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Investment, financing and exchange rate parity impacts on the currency gains of mexican companies

Impactos de la inversión, financiamiento y la paridad cambiaria en las ganancias cambiarias de compañías mexicanas

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Abstract

We analyze the impacts on currency gains of companies quoted in the Mexican stock market as a consequence of their investment in long-term assets, intangible assets and property, plant and equipment (PP&E), so as their indebtment in foreign currency and the Mexican peso/USD parity. According to the results of quantile regression analysis going from 1990Q1 to 2023Q2, the main negative impact on currency gains come from debt denominated in USD, followed by the Mexican peso-USD parity which is also negative related to such gains. Intangible assets also have negative impacts on currency gains while PP&E investments enhance them, so as recent investments on fixed assets do, but this last only marginally. So, our analysis suggests that the currency exposition of Mexican firms can be negative for their profitability and can be seen as warning signs for corporate decisions on overseas operations and financing planning based in foreign currency. Nevertheless, profitability sources also exist and can be used to foster companies' performance.

JEL Code: F31, F36, G32, M21, M41
Keywords: currency gains; balance sheet effects; corporate profitability; exican companies

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Resumen

Analizamos los impactos de las ganancias cambiarias de empresas enlistadas en el mercado accionario mexicano como consecuencia de su inversión en activos de largo plazo, activos intangibles y PP&E (propiedades, planta y equipo), así como de su endeudamiento en moneda extranjera y de la paridad cambiaria del peso mexicano con el dólar estadounidense. Según los resultados del análisis de regresión cuantílica de 1990Q1 a 2023Q2, el principal efecto negativo sobre las ganancias cambiarias proviene de la deuda denominada en dólares estadunidenses, seguida por la paridad cambiaria que esta también negativamente relacionada con dichas ganancias. Los activos intangibles también tienen impactos negativos sobre las ganancias cambiarias en tanto que las inversiones en PP&E las mejoran al igual que lo hacen las inversiones en activos fijos, aunque éstas sólo marginalmente. Así, nuestro análisis sugiere que la exposición cambiara de las empresas mexicanas puede ser negativa para su rentabilidad y puede ser vista como señales de alerta para las decisiones sobre operaciones internacionales y planeación de financiamiento con base en moneda extranjera. Sin embargo, también existen fuentes de rentabilidad y pueden usarse para fomentar el desempeño de las compañías.

Código JEL: F31, F36, G32, M21, M41
Palabras clave: ganancias cambiarias; efectos en los balances; rentabilidad corporativa; compañías mexicanas

Introduction

The depreciation of Latin American currencies has impacted different areas of companies, i.e: fixed-asset investment profiles, profitability, growth and level of sales which are called balance effects that have an effect on the probability of generating currency gains. A high depreciation could lead a company to bankruptcy. According to Caballero, Panizza, and Powell (2014) deterioration of balance sheets may have a negative impact on domestic financial systems, and it is even related to a higher risk of sovereign non-payments according to Du and Schreger (2016). The financial health of companies may have an impact on financial systems and if it deteriorates this could result in a lack of liquidity for companies which will be reflected as past-due portfolio of loan institutions. Worth considering is the relevance of the role of companies' balance sheets in reactivating the economy during crises according to Krugman (1999). It is crucial for entrepreneurs to know how the different levels of investment in productive assets interact with the company operation, and given exchange movements, how to develop financing, investment and risk hedging plans to avoid exchange losses. Dubiel y Hilarowicz (2025) highlight the importance of exchange rate behavior as crucial for companies operating in international markets, given that exchange rate volatility can have a significant impact on their financial results.

The goal of this chapter is discussing how the levels of investment in long-term assets, working capital, debt in foreign currency, and the value of US dollar have an impact on the probability of generating currency gains for Mexican companies. The hypothesis is that the higher the levels of investment in long-

term assets, working capital, debt in foreign currency, and in the value of US dollar, the lower the probability of generating currency gains. The seeming lack of similar studies in Mexico makes this document a contribution to know the influence of the investment levels and the use of foreign currency in establishing the probability of currency gains.

