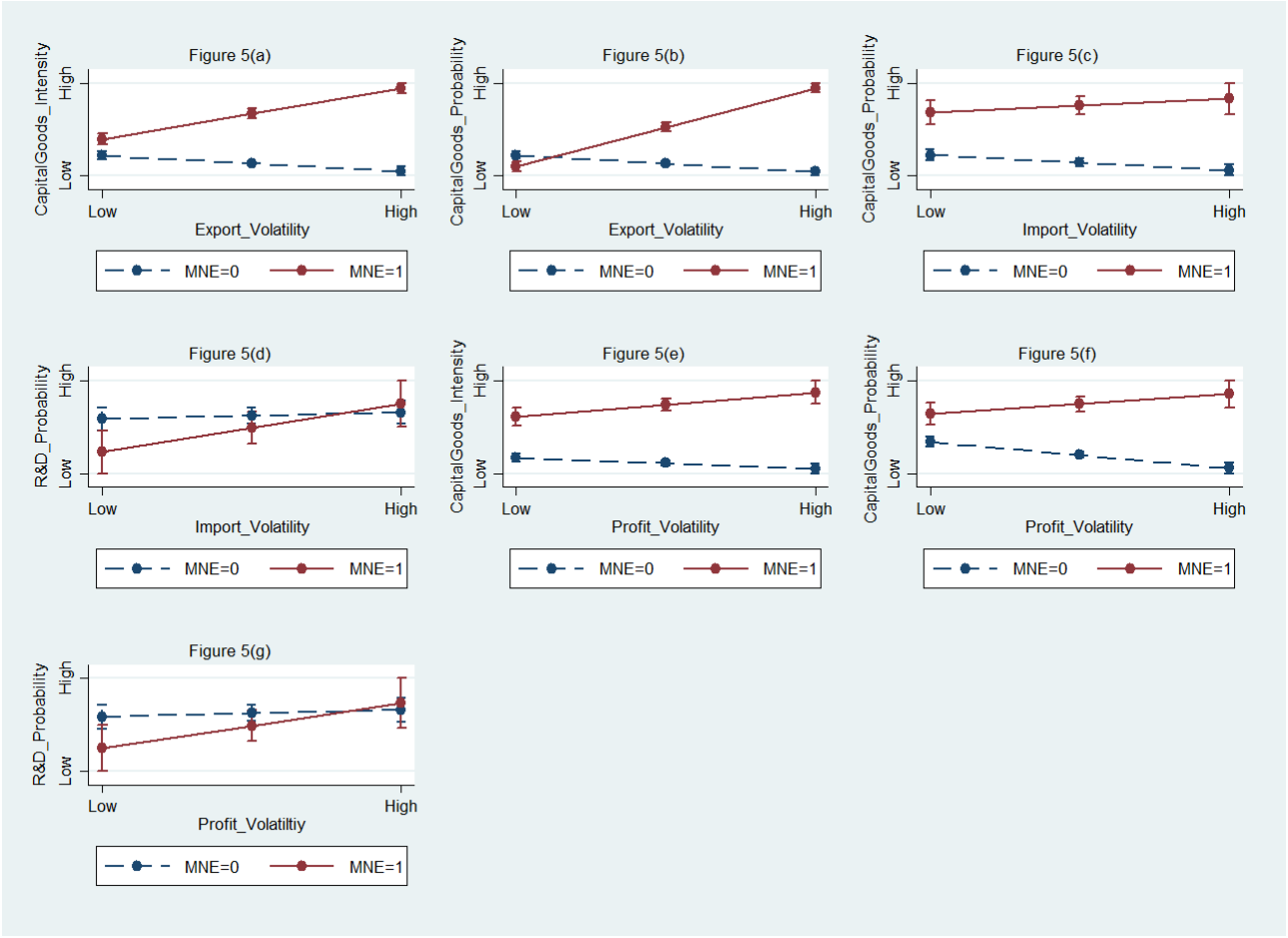
Note: The figure shows the moderating role of firm's performance on the baseline relationship when Hypothesis 2 is supported, i.e. when the coefficient of the interaction between *Performance* and *Export_Volatility*, *Import_Volatility*, *Profit_Volatility* is positive and significant. The plots are based on regression results of the models of Table 3.

