

Universidade do Minho
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Corporate investment and currency depreciations: different responses by multinational affiliates and local firms



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depreciations: different responses
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Mestrado em Finanças

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Professor Doutor Gilberto Loureiro

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Statement of integrity

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Resumo

Nesta pesquisa é analisada a diferença de comportamentos de investimento e atividade entre subsidiárias estrangeiras e empresas locais na Área Euro aquando de uma depreciação do euro.

Este estudo pretende contribuir para a literatura existente sobre crises cambiais e diferenças de desempenho entre filiais e empresas domésticas, sendo que, a pesquisa foca em empresas localizadas em países desenvolvidos, ao passo que na maioria dos estudos existentes sobre a matéria, o objeto de análise recai sobre os mercados emergentes. É ainda importante frisar que a maioria das depreciações do euro que são encontradas neste estudo coincidem com anos de crises económicas e financeiras com um impacto a nível global.

Os resultados deste estudo vão de encontro à literatura existente sobre diferenças de desempenho entre filiais de multinacionais e empresas locais: filiais estrangeiras aumentam mais a sua atividade do que as empresas locais quando enfrentam uma depreciação. É encontrada também evidencia de que a diferença de desempenho entre empresas estrangeiras e locais é mais acentuada em países com um menor PIB real per capita.

Palavras-chave: Investimento empresarial, Filiais, Empresas Locais, Crises cambiais, Desempenho, Depreciação do Euro

Abstract

In this research, I analyse different responses in investment and other corporate activities to a currency depreciation by subsidiaries of multinational companies and local firms in the Eurozone.

The study intends to contribute to the literature on currency crisis and difference of performance between multinational affiliates and domestic-owned companies to the extent that it focuses, conversely to most of previous literature on the matter, on developed host countries. Moreover, most euro depreciations against other currencies happened during world widespread economic and financial crisis.

This study finds evidence in line with the previous literature on the difference of performance between multinational affiliates and domestic companies: subsidiaries increase activity more than local companies do when facing a currency crisis. Furthermore, the results also indicate that this difference of performance is aggravated when the host country have a lower real GDP per capita.

Keywords: Corporate Investment, Multinational Affiliates, Local Companies, Currency Depreciation, Difference of Performance, Euro Depreciation

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1. INTRODUCTION

In a globalized World the growing role of multinationals and foreign direct investment (FDI) in the global economy is undeniable, and with those factors comes the increasing importance of currency fluctuations.

Multinational companies have, at their disposal, channels that allow them to generate arbitrage profits and which are not available for other companies solely operating within one country. Intra-corporate loans, dividend repatriation policies or choice of invoicing currency, are some examples of these channels (Lessard, 1985). Internal capital markets are useful for parent companies to allocate capital across distinct projects/affiliates. This is particularly true if external funds are already allocated for some expenditures/assets. In addition, multinational companies tend to make more use of internal capital markets when the external capital markets are less developed.

Depreciation of one currency in relation to another makes the relative value of assets within two countries vary. Consequently, the investment in the country whose currency has been depreciated is expected to become relatively cheaper for its counterpart. Furthermore, local inputs become cheaper when compared to imported factors of production. Conversely, imported inputs become costlier creating a comparative advantage for exporters (see Forbes (2002a)). By the same token, a rise in the price of imports is expected to divert the country's consumption to domestic products to causing a relative drop of productions costs. In this scenario, firms selling in the internal market get advantage over foreign competitors.

The purpose of this research is to shed light on the different reactions of multinational affiliates and local companies to a currency depreciation. In other words, to determine whether multinational affiliates increase investment, sales or assets more than domestic-owned companies in the aftermath of a currency shock.

Analyses of relative performance of foreign establishments and domestic firms during financial crises and currency shocks are extensive. Many studies find that multinational affiliates overperformed local firms when a currency shock happens. A case in point is the depreciation of the host currency analysed by Desai, Foley and Forbes (2007).

There are many suggested reasons for difference in performance between the two mentioned types of firms: credit constraints and access to capital markets are often referred in existing literature.

For instance, if multinational affiliates are heavily borrowing from domestic banks this can lead to a crowding out of domestic companies from domestic capital markets (see Harrison and McMillan (2003)). Moreover, foreign companies are expected to have easy access to external capital markets. Multinational companies can also make use of the internal capital markets to take advantage of the depreciated currency where its affiliate is operating.

Although Desai, Foley and Forbes (2007) find that after a depreciation, multinational affiliates increase capital expenditures, sales, and assets, more than domestic companies, one could ask whether the results are different depending on the level of economic development (measured by real GDP per capita) of the host country. In other words, if the increase of relative investment would be higher if the host country is a wealthier country instead of a poorer one.

Multinational companies have more ways to circumvent some of the difficulties in obtaining capital than local companies. Better access to international capital markets and the existence of internal capital markets are good examples of that. It is important to notice that effectiveness of internal capital markets is dependent on the geographical and cultural distances between parent companies and affiliates. Larger distances make it more difficult to pinpoint inaccuracies in reported information (Mudambi, 1999).

There is evidence of both contractionary and expansionary effects of currency crisis (see Calvo, 1998). External finance has been a major channel through which financial shocks are transmitted. However, internal capital markets can be part of this transmission as well.

This research contributes to the literature to the extent that it studies a period wherein worldwide spread financial crises occurred. Moreover, the host countries considered are classified as developed whereas most of existing literature focus on the impact of depreciations in companies (affiliates and locals) located in emerging markets. Calvo and Reingart (2000) find that emerging markets suffer more contractionary effects with adverse currency fluctuations than do the developed ones.

The results of this study indicate an increase of activity (investment, assets and sales growth) of multinational affiliates in a higher level than the activity of domestic-owned companies, with special incidence on the aftermath of a depreciation. On average, before the considered depreciation episodes, affiliates had significant lower investment than did local companies, as well as assets and sales growth rates.

Despite the difference in host countries (which are developed instead of emerging economies as mentioned before) and the considered period of analysis (which includes great economic and financial crises affecting both home and host countries), these results, are in line with Desai, Foley and Forbes (2007)' findings. Their conclusions also point to a higher increase in investment sales and assets when compared to those of domestic companies.

Furthermore, for most of depreciations, and for the majority of parent companies' countries, local companies tend to decrease its investment levels, keeping them, however, above the mean levels. The exception is the year of 2011, when there was a depreciation against the swiss franc, local companies show a worse-than-average investment results in the two years that follow the depreciation.

The second finding of this research, regarding GDP level of host countries, indicates that multinational affiliates increase its sales growth and assets growth in higher percentage in host countries with lower GDP per capita. There is evidence regarding both sales, and assets growth rates, that affiliates as well as domestic companies have a higher positive difference in growth rates in lower GDP host countries than in higher GDP host countries.

The remainder of this dissertation is structured as follows: the second section reviews the existing related literature; the third section explains the methodology and describes the dataset; the fourth section analyses the results from testing the hypotheses; the fifth section provides a brief conclusion.

2. LITERATURE REVIEW

There is a variety of studies regarding the relative performance of multinationals' affiliates, and domestic companies. Most of this literature focuses on the reasons behind this difference of performance between foreign establishments and local firms. There are many possible explanations pointed out in the literature, for instance internal capital markets, access to external capital markets or credit and financial constraints.

A sharp depreciation can have at the same time two offsetting impacts for companies: on one hand increases investment opportunities and growth, on the other hand, accentuate financial constraints within a country.

In poor countries, FDI can either facilitate credit access for domestic firms by bringing in capital, or aggravate credit constraints for these companies due to heavy borrowing from local banks.

Harrison and McMillan (2003) conduct a study on differences in credit constraints for local companies and foreign establishments in the Ivory Coast. The results show that local firms have more credit constraints than foreign firms. They argue that due to the fact that, on average, foreign companies are more profitable and liquid than domestic ones, local banks are keener on lending to those companies as they represent a less risky investment. Thus, there is a crowding out of domestic companies due to foreign borrowing.

Domestic companies in a country might face collateral constraints when there is a need to resort to external financing, either with foreign or domestic establishments. Caballero and Krishnamurthy (2001) study emerging market crises and the impact of limited collateral that companies have to offer. They argue that if there is a constraint regarding international collateral there is also an increase in interest rates and sales of domestic assets. The limited domestic collateral ultimately leads to a waste of international collateral which, in turn, amplifies the effects of a crisis. Moreover, the scarcity of collateral is, itself, one of the financial constraints faced by enterprises.

The different response between US multinational affiliates and domestic firms operating in tradable sectors of emerging markets is analysed by Desai, Foley and Forbes (2007).

They find that in emerging markets, during and in the aftermath of an adverse currency shock, US affiliates increase sales, assets and investment considerably more than local companies. The authors test financial constraints and product market exposure as determinants of the different observed responses.

One would expect that when there is a currency shock, such as depreciation of host currency, foreign subsidiaries would benefit from arising investment opportunities since they can now produce or sell goods that have a lower relative production cost.

However, the results from Desai et al. (2007) did not support the conclusion that different investment opportunities are the reason for the small increase in investments observed in multinational affiliates with rising exports when compared to those who sell just in local markets. It is also observed that after controlling for operating exposures the results are maintained.