The structure of this chapter is the following. The next section shows a review of the relevant literature. A section discussing the variables under study by means of a logit model is then presented, and the last section will be devoted to conclusions.

Literature review

Currency fluctuations and balance sheets

Exchange fluctuations have a different impact on each country, and they may be favorable or unfavorable, depending on the specific characteristics of their economy and the mechanisms implemented by governments in such event. If a government favors the international competitivity of domestic goods a devaluation increases the aggregate local demand and the need to produce more. This is what is called an expansive devaluation. If a devaluation causes negative effects an economic contraction may take place, motivated in part by the fact that companies reduce their productive investments by allocating more funds to pay the foreign currency denominated debt service.

A contracting devaluation, according to Krugman and Taylor (1978), reduces domestic production if imports exceed exports, and if there are differences in the inclination to consumption in relation to benefits and wages. If wages slowly adjust to an increase in prices a reduction of purchasing power takes place which results in lower consumption and production due to the lack of demand, having thus an impact on the levels of company investment in machinery and equipment. Hong (2018) adds that the conditions of balance and the location in the international trade network are crucial factors for a country to establish its economic growth rate prior to and during a crisis. According Montiel (2024), before Covid pandemics, the Mexican peso showed an erratic overvaluation regards the dollar which was corrected in the recent past years.

Krugman (1999) explains that the deterioration of companies' balance sheets plays a vital role in the crisis itself. The outlook for the economic recovery is hard to tell, due to the weak financial situation of companies which capital has significantly declined as a result of lower sales, high interest rates, and a depreciated currency. Although these balance problems are in turn a cause of the unproductive loans granted by Banks, even a recapitalization would not resolve the negative situation of financially weak companies. In order to explain exchange rate crisis, we must evaluate the role of companies balance sheets

as regards their capacity to invest and generate the capital flows required to reactivate the economic activity.

Tobal (2013), by means of a database itemized by currency, showed that the degree of monetary imbalance of the private bank sector in Latin America and the Caribbean differs depending on the exchange rate system, it being lower in those countries that follow a de-dollarization policy. The monetary imbalance is associated to the exchange rate risk, and therefore, it is a potential source of systemic risk and financial instability. Latin America and the Caribbean have a history of high levels of partial dollarization and are therefore particularly vulnerable to monetary imbalances when strong exchange rate fluctuations take place.

Benetrix, Lane, and Shambaugh (2015) examined the evolution of international monetary positions and found out that during the period prior to the 2008 crisis a generalized change to net positive positions in currencies took place. Few countries had the archetypical short position in currencies shown by emerging markets, thus confirming a reduction in the number of countries with substantial short positions in currencies. At the same time, the rise in international operations, particularly in the developed economies, may generate cross-border wealth effects that are much higher in relation to the GDP if there is a change in the exchange rate. Those countries with low amounts of US dollars and yens experienced the highest exchange losses.

Tobal (2018) found a reduction in long positions of currencies and that several countries adopted short positions after 2006 resulting from the de-dollarization policies implemented in the region. Such policies were successful in reducing the average imbalance in Bolivia, Paraguay, and Peru.

Venkatesh and Gourishankar (2020) examined the financial vulnerability of 22 economies in the emerging markets to an exchange risk with an “original sin” approach. To this end they measured the monetary imbalances between liabilities and assets in foreign currency. The discovered that Latin American countries have a higher value of the so called “original sin” (a metaphorical term which refers to the decision of funding in a currency other than that of a company’s revenues) followed by Central European countries. Their research shows that the cause for monetary imbalances may be explained by the global and specific characteristics of each country, such as their size, trade opening and its level of development.

Björk and Ekström (2024) find that the main multinational Sweden firms are in best position to manage the exchange rate risk by means of complex hedging strategies. According to Pari and Patel (2025), the South Korean and German recovered from the Eurozone crisis thanks to exports, and from the 1997 financial crisis due to their sound exchange risk management.