Figure 4. Moderating effect of firm's performance on the baseline relationship



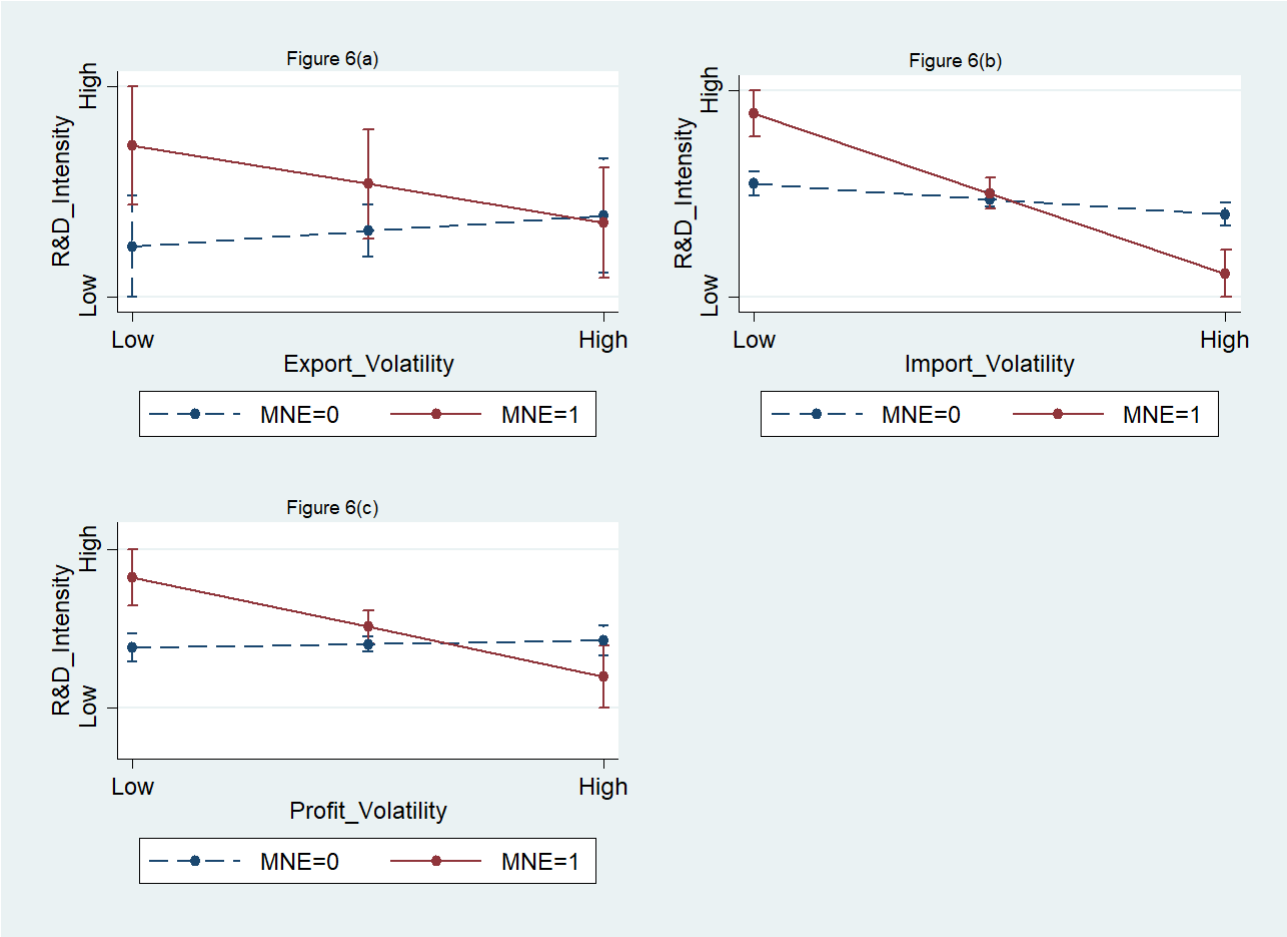
Note: The figure shows the moderating role of firm's performance on the baseline relationship when Hypothesis 2 is not supported, i.e. when the coefficient of the interaction between *Performance* and *Export_Volatility, Import_Volatility, Profit_Volatility* is negative and significant. The plots are based on regression results of respectively Models 22 and 24 of Table 3.