They find that domestic firms with more financial constraints are those who reduce investment the most in relation to foreign companies; thus, providing evidence that financial constraints are an important explanation for difference in performance. However, foreign currency denominated debt is not considered in this study.

Through the access to external financial markets and internal capital markets, subsidiaries are able to overcome financial constraints they might face in the host country whereas local enterprises are more subject to it. Desai et al. show evidence that parent companies use the internal capital market to provide capital to its affiliates in currency depreciations.

It is also interesting to note that in the aftermath of depreciation, local firms with low-debt increase the investment in similar magnitude as the affiliates. Overall foreign companies have revealed to be more capable of overcoming financial constraints than local companies.

Despite the results obtained by Desai et al. (2007) there is literature providing evidence that companies actually take advantage of the competitiveness effect of a currency depreciation. For instance, Forbes (2002b), studies a set of sharp depreciations and finds that companies with a higher foreign sales exposure improve their performance after depreciations. Furthermore, companies see their market capitalization grow subsequently to a currency shock. Aguiar (2005), also finds that Mexican exporter companies increased their sales and profits relatively to non-exporters after Mexican peso crisis of 1994. However, those firms with high foreign currency denominated debt showed relatively low investment levels after depreciation. This is partly explained by the fact that after Mexican peso devaluation foreign debt was then relatively higher in terms of domestic currency. Thus, Aguiar (2005) provides evidence that weak balance sheets (relatively high levels of liabilities in comparison to a firm's net value) deter investment during currency crisis.

A study on relative performance between domestic-owned companies and foreign affiliates, regarding employment growth, is conducted by Alvarez and Gorg (2007). They focus on the Chile economic crisis of 1990 and consider access to financing as a factor that influences firms' behaviour during a crisis. Conversely to what was expected, they find no evidence that affiliates have a different reaction to crisis. Moreover, they do not find that access to finance have significant or relevant impact on firms reaction.

Alfaro and Chen (2010) focus their work on the financial crisis of 2008-2009 and try to determine what is the role of Foreign Direct Investment (FDI) in the relatively better performance of multinationals affiliates over local firms.

They conclude that FDI has an impact in the affiliates performance in at least three different channels they explore: (1) production linkage: companies with a vertical integration (complementary production) with their parent companies experience less difficulties to overcome financial crises than those with horizontal integration (duplicated cross-country production); (2) financial linkage: multinationals have greater advantage in industries with more financial constraints. This can be explained by a capability for multinationals to overcome financial constraints easier than domestic companies (as argued by Desai, Foley and Forbes (2007)); (3) larger multinational networks are associated (in most countries) with better performance during crises. However, this does not hold for US companies (either headquartered in the US or foreign affiliates in the US).

Nonetheless, the role of FDI varies in the way crises affect host and home countries, insofar as multinational affiliates in countries that are less exposed to crises had a better relative performance than those of affiliates belonging to multinationals headquartered in countries where crises have a more severe effect.

Nucci and Pozzolo (2001), find evidence, in Italian manufacturing firms, supporting, the positive effect that a currency depreciation might have in firm's investment through revenues (companies increase investment the most when the share of foreign sales is higher) on one hand, and, on the other, the negative effect through costs (the more a company relies on imported inputs the heavier is the reduction in investment). Moreover, the authors find that companies that have less market power and are smaller in size, suffer a higher impact with exchange rate fluctuations.

More studies were conducted regarding the crisis of 2008-2009. Kahle and Stulz (2013) tested the impaired access to capital theories (bank lending shock and credit supply shock), against the hypothesis

that a demand shock (and uncertainty about future demand) could provide a better explanation for the effect of crises on investment and net debt issuance. Capital access theories are commonly pointed out as explanations for the decrease in investment and net debt issuance observed around the period of the Lehman's failure

Previous literature argues that a bank lending shock, like the one that happened after Lehman's failure, is the cause for a reduction in capital expenditures (see Brunnermeier (2009)). However, Kahle and Stulz find evidence that makes us wonder if there is, in fact, a causal relation between the two phenomena, since firms with higher bank dependency are not the ones that most reduce investment during the crisis, contrary to expectations.

Surprisingly, there are studies that find that not all crises have contractionary effects. As a matter of fact, around 40% of crises have expansionary effects (these results are mostly evidenced in small emerging markets in the period that ensued the 1990s currency crisis) (see Calvo, 1998). Such results might have to do with relative cheaper costs of production and other associated costs which make investment more attractive in countries enduring financial crises, thus increasing the output.

Mudambi (1999) studies multinationals' internal capital markets and the relationship between parent companies and their subsidiaries. The role of internal capital markets for multinational companies and its affiliates is very important in terms of creation of arbitrage opportunities. This is true because multinational enterprises (MNE) can take particular advantage from the different jurisdictions and currency fluctuations in countries where they operate. For instance, MNE can obtain more tax savings or choose the invoicing currency.

He suggests that internal capital markets are most useful in countries where external capital markets are less developed and consequently where the asymmetric information and agency problems are a bigger issue.

Another analysis on internal capital markets conducted by Desai, Foley and Hines (2004b) on US multinational firms, also concludes that external debt is less used in countries with weak capital markets and creditor rights.

They find that internal capital markets are a strong substitute for external finance due to capital market conditions. Capital markets are then a mean whereby multinational companies circumvent difficulties of shallow capital markets. In such conditions, Desai et al. (2004b) find that affiliates borrow

more money from their parent companies than from local sources meaning that the former substitutes the latter in this type of funding.

Their evidence also suggests that less creditors protection and weak capital markets are linked with costly external capital markets, thereby making the borrowing from parent companies more attractive for US foreign affiliates. La Porta et al. (1997) argue that smaller local capital markets are associated with weaker creditor rights. In these countries, multinationals can opportunistically use internal capital markets to fund affiliates, borrowing from countries with more solid creditor rights in order to avoid agency costs.

Desai et al. (2004b) also suggest that parent-provided debt is a substitute for locally provided debt when the host country has weak local legal creditor conditions and an underdeveloped credit market. The higher the taxes are, the more intense internal borrowing between parent companies and their affiliates become.

Lamont (1997), focus on the consequences of the oil price collapse in 1986 to the investment and cash flow of nonoil segments of oil-related enterprises and thus, tackling the role of internal market during a crisis. His results support the expected decline of the investment in those segments. These findings are consistent with imperfect information literatures and with principal-agent models as well.

Imperfect information theories suggest that we observe underinvestment due to the increased costs of external finance during a crisis; Agency problem theories (as in Jensen (1986)) state that managers tend to overinvest, thus when a crisis arrives managers must diminish investment. In both cases, investment decreases when there is a crisis and when internal finance is weaker. Lamon (1997) main finding is that, with the oil price fall, nonoil segments of oil companies decreased investment due to reductions in collateral value, and cash flow.

Capital controls are another obstacle that companies might face. Both domestic and foreign enterprises are discouraged by these controls to invest because they are associated with high interest rates. Despite some evidence mentioned in previous literature on how capital controls can differently affect affiliates and domestic companies, for domestic companies it is still not as easy to circumvent such high taxes, as they have less access to external markets when compared with affiliates. Thus, although at a cost, some foreign companies can obtain external finance, while others are not able to do it.

Affiliates of US multinational companies face higher interest rates when located in countries with capital controls than those of affiliates of the same parent company located in countries more liberalized in terms of capital control. This is documented by Desai, Foley and Hines (2006) in their research. In

countries with such controls, investment is discouraged due to the associated costs (high interest rates and costs of avoiding capital controls). Conversely, when a country goes through a process of liberalization, local activities of foreign affiliates grow faster and so does the investment. Capital controls also have an impact in domestic enterprises since it makes it difficult for them to cope with the high interest rates.

By using parent-provided debt and by means of under or over invoicing trading strategies within its internal market, multinationals are able to circumvent some of the imposed capital controls. The same happens when the issue is high taxes: the company manipulates incomes in order to take advantage of different tax jurisdictions.

The impact that financial crises have on corporate investment is subject of study by Duchin, Ozbas, and Sensoy (2010). Crises have a negative impact on availability of external finance for enterprises. The authors find that corporate investment decreases after crisis triggered.

For companies with more cash reserves external finance is more accessible and the crisis effects are smoothed as documented by both Duchin et al. (2010) and Campello et al. (2012), while for more financial constrained, for smaller companies and for firms heavily relying on external finance, the decrease in corporate investment is more aggravated.

Campello, Giambona, Graham, and Harvey (2012), focus their study on the relation between investment and liquidity of European firms during the financial crisis of 2008-2009. Their main finding is that credit lines ensure that companies had the necessary liquidity to invest during this difficult period. Above all, European companies were more prone to resort to enlarged credit lines during the crisis. At the same time, financially constrained companies relied on credit lines more than their counterparts did. This implies, that credit lines were vital for European companies to finance their investment during the crisis and mitigate the negative impact this crisis could have had on corporate investment.

It is also usual to divert the sales orientation when there is a crisis in the host country (see Lipsey, 2001), and if the share of exportations grows in weight as well as in value the negative effects on that same company can be diminished. Once more, this is a strategy that affiliates usually can adopt with greater ease than domestic companies as they are already inserted in a more globalized market as part of a multinational company.