This shows that companies match their liabilities and assets in foreign currency and that they use their hedge positions to reduce their exposure to exchange rate fluctuations.

Currency fluctuations and profits

Krugman and Taylor (1978) point out that a devaluation raises the price of imported goods compared to domestic goods, and the prices for foreign consumers are reduced. This stimulates the production of export goods which results in benefits for exporting companies.

Forbes (2002) examined the impact on 13,500 companies in 42 countries of twelve depreciations that took place between 1997 and 2000. His findings show that into the year following the depreciation companies have a significantly higher growth in market capitalization, suggesting that they increase the current value of the expected future gains. Exporting companies reflect a substantially better return; those with high levels of debt show a lower growth of net revenues, and larger companies often post worse results than smaller ones.

By contrast, the revaluation of a local currency may generate negative effects and damage the international sales of domestic firms, as Bărglăzan (2007), and Sierra and Manrique (2014) point out. Bruno y Song (2023) state that the revaluation of a local currency has a negative impact on the sales of export goods due to an increase in their price in terms of the foreign currency, although there may also be some benefits. That is the case of imported supplies, which have a lower price in local currency, and of the interests and principal payments on credits in foreign currency.

Kesriyeli, Özmen, and Yigit (2011) found that during the 1992-2003 period Turkish companies had a dollarization level of liabilities above the international average, which made them potentially vulnerable to the depreciation of the real exchange rate. These companies, however, managed to partially match the mix of currencies of their debt to revenue flows. The dollarization of liabilities and the levels of exporting have a positive correlation, and therefore it would be expected that those sectors with larger exports are less vulnerable to a negative impact in their balance due to a currency depreciation. They concluded that depreciations are contacting in terms of investment and gains for companies with more liabilities in US dollars.

Bruno and Song (2018) in examining companies in the emerging economies during periods of depreciation of local currencies during 2014-2016 found that these companies made use of favorable conditions to issue US bonds. For those companies that accumulated balances in cash, the price of their shares was more vulnerable to local currency depreciation. Even though depreciation fosters competitivity of exporting companies, their results suggest that the negative impact of the financial channel floods the benefits obtained from trade competitivity, most likely because balances in cash did not have returns.

Hale and Hale & Juvenal (2021) analyze the consequences of pandemic on 48 countries and their firms, finding that several countries and firms experimented significant currency losses but others

countries were able to manage the imbalances and some firms were able to reduce the currency mismatches into their balance sheets.

Studying an oil&gas firms group listed in the Nigerian Stock Market, Obasi and Okegbe (2023) find a direct relationship between their currency gains and returns. Extending the analysis to include agriculture firms, Eden, Ifurueze and Umeh (2024) show that exchange rate fluctuations have positive effects on profits from 2012 to 2022. Liu (2024) find that the costs of their foreign trade have strong effects on the profits of Chinese firms, while the Japan firms' profits are more sensitive to the exports and imports volumes. Kiarostami and Rahmani (2025) provide evidence of the higher financial yields obtained by Iranian banks due to their sound exchange risk management.

Currency volatility and firms' investments

Exchange rate pressures may result in a devaluation of currencies in controlled systems or in a depreciation in free-floating exchange rate systems. Diaz (1963) explain that a devaluation will have, in principle, an impact on the trade balance and, consequently, increase domestic production, stimulating the manufacturing of export goods, and this is then extended to other sectors of the economy. As a result of this, the capacity of production will be required to be increased by acquiring fixed assets.

Benavente, Johnson, and Morandé (2003) showed that the depreciation than took place from 1994 to 2001 in Chile after the Asian crisis could have expanded the corporate investment in companies that had previously incurred un foreign currency debt. Companies of the trade sector could presumably enhance their competitivity. Even though depreciation of a currency by itself does not affect investment, a higher GDP growth rate would have a positive impact on investment.