Figure 5. Marginal plots for the moderating role of MNE on the baseline relationship



Note: The figure shows the moderating role of being a multinational firm instead of a domestic one on the baseline relationship when Hypothesis 3 is supported, i.e. when the coefficient of the interaction between *MNE* and *Export_Volatility*, *Import_Volatility*, *Profit_Volatility* is positive and significant. The plots are based on regression results of the models of Table 4.

Figure 6. Marginal plots for the moderating role of MNE on the baseline relationship



Note: The figure shows the intensity of investment in R&D for different levels of sectoral volatility (in export (a), import (b), and profit (c)) for multinational firms (i.e. MNE=1), and domestic firms (i.e. MNE=0). The plots are based on regression results of Models 31-33, Table 4.

TABLES

Table 1. Descriptive statistics and correlation matrix

	Variables	Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11
1	*CapitalGoods_Intensity*	8056.12	40126.59											
2	*R&D_Intensity*	79475.32	762015.3											
3	*CapitalGoods_Probability*	0.72	0.45											
4	*R&D_Probability*	0.27	0.44											
5	*Export_Volatility*	0.30	0.39	0.03	0.03	-0.04	0.02							
6	*Import_Volatility*	0.30	0.15	0.02	-0.13	-0.04	0.01	0.22						
7	*Profit_Volatility*	0.15	0.09	-0.00	0.05	-0.07	-0.01	0.13	0.61					
8	*Performance*	-0.01	0.32	0.24	-0.03	-0.01	-0.01	-0.00	0.00	-0.06				
9	*MNE*	0.14	0.35	0.18	0.05	0.12	0.09	0.14	0.02	0.03	0.12			
10	*Size*	235.61	498.10	0.10	-0.11	0.18	0.17	0.15	0.03	-0.12	0.00	0.08		
11	*Skills*	0.06	0.09	0.18	0.27	0.09	0.19	0.05	-0.09	-0.03	0.15	0.31	0.08	
12	*Age*	35.62	22.23	-0.00	-0.16	0.10	0.12	-0.03	-0.06	-0.23	0.06	0.10	0.21	0.07

Note: To compute the mean and s.d. we used the original unit of measure of our variables, while for the correlation matrix we used the measurement unit that have been used for the regression models, namely the natural logarithm for *CapitalGoods_Intensity*, *R&D_Intensity* and *Size*.