The literature thoroughly explains and evidences the ways whereby foreign subsidiaries can not only overcome difficulties (mostly financial) but also create new competitive advantages in comparison to

domestic companies. Furthermore, during financial crises, devaluations, or depreciations of host currencies, multinational affiliates are in a better position to face such challenge by the above-mentioned means.

Based on previous literature I formulated the following hypotheses:

H1: Multinational affiliates, in the aftermath of a depreciation, increase the investment, sales, and assets growth more than local companies do.

H2: The highest difference in investment, sales, and assets growth between multinational affiliates and local firms following a currency depreciation occurs in host countries with higher GDP.

Following Desai et. al (2007), I tested these hypotheses. However, due to the heterogeneity that characterises the parent companies' countries, I divided the main sample into five subsamples according to the parent company's country.

It is possible that US affiliates are faster to respond to currency shocks as the United States is a common law country. Capital markets within common law country usually are more liquid and for this reason parent-companies can be quicker transferring capital to its subsidiaries.

Swedish and Swiss parent companies are also affected with euro-crisis, as they are in Europe. Moreover, Switzerland, and Sweden are also small countries. For these reasons, it is expectable that Swedish and Swiss subsidiaries also feel the negative impact of euro depreciations.

Because Japan and China are two distant countries, not only geographically but also culturally, it is possible that results might deviate from what one would expect. Furthermore, China was less affected by the crisis of 2008. Thus, regarding investment, sales, and assets, Chinese subsidiaries might have better results than those of affiliates of multinationals headquartered in countries that suffered more with the financial crises (see Alfaro and Chen (2010)).

Moreover, as the Eurozone is composed of several countries with different economies, it is possible that different patterns of results appear. For instance, countries with a higher GDP per capita can be more appealing for foreign companies than countries with a lower GDP.

3. DATA AND METHODOLOGY

3.1. DATASET AND DEPRECIATION EPISODES

To explore the hypothesis that multinational affiliates increase investment and growth (sales and assets) more than local firms in the occurrence of a currency depreciation it is important to start with the sample construction. Data on affiliates and local companies is collected from Amadeus database.

Local firms are defined as companies domiciled in the Eurozone, i.e. whenever the ultimate owner¹ (as defined by Amadeus database) is located in the domestic country. Multinational affiliates are firms located in any of the 19 countries of the Eurozone but with parent companies outside the Eurozone.

Additionally, the sample is only composed of active companies, with a size restriction, as measured by number of employees, of at least 5 employees in the years of analysis. All companies have available accounts in the period of reference. Financial and utility companies were excluded (as it is a standard procedure) to avoid results distortions due to their very specific characteristics, and differences in accounting items.

However, the sample includes more than a hundred different countries where parent companies are located, so it was narrowed down to multinational companies of United States of America, United Kingdom, Switzerland, Sweden, Japan, Denmark, China and Norway. This screening results from the exclusion of countries that have a representation under 2% in the sample of affiliate companies.

The raw sample is composed of 10 780 multinational affiliates and 14 282 domestic companies.

Next step was to identify euro depreciation periods against each of the eight currencies of the above-mentioned countries.

¹ According to Amadeus definition of global owner, it is required a minimum percentage of 50.01% of the company and "have no shareholder identified or all its shareholders have an unknown percentage".

TABLE 1: CURRENCY DEPRECIATION EPISODES

| Country | China | Denmark | Japan | Norway | Sweden | Switzerland | UK | USA |
|--------------------------------|-------|---------|-------|--------|--------|-------------|----|------|
| N° of Depreciation Episodes | 3 | 0 | 4 | 0 | 1 | 1 | 0 | 4 |
| Years of Currency Depreciation | 2008 | | 2008 | | 2010 | 2011 | | 2009 |
| | 2010 | | 2009 | | | | | 2010 |
| | 2015 | | 2010 | | | | | 2012 |
| | | | 2012 | | | | | 2015 |

The depreciation episode is defined as a decrease of at least 15% in the euro exchange rate against the other currencies in a homologous quarterly comparison. If at least one quarter of the year registered the whole year is considered as a depreciation year.

Following Desai, Foley and Forbes (2007) I collected data of nominal Exchange rates from DataStream was collected and computed real exchange rates by taking out the inflation rates in order to mitigate possible distortions in competitiveness caused by high inflations along with nominal depreciations.

A depreciation episode is defined as a decrease of at least 15% in the Euro exchange rate against other currencies in a homologous quarterly comparison from the period between 2008 and 2017.

According to this definition, the euro has registered a depreciation during the reference period against five of the eight currencies of the Multinational's home countries: United States Dollar, Japanese Yen, Swedish Krona, Swiss Franc and Chinese Yuan. This led to a reduction in the number of affiliates to 6 023. The episodes of depreciation against each of the five currencies are summarized in figure 1, with a total of 13 depreciations of the euro.

In 2008, the euro depreciated 16% in relation to Yuan and 29% against the Yen (the prominent devaluation in this study). In 2009 there was a 18% depreciation in relation to the American dollar and 22% and 16% in relation to the yen in the first and second quarter of the year. In 2010 depreciations of 18%, 16% in relation to the Chinese yuan, 16% in relation to USD, 18% against Swedish Krona, and 19% and 17% against the Japanese yen. In 2011 euro depreciated in relation to Swiss franc by 15%. Finally, in 2015 two depreciations against yuan of 17% and 18%, and in relation to USD 19% and 10% depreciation in the two first quarters.

The final sample is composed of 20 305 companies of which 6 023 are multinational affiliates, and 14 282 are domestic firms. The affiliate's sample is composed by 47.98% US affiliates (2 890

companies), 20.07% Swiss affiliates (1 209 companies), 14.03% Swedish affiliates (845 companies), 12.92% Japanese affiliates (778 companies), and 5% Chinese affiliates (301 companies).

3.2. MULTIVARIATE ANALYSIS

To test the hypothesis that multinational affiliates increase investment, sales and assets more than local companies in the aftermath of a depreciation, I follow Desai et al. (2007) and estimate a similar model:

$$(1) Y_{i,j,k,t} = \beta_0 + \beta_1 CDep(t-1)_{k,t} + \beta_2 CDep(t)_{k,t} + \beta_3 CDep(t+1)_{k,t} + \beta_4 CDep(t+2)_{k,t} + \beta_4 CDep(t-1)_{k,t} \times Multinational_i + \beta_5 CDep(t)_{k,t} \times Multinational_i + \beta_6 CDep(t+1)_{k,t} \times Multinational_i + \beta_7 CDep(t+2)_{k,t} \times Multinational_i + \beta_8 Z_{i,j,k,t} + \beta_9 X_{i,j,k,t} + \varepsilon_{i,t}$$

Where i stands for firm; j for industry; k for country; t represents each period. $Y_{i,j,k,t}$ is a proxy for firms' outcomes in terms of CAPEX, sales or assets growth, $CDep(t-1)_{k,t}$, $CDep(t)_{k,t}$, $CDep(t+1)_{k,t}$, $CDep(t+2)_{k,t}$, are dummy variables equal to 1 for observations of the year before, the year, the year after and two years after a depreciation respectively and 0 otherwise. $Multinational_i$ is a dummy equal to 1 if the company is an affiliate, $Z_{i,j,k,t}$ is a group of firm-specific variables and, $X_{i,j,k,t}$ is a set of control variables for country and industry's fixed effects.

The response of domestic companies to a currency depreciation is captured by the coefficients of the depreciation dummies. But, the key variable to perceive and measure the difference of performance between foreign companies and domestic firms is the interaction between depreciation dummies with the multinational dummy, as it reflects the additional reaction to currency shocks of affiliates in relation to local companies.

It is expected that subsidiaries respond to a currency depreciation through an increase in investment, assets and sales growth increase thus, taking advantage of relative lower prices, and their higher ability to overcome financial constraints in comparison to local companies.

Furthermore, a thorough analysis is made when affiliates of multinationals headquartered in each of the five countries in study are considered separately against all the domestic companies. It is important to notice that the period between 2008-2017 includes years of financial crisis² that had worldwide-spread impact and which might influence the results deviating them from the expectations.

To test the hypothesis that affiliates in host countries with a higher GDP overperform local companies in a higher degree than affiliates in host countries with a lower GDP, the sample is separated in two groups. Eurostat website data on real GDP per capita from the 19 countries of the Eurozone, referring to the year of 2018, was gathered. The median value was computed. The group with a higher GDP is composed of domestic and subsidiaries located in the countries with GDP per capita above the median value; the second group consists of the remaining companies (those located in countries with GDP per capital under the median).

Running the same above-mentioned regressions for each group of companies individually, it is possible to compare coefficients and better understand whether the fact of a host country presents a higher GDP is, or is not, relevant for the investment decisions of an affiliate during an episode of currency depreciation.

Moreover, through the comparison of the coefficients of both groups we can not only understand if affiliates in countries with higher GDP have a better relative performance than those located in lower GDP countries, but also to spot the differences in the reaction between local companies of this two groups of countries within the Eurozone.