Bleakley and Cowan (2005) found that companies in the emerging markets with imbalances in their liabilities and assets in foreign currencies during 1990 -1999 reduced their investment in assets as a result of exchange fluctuations. Although the balance sheet is deteriorated it is later mitigated or even reverted due to the expansive effects of depreciation, and then gains are higher in those companies with more debt in US dollars.

Cowan, Hansen, and Herrera (2005) found that after a depreciation Chilean companies with a higher debt in US dollars did not show a statistically different level of investment than firms that keep debt in pesos from 1995 to 2003. Harchaoui, Tarkhani and Yuen (2005) found that the exchange rate had not significant effects on the investment programs of a sample of Canadian firms, detecting also diverging patterns of investment between on fixed assets as response to exchange rate fluctuations. Aguiar (2005) find that, after 1994 devaluation, Mexican firms heavely indebted in foreign currency reduced their investment expenses. Studying the Brazilian 2001-2003 crisis, Janot, Garcia and Novaez (2008) found

that enterprises with significant currency mismatching just before the crisis after it reduced their investment in a 8.1% more than other enterprises; also exporters focused firms with such kind of mismatches reduced their investment expenses in a 12.5% more than other exporters companies.

Barajas, Restrepo, and Steiner (2017) identified that Colombian firms accumulated liabilities in foreign currency between 2005 and 2013, thereby increasing their vulnerability in the event of changes in external conditions. They found a balance effect on investments during exchange rate fluctuations, and it is much stronger in depreciations than in appreciations. There is also the possibility that vulnerable companies need to cut down their investment when responding to a negative impact on their balances. This situation is worrisome, since a heavy depreciation may lead companies with large currency mismatches to bankruptcy and result in serious consequences for the economy, creditors and even for public finances. A large number of companies were allowed to widen the scope of their operations more easily, but at the same time, there was a substantial reduction in their profitability. The higher level of leverage in a currency that did not correspond to the currency of revenues increased mismatches in foreign currency since 2010 in balance sheets. This then showed significant vulnerabilities that could worsen with the volatility of the exchange market. A low profitability may also limit fixed investment, and therefore, the short-term growth of a company.

Banerjee, Hofmann, and Mehrotra (2020) when examining the data of the G7 (Canada, France, Germany, Italy, Japan, the UK, and the USA), as well as of those of the main emerging economies (Brazil, Chile, China, India, Indonesia, Korea, Mexico, Russia, and South Africa) found that the depreciations in the exchange rate from 2000 to 2015 had an impact on the corporate investment of those companies with debt in foreign currency. A depreciation has a negative impact on investment, due to the effect on the loan risk, although it may partly be set off by trade revenues. Companies of developed economies reduced their capital expenditures as part of total assets prior to the crisis, and thereafter increased such expenditure, to then decline again in 2015. This reduction was more significant in emerging economies; this suggests that the strong depreciation of their currencies substantially accounted for the recent slowing of investment in such economies.

The depreciation of a currency has an impact on the economy, according to Candelo and Oviedo (2021), establishing the investment profile in the fixed assets needed to produce goods in demand depending on which stage the economy is. However, different studies on this issue do not follow these findings. Kuruc, Tissot, and Turner (2016), for example, by means of an analysis using statistics from the Bank for International Settlements noted a significant decline in currency mismatches from the late 90s up to 2010. Ismail, Magaji & Musa (2025) offer evidence that currency devaluation reduces the profitability of Nigerian companies, due to their high dependence on imports of capital goods and raw materials.

For medium-sized companies in an emerging economy which have seen higher currency mismatches, their balances would be substantially weakened in the event of a depreciation. This may limit the investment of companies and therefore influence the economic results of these emerging economies. By contrast, Bonono and Terra (2001) and Bruno and Song (2023) argue that a depreciation expands the manufacturing of export goods and boost investment in fixed assets.

Foreign debt effects

Carranza, Cayo, and Galdón (2003) studied 163 firms in Peru and the showed that those with debt in US dollars see a negative impact on investment due to the depreciation of the real exchange rate. These companies faced a contraction of domestic demand that had a severe effect on sales. Furthermore, the export sector was characterized by being relatively small and with a low diversification.