Table 2. Results for the baseline model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
					FE Second Step						**RE**	
Variables		**FE component for CapitalGoods_Intensity**			**FE component for R&D_Intensity**			**FE component for CapitalGoods_Probability**			**R&D_Probability**	
Export_Volatility	-0.05			0.31***			-0.09***			-0.00		
	(0.10)			(0.07)			(0.03)			(0.04)		
Import_Volatility		0.41			-0.91***			-0.32***			-0.11	
		(0.29)			(0.31)			(0.07)			(0.10)	
Profit_Volatility			-1.60***			0.24			-0.87***			-0.03
			(0.45)			(0.59)			(0.12)			(0.15)
					FE First Step							
		CapitalGoods_Intensity			**R&D_Intensity**			**CapitalGoods_Probability**				
Performance	0.47**	0.47**	0.47**	0.37	0.37	0.37	-0.01	-0.01	-0.01	0.02	0.02	0.02
	(0.20)	(0.20)	(0.20)	(0.42)	(0.42)	(0.42)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
MNE	0.93***	0.93***	0.93***	-0.10	-0.10	-0.10	0.04	0.04	0.04	-0.04	-0.04*	-0.04
	(0.22)	(0.22)	(0.22)	(0.16)	(0.16)	(0.16)	(0.05)	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)
Size	-0.01**	-0.01**	-0.01**	-0.02***	-0.02***	-0.02***	0.00	0.00	0.00	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Size^2$	0.00*	0.00*	0.00*	0.00***	0.00***	0.00***	-0.00	-0.00	-0.00	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Skills	2.17***	2.17***	2.17***	1.92***	1.92***	1.92***	0.06	0.06	0.06	0.64***	0.64***	0.64***
	(0.61)	(0.61)	(0.61)	(0.56)	(0.56)	(0.56)	(0.13)	(0.13)	(0.13)	(0.08)	(0.08)	(0.08)
Age	-0.04**	-0.04**	-0.04**	0.08***	0.08***	0.08***	-0.02***	-0.02***	-0.02***	0.00*	0.00*	0.00*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age^2	0.00	0.00	0.00	-0.00**	-0.00**	-0.00**	0.00	0.00	0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Industry and time fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,196	2,196	2,196	1,711	1,711	1,711	3,058	3,058	3,058	6,367	6,367	6,367
R-squared	0.03	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.10	0.10	0.10

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in parentheses.

Table 3. Results for the moderation of performance

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
					FE Second Step						**RE**	
Variables	**FE component for CapitalGoods_Intensity**			**FE component for R&D_Intensity**			**FE component for CapitalGoods_Probability**			**R&D_Probability**		
Export_Volatility	-0.13			0.47***			-0.10***			0.01		
	(0.10)			(0.09)			(0.03)			(0.04)		
Export_Volatility *Performance	4.43***			3.75***			-0.38			-0.56***		
	(1.01)			(1.23)			(0.30)			(0.19)		
Import_Volatility		-0.09			-0.97***			-0.32***			-0.10	
		(0.28)			(0.31)			(0.07)			(0.09)	
Import_Volatility*Performance		3.15*			2.25			1.39***			0.78**	
		(1.65)			(1.98)			(0.44)			(0.34)	
Profit_Volatility			-1.04**			0.35			-0.84***			-0.06
			(0.43)			(0.59)			(0.12)			(0.15)
Profit_Volatility*Performance			3.68			0.83			-0.12			-1.04**
			(2.68)			(2.93)			(0.73)			(0.58)
Performance	0.25	-0.07	0.65***	-1.09***	-0.72	-0.14	0.05	-0.42***	0.04	0.16***	-0.24**	0.09**
	(0.21)	(0.55)	(0.24)	(0.22)	(0.69)	(0.26)	(0.06)	(0.15)	(0.06)	(0.05)	(0.12)	(0.04)
					FE First Step							
	CapitalGoods_Intensity			**R&D_Intensity**			**CapitalGoods_Probability**					
MNE	0.93***	0.92***	0.94***	-0.11	-0.11	-0.09	0.04	0.04	0.04	-0.04	-0.04	-0.04
	(0.22)	(0.22)	(0.22)	(0.16)	(0.16)	(0.16)	(0.05)	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)
Size	-0.01**	-0.01**	-0.01	-0.02***	-0.02***	-0.02***	0.00	0.00	0.00	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Size^2$	0.00	0.00	0.00	0.00***	0.00***	0.00***	-0.00	-0.00	-0.00	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Skills	2.16***	2.12***	2.08***	2.18***	1.89***	1.90***	0.06	0.05	0.05	0.66***	0.66***	0.66***
	(0.61)	(0.61)	(0.61)	(0.56)	(0.56)	(0.57)	(0.13)	(0.13)	(0.13)	(0.08)	(0.08)	(0.08)
Age	-0.04**	-0.04**	-0.04**	0.07***	0.07***	0.08***	-0.02***	-0.02***	-0.02***	0.00*	0.00*	0.00*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age^2	0.00	0.00	-0.00	-0.05**	-0.05**	-0.05**	0.01	0.01	0.01	-0.00	-0.00	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Industry and year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,196	2,196	2,196	1,711	1,711	1,711	3,058	3,058	3,058	6,367	6,367	6,367
R-squared	0.06	0.05	0.05	0.09	0.03	0.03	0.04	0.04	0.05	0.10	0.11	0.10