One would expect that multinational affiliates would have a higher incremental performance in host countries presenting a GDP above the median, than those affiliates operating in countries with lower GDP. A similar tendency is anticipated for local companies: i.e. a better performance for those belonging to the first group of countries when compared to those of the second group.

² For instance, the financial crisis of 2007-2008, which is considered by many has the worst financial crisis after the big depression (1929);

4. RESULTS

4.1. Descriptive Statistics

TABLE 2: DESCRIPTIVE STATISTICS

| Variables | Mean | Standard Deviation | Median | Variables | Mean | Standard Deviation | Median |
|---------------|--------|--------------------|--------|---------------|--------|--------------------|--------|
| CAPEX/TA | 0,04 | 0,11 | 0,02 | CAPEX/TA | 0,06 | 0,11 | 0,03 |
| Sales | 70 773 | 180 297 | 15 796 | Sales | 68 035 | 303 077 | 5 921 |
| Total Assets | 57 296 | 156 621 | 10 946 | Total Assets | 59 433 | 278 832 | 5 268 |
| Sales Growth | 0,02 | 0,25 | 0,02 | Sales Growth | 0,02 | 0,23 | 0,02 |
| Assets Growth | 0,03 | 0,24 | 0,03 | Assets Growth | 0,04 | 0,18 | 0,02 |
| CPI | 101,33 | 31,13 | 99,46 | CPI | 98,96 | 24,8 | 99,46 |
| Inflation | 0,01 | 0,02 | 0,01 | Inflation | 0,01 | 0,01 | 0,01 |

CAPEX, Sales and assets are measured in thousands of euros and are winsorised at 1% and 99% percentiles. CAPEX is the difference of fixed assets between a given year and the previous year plus the depreciation of that year, normalized by total assets. Growth rates are calculated as differences in log values.

Descriptive statistics for the two main samples of this study are presented in table 2. The left side shows the mean, standard deviation, and median values for all multinational affiliates included in the sample. The right side shows these statistics for local companies. CAPEX, sales, and assets are measured in thousands of euros. CAPEX, sales, assets and growth variables are winsorised at 1% and 99% percentiles, thus the effect of outlier values is mitigated. CAPEX is computed as the difference of the fixed assets between a given year and the previous year plus the depreciation of the year, normalized by total assets. Sales growth, as well as assets growth are computed as differences in log values.

The average (median) capital expenditures of multinational affiliates as a proportion of total assets is 4% (2%) and for local firms is 6% (3%). On average (median), subsidiaries have 70 773 (15 796) thousands of euros while domestic firms have 68 035 (5 921) thousand euros. Regarding total assets, subsidiaries have 57 296 (10 946) thousand euros on average (mean) and local companies have 59 433 (5 268) thousand euros. In relation to growth rates, similar values are observed for the two groups of companies: both affiliates and domestic companies present a 2% average (and median) growth rate, and MNC affiliates present a 3% average (median) rate for assets whereas locals have a correspondingly mean and median assets growth rate of 4% and 2% respectively.

Figure 1 shows us evolution of median Sales Growth for multinational affiliates and domestic companies in the previous year (t-1), the depreciation year (t), the following year (t+1) and two years after

the occurrence (t+2). We can observe that in the year prior to currency depreciation, multinational affiliates have a lower sales growth than domestic firms. In the year when depreciation occurs, however, subsidiaries equal local companies regarding the rate of sales growth. The years ensuing a depreciation show higher levels of sales growth for MNE affiliates compare to those registered in preceding years. Local companies see their sales growth rate reduced in the year after depreciation but with a considerable rise in the second year. The premise, once more, is that both types of companies have a similar sales growth rate. After a depreciation, companies have median sales growths higher than those registered prior to the depreciation episode.

Figure 2 shows that the median of assets growth rate of subsidiaries increase in the two years after the depreciation, while local companies see their assets growth rate decrease in relation to the level registered in the year before the currency crisis. In the aftermath of the event, years t+1 and t+2, MNE affiliates present a higher assets growth rate than that of domestic companies, and also higher than the rate they had in the year prior to the event, while local companies show a growth rate lower than that they had in the year before the onset of a depreciation.

FIGURE 1: SAMPLE SALES GROWTH

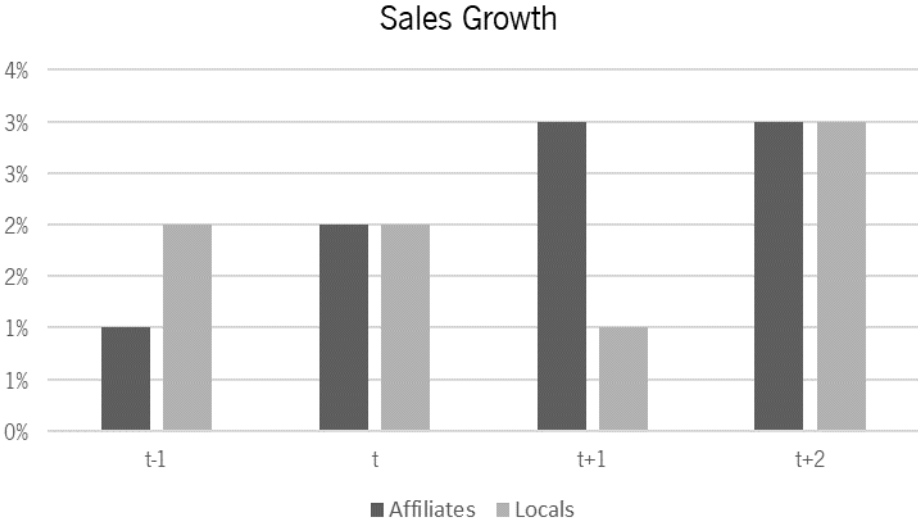


FIGURE 2: SAMPLE ASSETS GROWTH



In figure 4, and figure 5, sales growth and assets growth evolution, respectively, are presented for affiliates from Switzerland, China, Japan, Sweden and United States of America separately. In figure 4, we observe that all affiliates increase sales growth in the occurrence year, and in years after a depreciation, with the exception of Swiss subsidiaries which decreased the rate at which sales grow from the year prior to depreciation to the second following year. Two years after the depreciation, all Chinese, Japanese, American and Swedish affiliates show a rate of sales growth higher than the one they show prior to the currency shock.

Moreover, Swedish and Chinese affiliates increase their sales growth in the depreciation year and year after, but this level diminished in the subsequent year (although it is still higher than the level preceding depreciation). Subsidiaries from Japan and United States of America experienced their highest level of sales growth in the years following depreciation.

Figure 5 shows the asset growth; this variable has a similar evolution to sales growth. Subsidiaries from Switzerland are still the only ones decreasing their assets growth rate, while all other affiliates increase this rate.

When comparing the results of figure 2 for local companies and those of figures 4 and 5 we observe that in the year prior to depreciation episodes, only Swiss affiliates have higher sales growth as well as assets growth. American affiliates and local companies have very similar growth rates before depreciations. In the year of depreciation, however, there is an overall increase in growth rates. Swedish and Swiss affiliates outpaced domestic companies' growth rates. In the first year after depreciation, all affiliates show higher rates than domestic companies, with exception of Swiss subsidiaries. Two years after the event, growth rates are, once more, lower or equal than those of domestic companies with exception of Japanese affiliates.

FIGURE 3: AFFILIATES' SALES GROWTH

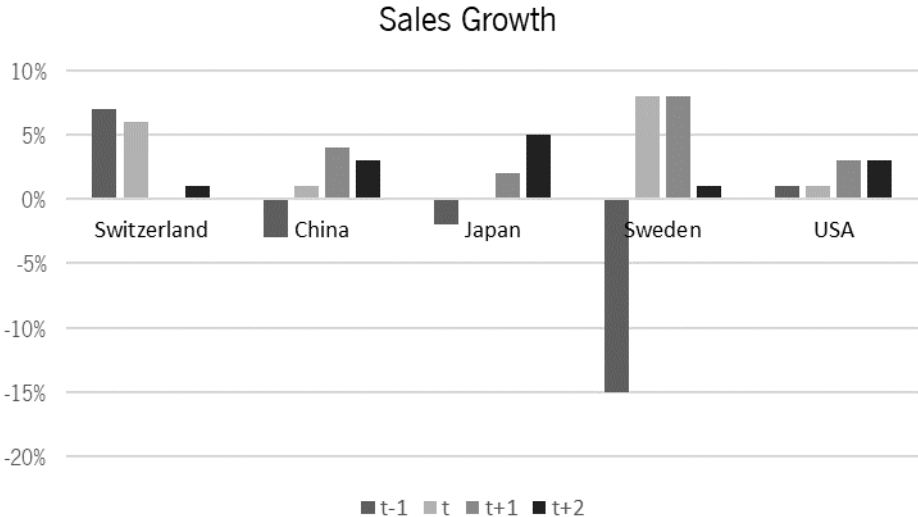
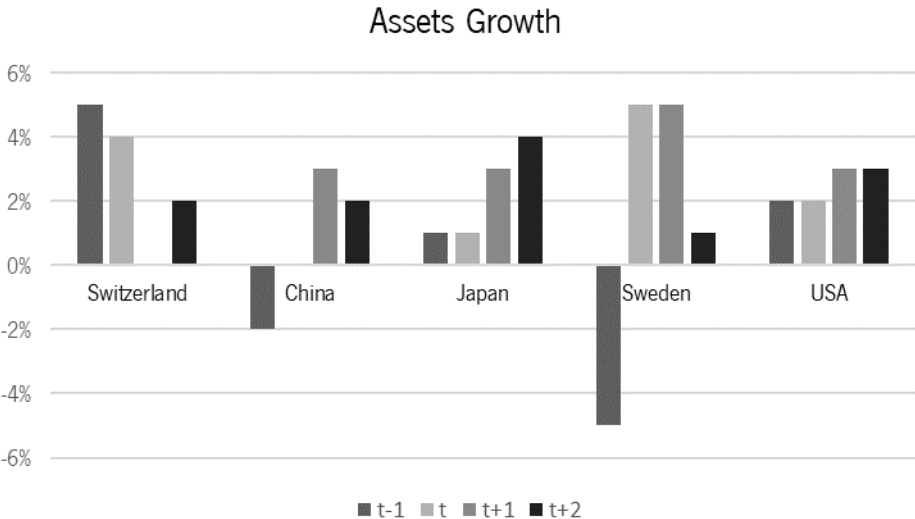