Brown, Ongena, and Yesin (2011) studied the determining factors for the level of debt in foreign currency of 9,655 small companies of 26 countries in 2005. Their findings suggest that companies with revenues and assets in foreign currency have higher probability of getting loans in foreign currency. The presence of foreign banks, an inadequate company management, and the absence of capital controls foster debts in foreign currency.

Restrepo, Niño, and Montes (2014) found that Colombian companies did not match the composition by currency of liabilities with their assets and revenues in 2005-2012. As a result of this, they found that a 10% depreciation implies a 3% reduction in the rate of investment in fixed assets of the companies with a higher level of debt in US dollars.

Caballero, Panizza, and Powel (2014) point out that loans in foreign currency have strongly increased in the 2009-2012 period throughout Latin America and the Caribbean as a result of a higher financial deepening and integration. A severe deterioration in private sector balance sheets, however, has taken place. The mismatches of currencies in company and bank balance sheets that have placed debt instruments in international markets presumably profiting from low interest rates may have collateral effects on domestic financial systems, since balance sheets deteriorate if the local currency is depreciated, and this may even result in a lack of liquidity for companies with debt in foreign currency.

There are several causes that give rise to mismatches between foreign currency liabilities and assets. In this regard, Chow (2015) says that companies in the emerging markets increased their liabilities in foreign currency due to the easy access to world markets of capital, low interest rates and good investment opportunities, and evidence that although the risk in the private sector is moderate in most emerging markets, a combination of macroeconomic and financial disturbances may erode the ability of companies to meet the debt service, which could generate a higher debt in a risk environment.

Du and Schreger (2016) studied the company balances of Brazil, Colombia, Hungary, Indonesia, Israel, Malaysia, Mexico, Peru, Poland, Russia, South Africa, South Korea, Thailand and Turkey and found that during the 2004-2012 period a higher corporate funding in foreign currency is associated with a higher risk of sovereign default. They argue that a government is more inclined to defaulting than to inflation when the monetary imbalance in the corporate sector has a negative impact on their balances resulting from a monetary depreciation.

Chui, Kuruc, and Turner (2016) noted a remarkable growth in corporate loans of the emerging economies based on the issuance of dollar-denominated bonds in the world markets. A long period of low interest rates allowed for much cheaper funding compared to the first years of this century. Nuñez, Perrotini, and López-Herrera (2018) show that since 2009 the corporate bonds issue in international markets has become an increasingly important source of financing for Latin American companies, partly due to the dynamism of the world economy as a result of the low interest rates established by the Federal Reserve of the United States, as a response to the 2008 financial crisis.

Salomao and Varela (2018), when examining the funding and investment decisions of Hungarian firms found that those using loans in foreign currency from 1996 to 2010 may have a higher growth. They confirmed that highly productive companies with little capital prefer to incur in foreign currency debt and expose themselves to an exchange risk to attain more quickly an optimal production level. This means that the exchange rate has an heterogenous impact on the decisions made by companies.

Hardy (2018) explains that companies in the emerging markets often apply for loans in foreign currency, but their assets are in local currency, which leads to a mismatch of foreign currency in their balance sheets. This may damage their net worth in case a depreciation takes place. Hardy analyzed Mexican companies for the 2008-2015 period and found that non-exporting firms with a higher currency mismatch show a slower growth in foreign currency loans after a depreciation. Larger firms with a higher exposure to foreign currency debt increase loans in domestic currency. He concludes that large non-exporting companies increase their debt, while the smaller ones do not, and therefore the risk evaluation must focus on the exposure of small and medium-sized companies, since these firms may experience the strongest negative impact.