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in parentheses.

Table 4. Results for the moderation of multinational

	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)
	FE Second Step									**RE**		
Variables	**FE Components for CapitalGoods_Intensity**			**FE Components for R&D_Intensity**			**FE Components for CapitalGoods_Probability**			**R&D_Probability**		
Export_Volatility	-0.79***			0.15			-0.29***			-0.08		
	(0.20)			(0.23)			(0.06)			(0.07)		
Export_Volatility * MNE	3.40***			-0.52**			1.63***			0.11		
	(0.23)			(0.25)			(0.07)			(0.08)		
Import_Volatility		0.23			-1.03***			-0.26***			-0.13	
		(0.27)			(0.31)			(0.07)			(0.10)	
Import_Volatility *MNE		0.31			-4.35***			0.49***			0.33**	
		(0.56)			(0.56)			(0.18)			(0.15)	
Profit_Volatility			-1.33***			0.35			-0.79***			-0.08
			(0.43)			(0.59)			(0.12)			(0.15)
Profit_Volatility*MNE			4.32***			-5.18***			1.38***			0.49*
			(1.05)			(1.18)			(0.30)			(0.28)
MNE	0.50***	1.28***	0.78***	0.29**	1.36***	0.94***	-0.12***	0.14***	0.10**	-0.07**	-0.14***	-0.11**
	(0.11)	(0.17)	(0.16)	(0.12)	(0.19)	(0.19)	(0.03)	(0.05)	(0.05)	(0.03)	(0.05)	(0.05)
	FE First Step											
	CapitalGoods_Intensity			**R&D_Intensity**			**CapitalGoods_Probability**					
Performance	0.47**	0.47**	0.47**	0.36	0.39	0.35	-0.01	-0.01	-0.01	0.02	0.02	0.02
	(0.20)	(0.20)	(0.20)	(0.42)	(0.42)	(0.42)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Size	-0.01**	-0.01**	-0.01**	-0.02***	-0.02***	-0.02***	0.00	0.00	0.00	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$Size^2$	0.00	0.00*	0.00*	0.00***	0.00***	0.00***	-0.00	-0.00	-0.00	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Skills	2.18***	2.17***	2.17***	1.89***	1.95***	1.89***	0.05	0.06	0.06	0.65***	0.65***	0.65***
	(0.61)	(0.61)	(0.61)	(0.57)	(0.57)	(0.56)	(0.13)	(0.13)	(0.13)	(0.08)	(0.08)	(0.08)
Age	-0.04**	-0.04**	-0.04**	0.08***	0.07***	0.08***	-0.02***	-0.02***	-0.02***	0.00	0.00*	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age^2	0.00	0.00	0.00	-0.06**	-0.05**	-0.06***	0.01	0.01	0.01	-0.00	-0.00	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Industry and year fixed effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,196	2,196	2,196	1,711	1,711	1,711	3,058	3,058	3,058	6,367	6,367	6,367

R-squared	0.32	0.13	0.14	0.04	0.09	0.04	0.37	0.08	0.09	0.10	0.10	0.10

Note: *** p<0.01, ** p<0.05, * p<0.1, standard errors in parentheses.

Discussion Papers
Collana del Dipartimento di Economia e Management, Università di Pisa

Email della redazione: lfanti@ec.unipi.it