FIGURE 4: AFFILIATES' ASSETS GRWOTH



4.2. MULTIVARIATE ANALYSIS

4.2.1. WHOLE SAMPLE

Desai et al. (2007), as already mentioned, find in their study that US affiliates increase their investment, sales and assets more than domestic companies do. For the whole sample, which includes not only US affiliates but also Japanese, Chinese, Swiss and Swedish subsidiaries, the research results point to the same direction. Moreover, the host countries are developed countries in Eurozone, while Desai et al. focus on emerging markets.

Despite, the differences in samples and periods of analysis, results show a negative difference between foreign and local companies in the year prior to depreciation as does Desai et al. (2007) observed, and then a positive difference in the following years. Yet, Desai et al. (2007), find a larger difference in the years after depreciation, which supports the view that developing countries suffer a more contractionary effect with adverse currency fluctuations, and that multinational affiliates find more attractive investment opportunities in these countries. In addition, the fact that investment and activity reactions in this sample are less notorious than those of existing literature might have to do with the fact that parent companies are also facing financial difficulties themselves with the economic and financial crises in some of the countries within the sample.

Moreover, results for sales and assets growth also follow the tendency found in Desai et al. (2007), however, and once more, with smaller differences in growth rates between subsidiaries and domestic companies than those found in their study.

TABLE 3: REGRESSION OUTPUT - WHOLE SAMPLE

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|------------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.116*** (9.293) | 0.00195 (1.079) | 0.0109*** (8.951) |
| CDep(t) | 0.0360*** (2.780) | 0.000316 (0.163) | 0.00545*** (4.126) |
| CDep(t+1) | 0.0263** (2.058) | -0.0323*** (-18.59) | -0.00560*** (-4.705) |
| CDep(t+2) | -0.0412*** (-3.247) | 0.0270*** (10.46) | 0.00180 (1.002) |
| Multinational | 0.0105 (0.0246) | -0.00731 (-0.135) | 0.00858 (0.151) |
| CDep(t-1) * Multinational | -0.104*** (-4.203) | -0.0438*** (-12.45) | -0.0300*** (-9.956) |
| CDep(t) * Multinational | 0.0474** (2.020) | -0.00333 (-1.065) | -0.0103*** (-3.736) |
| CDep(t+1) * Multinational | 0.0521** (2.266) | 0.0608*** (19.54) | 0.0154*** (5.661) |
| CDep(t+2) * Multinational | 0.0907*** (3.865) | 0.00311 (0.998) | 0.00757*** (2.740) |
| Lag Sales | | -7.57e-07*** (-23.10) | |
| Inflation | | 0.0765 (0.787) | -0.00360 (-0.0479) |
| CPI | -0.000275 (-0.498) | | |
| Lag Total Assets | | | -6.52e-07*** (-23.30) |
| Constant | -3.803*** (-24.18) | 0.0699*** (3.548) | 0.0680*** (3.711) |
| Observations | 123,406 | 147,160 | 168,109 |
| R-squared | 0.433 | 0.143 | 0.153 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. "CDept-1", "CDept", "CDept+1", "CDept+2" are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. "Multinational" is a dummy variable equal to 1 for multinational affiliates. "Lag Sales" are sales in the previous year. "Lag Total Assets" are the total assets of the previous year. Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1.

The model presents separated dummy variables for the years surrounding the event date: one year before, the depreciation year, and the two subsequent years. The effect of a depreciation, as it happens for other economic or financial events, most of the times has a delayed impact in time. For this reason, it is interesting to analyse not only the period when the event actually happened (in this study periods of a year are considered) but also the immediate subsequent periods. It is also important to consider the period before the currency episode so we can have a point of comparison.

The columns in table 3, represent different independent variables. In addition, all the presented regressions have firm fixed effects. Regressions with control for country and industry fixed effects were also considered but the results were not significantly different from those presented with control for firm fixed effects. Year fixed effects are not considered in this study since depreciation dummy variables rely on the years of depreciation and would have been annulated due to collinearity. When the independent variable is sales (assets) growth, it is also regressed on lag sales (lag assets), which are the absolute initial value of sales (assets).

Table1 includes the whole sample. In other words, it includes American, Chinese, Japanese, Swedish, and Swiss subsidiaries. Regarding local companies, the years of depreciation are any of those for which the euro has suffered a depreciation against at least one of these five currencies.

Looking at the first column in table 3, the impact of a depreciation in firms' capital expenditures is observed. The coefficients associated with the depreciation dummies alone, indicate that local firms have significantly lower capital expenditures two years after a depreciation. The coefficient -0.0412 registered two years after depreciation in comparison to the 0.116 coefficient at the year before represents a 16 percentage points (p.p.) decrease since the year before until two years after a currency shock. Conversely, the interaction variables between depreciation and multinational dummies, indicate that investment significantly differs from its mean levels. There is an increase of the coefficients associated with the interaction dummies indicating that multinational affiliates increase investment during, and after a currency depreciation. The coefficients on the interaction terms, $CDep(t)*Multinational$, $CDep(t+1)*Multinational$, $CDep(t+2)*Multinational$ indicate that, on average, in the depreciation year and in the years after, affiliates of multinational companies invested 4.7% to 9% more than their counterparts.

The second column of table 3, considers sales growth, as the dependent variable, measured as the difference between log values. Although there are no significant results for the year of depreciation, neither for two years after it, the coefficients of interaction terms are significant in the year before and the year after a currency depreciation, -0.0438 and 0.0608 respectively. These estimates indicate that

multinational affiliates have higher sales growth than local firms in the aftermath of a depreciation despite presenting lower sales growth before the event. The coefficient estimate is significantly negative (-0.0323) in the year after a depreciation for local companies, meaning that the variation around the mean is negative, and indicating a possible adverse reaction to the currency depreciation. The coefficient for two years after depreciation is slightly positive (almost 3 percentage points above mean) which might possibly show a recovery in this variable.

The last column of table 3, displays assets growth as dependent variable, computed as the difference in assets log values as well. The estimates for the year before, for the occurrence year, and for the year after depreciation indicate a decrease in sales growth of domestic companies, around its mean value. In the year after a depreciation sales growth is, on average, 0.4 percentage points below the mean rate. In the previous and subsequent years, multinational affiliates' assets growth rate is lower than those of local companies, however, this tendency is inverted. One year after, and two years after a depreciation, subsidiaries exceeded asset growth of local companies in almost 2 percentage points, and 0.8 percentage points, respectively.

4.2.2. USA AFFILIATES

Table 4 replicates regressions of table 3 with log CAPEX, Sales Growth, and Assets Growth as dependent variables placed in columns 1, 2 and 3 respectively. However, in this analysis, only United States subsidiaries are considered against all local companies.

It is important to notice that US multinational affiliates are the larger group of subsidiaries in this study. It is also important to stress that the number of depreciation events of the euro related to the US dollar, is one of the highest in the sample period. Indeed, there are four years of currency depreciation: 2009, 2010, 2012 and 2015. One should notice that these years are marked for financial crises that had severe consequences for both North American and European economies.

Looking at column 1 of table 4, the investment behaviour of local companies in years when the euro depreciated against the dollar, we observe that there is a positive deviation to the mean levels in the previous year, in the depreciation year, and in the subsequent year. A slight increase in the depreciation coefficients is observable from the year before to the year of depreciation, but investment levels decrease significantly one year after the event. This represents a 0.25 percentage points decrease throughout the reference period.

The coefficients of the interaction terms, which measure the difference in investment between the two types of companies, indicate that investment is higher in US affiliates two years after a depreciation compared to their local counterpart.

Results for sales growth in column two show a different picture for local companies. Those companies significantly increase sales growth since year $t-1$ (-0.0360) until the second year subsequent to a depreciation (0.107). However, US affiliates significantly surpass the sales growth rate of local companies in the depreciation year, the year after that, and two years after. In the year after, the coefficient is higher, and American subsidiaries exceed domestic firms' sales growth by 1.36 percentage points.

Regarding assets growth, a similar tendency to sales growth can be observed in what concerns local companies: they significantly increase their assets growth rate when there is a depreciation. Moreover, for this indicator, although the difference in assets growth between the companies is smaller in the year of depreciation compared to the previous year, US affiliates rate falls behind domestic firms.

The unexpected results in this specific case can derive from the financial distress lived in the United States of America during the years of currency depreciations. Benefits that affiliates could have accrued from euro depreciation might have been offset by the consequences of the financial crisis endured by American parent companies.

TABLE 4: REGRESSION OUTPUT – SUBSAMPLE: USA

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|-----------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.0913*** (6.899) | -0.0360*** (-18.48) | -0.000964 (-0.746) |
| CDep(t) | 0.109*** (7.324) | 0.0360*** (13.71) | 0.0229*** (13.08) |
| CDep(t+1) | 0.0888*** (6.107) | 0.0868*** (27.63) | 0.0345*** (16.33) |
| CDep(t+2) | 0.00217 (0.148) | 0.107*** (28.19) | 0.0319*** (12.61) |
| Multinational | -0.0772 (-0.146) | -0.0113 (-0.298) | 0.000725 (0.00777) |
| CDep(t-1) * Multinational | -0.00753 (-0.235) | -0.00419 (-1.010) | -0.0156*** (-3.999) |
| CDep(t) * Multinational | 0.0334 (0.947) | 0.00727* (1.726) | -0.0147*** (-3.601) |
| CDep(t+1) * Multinational | 0.0494 (1.395) | 0.0136*** (3.136) | -0.000703 (-0.167) |
| CDep(t+2) * Multinational | 0.0925*** (2.600) | 0.00769* (1.709) | 0.00431 (0.988) |
| Lag Sales | | -6.93e-07*** (-20.70) | |
| Inflation | | -2.955*** (-23.60) | -1.040*** (-11.86) |
| CPI | -0.000767 (-1.239) | | |
| Lag Total Assets | | | -6.12e-07*** (-19.92) |
| Constant | -3.745*** (-29.77) | 0.00773 (0.872) | 0.0485*** (2.777) |
| Observations | 101,753 | 119,638 | 140,033 |
| R-squared | 0.420 | 0.152 | 0.158 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. “CDept-1”, “CDept”, “CDept+1”, “CDept+2” are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. “Multinational” is a dummy variable equal to 1 for multinational affiliates. “Lag Sales” are sales in the previous year. “Lag Total Assets” are the total assets of the previous year. Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1.

4.2.3. SWEDISH AFFILIATES

In table 5 the results for the regressions accounting for Swedish affiliates in the Eurozone in the year of 2010 are presented. There is only one currency shock episode, when the euro depreciated against the Swedish krona by almost 18%.

In column 1, the depreciation coefficients, in the year of 2010, show that domestic companies increased investment in relation to 2009, and decreased it in 2011, after the depreciation. The mean levels deviation was less than that registered in the year before the shock, although it was positive. Analysing the interaction dummies, which are indicator of the difference in investment behaviour between domestic European companies and Swedish affiliates in the eurozone, there is an increase in the coefficients. Furthermore, in the year before and in the year of depreciation, affiliates invested less than local companies, which is evidenced by negative coefficients. In 2011 (the year after a depreciation), however, the coefficient is significantly positive at 95% significance level.

TABLE 5: REGRESSION OUTPUT – SUBSAMPLE: SWEDEN

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|-----------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.175*** (8.465) | -0.101*** (-31.46) | -0.00804*** (-3.922) |
| CDep(t) | 0.215*** (11.30) | 0.0460*** (15.79) | 0.0335*** (16.73) |
| CDep(t+1) | 0.112*** (6.041) | 0.0462*** (12.53) | 0.0282*** (11.48) |
| CDep(t+2) | -0.0298 (-1.627) | -0.0209*** (-6.027) | -0.00429* (-1.915) |
| CDep(t-1) * Multinational | -0.249*** (-2.639) | -0.0851*** (-6.124) | -0.0626*** (-5.538) |
| CDep(t) * Multinational | -0.206** (-2.282) | 0.0374*** (3.392) | 0.0134 (1.293) |
| CDep(t+1) * Multinational | 0.162** (2.129) | 0.0523*** (5.495) | 0.0207** (2.288) |
| CDep(t+2) * Multinational | 0.0855 (0.933) | 0.0403*** (4.841) | 0.00730 (0.818) |
| Lag Sales | | -7.43e-07*** (-20.22) | |
| Inflation | | -1.059*** (-8.917) | -0.495*** (-6.264) |
| CPI | 0.000545 (0.694) | | |
| Lag Total Assets | | | -5.39e-07*** (-17.56) |
| Constant | -3.722*** (-46.04) | 0.0788*** (31.24) | 0.0692*** (38.35) |
| Observations | 86,330 | 101,467 | 121,638 |
| R-squared | 0.393 | 0.161 | 0.166 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. "CDept-1", "CDept" "CDept+1" "CDept+2" are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. "Multinational" is a dummy variable equal to 1 for multinational affiliates. "Lag Sales" are sales in the previous year. "Lag Total Assets" are the total assets of the previous year. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Sales growth increases for local companies until the year after depreciation and decreases two years after. Regarding the coefficients of interaction terms, there is also evidence that multinational affiliates' sales growth reaches a higher rate than sales of domestic companies in 2010, 2011 and 2012. The major difference happens in 2011. Moreover, it is interesting to notice that before 2010 depreciation, sales growth rate of domestic companies had been lower than those of local firms (8.5 percentage points less).

In column 3, results for assets growth show similar results to sales growth, both for local companies and for Swedish subsidiaries. The former initially increased assets growth for slightly decreasing afterwards. The latter have a small growth rate before the depreciation episode but exceeded in 2 percentage points domestic firms' asset growth rate in the year after.

The results of all three activity indicators might be justified with a plausible delay in the reaction of corporations to such an event. It is expectable that companies need some time to adjust their activity to new information and to new market conditions, therefore, these results are not surprising.

4.2.4. SWISS AFFILIATES

Table 6 reports the results for the difference of performance between Swiss affiliates and companies within the eurozone, around 2011, when the euro has depreciated against the swiss franc.

Capital Expenditures of local companies decreased between 2010 and 2013. In the year before, and in the depreciation year, they overtook their mean levels, but decreased from one year to another. In both years after depreciation, investment was getting smaller and kept below mean levels. 8 and 12.5 percentage points below average was the figures observed for the first and second year after depreciation respectively. In the year prior to the depreciation multinational affiliates have, 19 percentage points less investment than domestic companies. However, in the year of depreciation, affiliates present investment levels above local firms, repeating the trend in the second year following the currency shock.

Local companies show a similar decrease tendency for sales growth rate, and assets growth rate (in columns 2 and 3 respectively) to the one they show for capital expenditures. Looking at the positive coefficients of interaction dummies of column 4, the growth rate of affiliates' sales is higher than that of locals for all four years. For both types of enterprises, at 95% significance level, there is a small increase in the difference between sales growth rates between the depreciation year and the year that ensued. In

column 5, we observe that two years after the euro depreciation against the Swiss franc, Swiss affiliates have a higher assets growth rate than local companies. The difference is 1.84 percentage points.

TABLE 6: REGRESSION OUTPUT – SUBSAMPLE: SWITZERLAND

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|-------------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.147*** (7.993) | 0.0507*** (16.13) | 0.0284*** (13.50) |
| CDep(t) | 0.0534*** (2.907) | 0.0378*** (9.092) | 0.0181*** (6.771) |
| CDep(t+1) | -0.0825*** (-4.508) | -0.0273*** (-7.021) | -0.0135*** (-5.561) |
| CDep(t+2) | -0.125*** (-6.751) | -0.0199*** (-7.463) | -0.0177*** (-10.12) |
| Multinational | -0.00135 (-0.00194) | -0.00296 (-0.0289) | 0.0107 (0.106) |
| CDep(t-1) * Multinational | -0.189*** (-3.065) | 0.0309*** (3.553) | 0.00561 (0.723) |
| CDep(t) * Multinational | 0.135** (2.496) | 0.0147** (2.085) | -0.00161 (-0.227) |
| CDep(t+1) * Multinational | 0.0702 (1.301) | 0.0154** (2.097) | -0.0106 (-1.491) |
| CDep(t+2) * Multinational | 0.120** (2.108) | 0.0117* (1.704) | 0.0184*** (2.673) |
| Lag Sales | | -6.45e-07*** (-16.45) | |
| Inflation | | -0.141 (-1.073) | -0.109 (-1.298) |
| CPI | -0.00196*** (-2.938) | | |
| Lag Total Assets | | | -4.94e-07*** (-17.91) |
| Constant | -3.424*** (-36.09) | 0.0558*** (5.241) | 0.0653*** (7.307) |
| Observations | 89,944 | 104,545 | 124,957 |
| R-squared | 0.392 | 0.141 | 0.163 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. “CDept-1”, “CDept” “CDept+1” “CDept+2” are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. “Multinational” is a dummy variable equal to 1 for multinational affiliates. “Lag Sales” are sales in the previous year. “Lag Total Assets” are the total assets of the previous year. Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1.

4.2.5. JAPANESE AFFILIATES

Table 7 shows results for Japanese affiliates against local companies. There were four depreciations of the euro against the Japanese yen. In 2008 and 2009 these depreciations were the most accentuated in the whole sample (29% and 22%). In addition, depreciations against the Japanese currency happened in years of worldwide financial crisis similarly to what have happened in the United States.

These regressions were also conducted only for depreciations of at least 20% (This is the only currency where that happened) in order to test if the results would have sharper differences in case more significant currency shocks were considered. However, the results were very similar to those found for currency depreciations with a minimum of 15%.

Although Japanese affiliates don't have significant differences in investment behaviour when compared to local companies, it is interesting to notice that domestic firms decrease investment in relation to its mean levels since the year prior to a depreciation (0.0667), to the year after a depreciation (0.0346). This decrease represents on average approximately 3 percentage points in the three years period, indicating that local companies trim its investment during these years.

However, when observing the sales growth column, one can conclude that local companies slightly decrease its rate in relation to mean levels from the year before depreciation to the year when it occurs. Yet, on average, in both years, domestic enterprises show sales growth rate below mean levels. On the contrary, in the two following years, the depreciation dummies' coefficients are positive and higher in the second year following the event than in the first, which indicates an increase in sales growth and a rate above mean. The difference in sales growth rates, as it can be inferred from the interaction of depreciation dummy and multinational dummy, is significantly negative in the year prior to depreciation, and depreciation year. It is however significantly positive in the two years after depreciation, implying an increase in relative sales growth of the Japanese affiliates.

In what concerns assets growth, a significant increase of growth rates of local companies is denoted in column 3. Japanese subsidiaries present a significantly higher growth rate than domestic companies in the aftermath of a depreciation. This is true, despite the negative difference registered in the year before and in the year of the currency shock. This reveals a higher increase of growth rate of subsidiaries when compared to local companies. Despite being lower, local companies had also increased assets growth as it is showed by depreciation dummies.

TABLE 7: REGRESSION OUTPUT – SUBSAMPLE: JAPAN

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|-----------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.0667*** (3.923) | -0.0385*** (-15.38) | -0.000128 (-0.0759) |
| CDep(t) | 0.0659*** (4.862) | -0.0509*** (-26.65) | -0.00548*** (-4.311) |
| CDep(t+1) | 0.0346** (2.365) | 0.0132*** (6.605) | 0.00738*** (5.438) |
| CDep(t+2) | 0.00902 (0.756) | 0.0430*** (22.54) | 0.0133*** (10.56) |
| Multinational | 0.0742 (0.116) | -0.0104 (-0.135) | 0.00727 (0.161) |
| CDep(t-1) * Multinational | -0.0950 (-1.553) | -0.0809*** (-7.858) | -0.0566*** (-6.850) |
| CDep(t) * Multinational | -0.0603 (-1.312) | -0.0204*** (-2.630) | -0.0238*** (-3.711) |
| CDep(t+1) * Multinational | -0.0579 (-1.142) | 0.0469*** (6.152) | 0.0199*** (3.127) |
| CDep(t+2) * Multinational | -0.0162 (-0.393) | 0.0322*** (4.733) | 0.00991* (1.762) |
| Lag Sales | | -7.81e-07*** (-20.43) | |
| Inflation | | -0.124 (-1.508) | -0.283*** (-5.138) |
| CPI | -0.00140* (-1.806) | | |
| Lag Total Assets | | | -5.36e-07*** (-18.47) |
| Constant | -3.540*** (-39.08) | 0.0686*** (11.58) | 0.0656*** (20.79) |
| Observations | 87,035 | 100,908 | 121,105 |
| R-squared | 0.401 | 0.149 | 0.163 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. "CDept-1", "CDept", "CDept+1", "CDept+2" are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. "Multinational" is a dummy variable equal to 1 for multinational affiliates. "Lag Sales" are sales in the previous year. "Lag Total Assets" are the total assets of the previous year. Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1.

4.2.6. CHINESE AFFILIATES

Results for Chinese affiliates in comparison to eurozone local companies are showed in table 8. For all three activity indicators there are no statistically significant differences between Chinese affiliates and domestic firms for the years of depreciation and two years later. However, in the year prior to the depreciation there is a significantly negative difference of 31 percentage points in the investment. Sales growth rates and assets growth rates are 4 and 5 percentage points lower for local companies respectively.

Regarding investment of domestic companies, there is an increase of 8 p.p. from the year before to the year after depreciation (from 0.0974 in the year $t-1$, to 0.132 in $t+1$), inverting the trend and start decreasing only in the second year (13 p.p. above mean levels).

Column two, shows that domestic companies increased sales growth from the year before until the depreciation year. In the year prior to depreciation the level of growth rates were, on average, below mean levels. In the depreciation year sales growth increased to levels, on average, higher than mean levels. Yet, growth rates returned to an average below mean level while higher than year $t-1$ rates.

TABLE 8: REGRESSION OUTPUT – SUBSAMPLE: CHINA

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|-----------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.0974*** (6.262) | -0.0370*** (-15.26) | 0.000594 (0.376) |
| CDep(t) | 0.146*** (9.507) | 0.0254*** (11.72) | 0.0235*** (15.68) |
| CDep(t+1) | 0.180*** (11.66) | -0.0112*** (-5.342) | 0.0167*** (12.19) |
| CDep(t+1) | 0.132*** (8.739) | -0.00256 (-1.172) | 0.0109*** (7.359) |
| CDep(t-1) * Multinational | -0.308*** (-2.845) | -0.0353** (-2.014) | -0.0475*** (-3.065) |
| CDep(t) * Multinational | 0.0710 (0.764) | 0.0214 (1.461) | 0.00384 (0.283) |
| CDep(t+1) * Multinational | 0.112 (1.107) | -0.00830 (-0.535) | 0.000517 (0.0361) |
| CDep(t+2) * Multinational | 0.0264 (0.272) | 0.000405 (0.0285) | 0.0101 (0.756) |
| Lag Sales | | -7.24e-07*** (-19.24) | |
| Inflation | | -0.144 (-1.611) | 0.0607 (0.988) |
| CPI | -0.000634 (-0.840) | | |
| Lag Total Assets | | | -5.08e-07*** (-17.55) |
| Constant | -3.687*** (-46.06) | 0.0709*** (22.63) | 0.0527*** (25.17) |
| Observations | 83,496 | 96,654 | 116,820 |
| R-squared | 0.388 | 0.140 | 0.163 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. "CDept-1", "CDept" "CDept+1" "CDept+2" are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. "Multinational" is a dummy variable equal to 1 for multinational affiliates. "Lag Sales" are sales in the previous year. "Lag Total Assets" are the total assets of the previous year. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1.

5.2.7. OVERALL COMPARISON

When considering the sample as a whole, the results are consistent with those of Desai et al. (2007), indicating that foreign-owned companies invest more than domestic-owned companies, during the year of depreciation, and the two years following the episode. For sales and assets growth rates, affiliates have higher rates in the aftermath of depreciation, which can be explained with a delayed reaction to currency fluctuations. This result is in conformity with most of existing literature. In the year prior to depreciation, and in the year of depreciation, affiliates show, on average, slower growth rates. The higher interaction coefficients are observed in the year after depreciation.

When we separately analyse the reactions of each nation's affiliates against domestic companies, we find that US and Swedish affiliates exhibit a very similar pattern. Investment, sales growth and assets growth of these two countries' affiliates are better than the ones found for the whole sample. In fact, Swedish affiliates present the highest coefficients for sales growth in the depreciation year, and in both years that follow the episode. It is important to notice that Swedish Krona (as well as Swiss Franc) only have one episode of depreciation for the entire period in analysis. Swiss subsidiaries behave in a similar way. However, its results regarding interaction dummies are slightly higher for all of the three regressions, meaning that the difference in reaction to currency depreciations is more obvious than that of subsidiaries of those countries mentioned before.

Japanese affiliates also have results indicating higher growth rates for both sales and assets in the years following a currency shock. They show the second highest sales growth rates in this study for both years that follow a depreciation episode. Yet, no significant results were found for investment differences between companies.

Notwithstanding, results for Chinese affiliates only allow to conclude that there is a slower sales and assets growth rates in relation to domestic companies, and a smaller investment regarding the year prior to the euro depreciation.

4.3 DIFFERENCE OF PERFORMANCE AND HOST COUNTRY GDP

To test whether affiliates located in host countries with higher GDP have a higher relative performance in relation to those affiliates located in host countries with lower GDP, the sample is divided in two groups according to the GDP of the host countries. The higher GDP group is composed of the Eurozone countries with real GDP per capita above the median, and the lower GDP group is composed of those who have a real GDP per capita equal or below the median.

Higher GDP countries are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxemburg, Spain and Netherlands. Lower GDP countries are Cyprus, Estonia, Greece, Latvia, Lithuania, Malta, Portugal and Slovenia. Real GDP per capita data was gathered from the Eurostat website.

Because a euro depreciation affects all the countries in the Eurozone, the fact that each country has its own rhythm of economic growth and different capability to face crisis, it is possible that countries with higher GDP might be more attractive for foreign investment than the others following a currency crisis.

Table 9 shows the results for the “higher GDP group”, while table 10 presents the “lower GDP group” results. The used regressions are the same as the ones used in the first part of the study, but to test the hypothesis two subsamples (higher and lower GDP) were introduced.

Looking at column 1 in both tables 9 and 10, before depreciations, on average, and in agreement with the previous results, the levels are above mean levels. The depreciation dummy is 24 percentage points higher for the “lower GDP group” (0.331) compared to the “higher GDP group” (0.0938). This indicates that local companies belonging to countries with a GDP below the Eurozone median, had higher investment levels (in relation to their mean levels) to those of its counterparts (in relation to their mean levels).

Regarding differences in investment, in the year prior to depreciation, both groups have lower investment levels of affiliates than those of local companies, but this difference is higher for the “lower GDP group”. In this group, subsidiaries investment level is, on average, 33 percentage points lower than those of local companies, while for “higher GDP group” this negative difference is only 8 p.p.

Results for depreciation years and years immediately after depreciation in the set of companies fitting the “higher GDP group” show that multinationals not only have, on average, bigger investment levels than domestic-owned companies but also had increased investment during these years.

Stronger results are found when analysing sales growth in columns 2 of table 9, and table 10. To begin with, sales growth in the year after depreciation, of local companies within the “higher GDP group” (-0.0352) fall more than local companies of its counterpart (-0.0263). All of them however getting values below mean levels. Moreover, sales growth of local companies of the “lower GDP group” have a stronger recovery in relation to its mean levels. In the second year after depreciation there was an increase of 8 p.p. in relation to the previous year for the “lower GDP group”, whereas growth of “higher GDP group” has only increased 5 p.p.

Finally, column 3 of each table show the results taking assets growth as the dependent variable. Before depreciation, the coefficients of interaction terms indicate that multinational affiliates’ growth rates are worse than those of local companies in both groups. In the year following a depreciation there is a positive difference between growth rates of subsidiaries and domestic-owned establishments for both groups. However, this difference is slightly bigger for the “lower GDP group”. The same happens in the second year after a depreciation, where relative assets growth rates are higher for “lower GDP group” (0.0161) than for “higher GDP group” (0.00683), however, both decrease in relation to the previous year.

This study finds evidence that foreign-owned companies have, at the beginning, a smaller relative investment levels in countries with a lower GDP. But in the years that follow depreciation, mostly in subsequent year, subsidiaries located in countries that belong to the “lower GDP group” increase their relative sales growth rate and assets growth rate more than the subsidiaries in countries of the “higher GDP group”.

Furthermore, even domestic companies present higher levels of activity in the “lower GDP group” compared to “high GDP group”. This is true for investment behaviour and assets growth before depreciations and for sales growth rates in the years after depreciation. Thus, local companies of low GDP countries have a better performance either before or after adverse currency chocks.

TABLE 9: REGRESSION OUTPUT - HIGHER GDP HOST COUNTRIES

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|------------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.0938*** (7.282) | 0.00345* (1.827) | 0.0107*** (8.279) |
| CDep(t) | 0.0322** (2.412) | -0.00153 (-0.751) | 0.00552*** (3.909) |
| CDep(t+1) | 0.0252* (1.914) | -0.0352*** (-19.11) | -0.00676*** (-5.313) |
| CDept+2 | -0.0384*** (-2.935) | 0.0174*** (6.272) | 0.000755 (0.376) |
| Multinational | -0.0171 (-0.0373) | -0.0130 (-0.193) | 0.000898 (0.0220) |
| CDep(t-1) * Multinational | -0.0779*** (-3.082) | -0.0381*** (-10.30) | -0.0295*** (-9.274) |
| CDep(t) * Multinational | 0.0406* (1.683) | -0.00626* (-1.907) | -0.0102*** (-3.538) |
| CDep(t+1) * Multinational | 0.0450* (1.907) | 0.0579*** (17.69) | 0.0152*** (5.280) |
| CDep(t+2) * Multinational | 0.0934*** (3.897) | 0.00569* (1.713) | 0.00683** (2.320) |
| Lag Sales | | -7.36e-07*** (-22.21) | |
| Inflation | | 0.450*** (4.139) | 0.0640 (0.732) |
| CPI | -0.000299 (-0.554) | | |
| Lag Total Assets | | | -6.29e-07*** (-22.80) |
| Constant | -3.782*** (-22.71) | 0.0779*** (3.209) | 0.0731*** (5.645) |
| Observations | 111,043 | 128,670 | 149,924 |
| R-squared | 0.438 | 0.144 | 0.151 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. "CDept-1", "CDept", "CDept+1", "CDept+2" are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. "Multinational" is a dummy variable equal to 1 for multinational affiliates. "Lag Sales" are sales in the previous year. "Lag Total Assets" are the total assets of the previous year. Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1.

TABLE 10: REGRESSION OUTPUT- LOWER GDP HOST COUNTRIES

| Variables | (1) Log CAPEX | (2) Sales Growth | (3) Assets Growth |
|---------------------------|-----------------------|--------------------------|--------------------------|
| CDep(t-1) | 0.331*** (5.869) | 0.00236 (0.415) | 0.0144*** (3.697) |
| CDep(t) | 0.0747 (1.469) | -0.00654 (-1.098) | 0.000910 (0.218) |
| CDep(t+1) | 0.0425 (0.851) | -0.0263*** (-4.918) | 0.00126 (0.340) |
| CDep(t+2) | -0.0714 (-1.471) | 0.0569*** (8.273) | 0.00348 (0.731) |
| Multinational | 0.170 (0.170) | 0.0151 (0.198) | 0.0331 (0.173) |
| CDep(t-1) * Multinational | -0.329*** (-3.476) | -0.0896*** (-8.152) | -0.0350*** (-3.674) |
| CDep(t) * Multinational | 0.137 (1.484) | 0.0230** (2.318) | -0.00840 (-0.956) |
| CDep(t+1) * Multinational | 0.130 (1.430) | 0.0729*** (7.497) | 0.0165* (1.960) |
| CDep(t+2) * Multinational | 0.0572 (0.596) | -0.00779 (-0.833) | 0.0161* (1.956) |
| Lag Sales | | -1.30e-06*** (-6.953) | |
| Inflation | | -0.517*** (-2.765) | -0.139 (-0.936) |
| CPI | 0.00331 (0.434) | | |
| Lag Total Assets | | | -2.12e-06*** (-7.847) |
| Constant | -4.347*** (-4.628) | 0.0306 (1.008) | 0.0506 (0.683) |
| Observations | 12,363 | 18,490 | 18,185 |
| R-squared | 0.401 | 0.147 | 0.175 |
| Firm FE | YES | YES | YES |

The dependent variable of column (1), (2) and (3) is log of CAPEX, Sales Growth and Assets Growth respectively. Sales and Assets growth are calculated as the difference between log values. CAPEX is normalized by total assets. All three regressions include firm fixed effects. "CDept-1", "CDept", "CDept+1", "CDept+2" are depreciation dummy variables equal to 1 in the year prior to, the year of, the year after and two years after a depreciation. "Multinational" is a dummy variable equal to 1 for multinational affiliates. "Lag Sales" are sales in the previous year. "Lag Total Assets" are the total assets of the previous year. Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1.

5. CONCLUDING REMARKS

The research focused on the different reactions of local companies and multinational affiliates located in Eurozone when facing a currency shock. As it is documented, much of previous literature on the subject, multinational affiliates tend to overcome crises and financial shocks more easily than domestic firms.

Multinationals can count on several ways to circumvent difficulties which are not available for domestic firms. Internal capital markets are an important example of one of these channels. Through them, affiliates can obtain capital to finance investment when external capital markets are more expensive or less available. The achieved results provide more evidence about the better relative performance of foreign establishments, even when considering developed economies such as those of Eurozone.

The results indicate that foreign companies invest more, and increase sales, and assets growth more, than domestic-owned companies. This is especially true in the two subsequent years following a currency depreciation. Furthermore, when considering separated subsamples regarding the subsidiaries' home countries, the results are similar, and provide further evidence that foreign subsidiaries increase activity (investment, sales and assets) more than domestic companies. The results, however, are not conclusive for Chinese affiliates.

One of the biggest limitations of this research was the fact that the sample of multinational affiliates was not very diversified in terms of location of parent companies. The US multinationals represent the major part of the sample. To overcome this limitation, it was carried out an individualized analysis for each group of foreign companies dividing them according to its global owner's country.

Another limitation of this research has to do with the lack of existing analysis of sales orientation and foreign currency denomination debt, since these two factors might influence the results.

This research shed some light on the difference of behaviour, in the context of a currency depreciation, between companies located in countries with a higher GDP, and companies located in countries with a lower GDP. Evidence suggests that either local, or multinational affiliates tend to have better activity levels in countries with lower GDP. However, the results are stronger when analysing sales growth. This might be justified with the increase in exports rather than internal sales.

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