Kadirgan (2019) points out that after the 2008 recession the excess accumulation of loans in foreign currency to companies in the emerging economies is worrisome, as it may deteriorate their solvency in the event of a depreciation. There is a risk induced by this debt to the extent companies do not match these liabilities to foreign currency assets. He found that the balance sheets information of Turkish firms indicated that companies with a direct access to international financial markets export more and have a larger proportion of assets in foreign currency than those that only use loans of domestic banks.

By examining the financial statements of companies from Chile, Colombia, Mexico, and Peru from 1994 to 2001, Byström (2017) found that the net monetary imbalance varies significantly among these countries. Such imbalances were due to the access that companies had to the international market of goods and capital, and to the level of interest rates in their domestic economies. It is worth to consider these results in view of a higher volatility of currencies derived from an increase in geopolitical risks and the fall of oil prices during the period of Byström´s study. This shows the relevance of acknowledging the imbalances of currencies in estimating loan risks, both for an investor that is aware of risks, and for a government agency charged with an overall financial stability of the economy.

Ribeiro et. al. (2017) showed that a depreciation in a currency had a negative impact on the balance sheets of Brazilian companies with debt in foreign currency during the 2009-2015 period. This is mainly explained by the negative correlation between the exchange rate and the international price of commodities. Although the nominal value of liabilities increased proportionately to the exchange rate during the period under research, the revenues of exporting companies did not increase in the same magnitude, as most Brazilian exporting companies manufacture basic products and their price declined over the last years. The natural hedging expected by the accounts receivable departments of exporting companies does not seem to be as effective as expected, and this led to losses.

Alfaro, et al. (2017) studied the relation between leverage and financial fragility in the corporate sector of emerging markets during the 2008 global financial crisis. They made clear that prior and after this crisis those companies with a higher leverage are closer to end up in financial difficulties. Their data suggest that after the 2008 crisis companies in the emerging markets show lower leverage levels than the five Asian countries most affected by the crisis: Indonesia, Malaysia, Philippines, South Korea, and Thailand.

Alvarez and Hansen (2017) studied a panel of Chilean companies from during the 1994-2014 period, and they saw that assets in foreign currency, exports and the use of currency derivatives are associated positively to the use of debt in foreign currency. They did not identify any potential effect or for having debt in foreign currency on profitability or on the investment of assets after a devaluation.

Covid-19 pandemic impacted several firms' activities around the world, with both positive and negative effects, Shang, Li, & Zhang (2021) quote as examples the global value chains, indebtness channels and digitalization. The shutdown of economics produced a fall in the value of local currencies, reducing the enterprises' chances for fresh borrowing and difficulting the repayment of previous debts contracted in foreign currencies.

Harasztosi and Kátay (2020) researched the efforts by Hungarian companies to match the currency mix of their assets and liabilities. They provide sound proofs to back the theory that matching currencies plays a significant role for exporting companies to decide on the currency of debt. Although a

natural hedging is not the main reason to choose a foreign currency, as it only accounts for 3.8% of the total new loans in foreign currency granted, and 2.9% of the total new bank loans in foreign currency. Consequently, the probability of being granted a loan in a foreign currency is higher when there are export revenues that fully cover the foreign currency debt service expenditure. In addition to the natural hedging, these authors suggest that both the carry trade and the diversification strategies are relevant factors in making decisions on foreign currency funding. Some authors also argue that other additional factors, among them Allayannis et al. (2003) who suggest that the theory of costly monitoring management and the signaling based on profitability is a possible explanation for the use of debt in foreign currency. Shapiro (1984) argues that in some countries, such as Sweden, fiscal laws stimulate using exchange rate debt by allowing currency losses to be immediately deductible from taxes. Giraldo and Turner (2022) found a deterioration in the balance sheets of Brazilian, Mexican, Argentinian and Chilean companies, especially for commercial ones. Such spoilage, sustain that researchers, is a consequence of the observed increasing USD indebtedness with an associated higher default risk level and the simultaneous decreasing of profits and capital expenses.

Analysis of mexican firms' foreign currency gains

Information on 84 non-financial companies listed in the Mexican Stock Exchange was analyzed, see Table A1. The price of the US dollar was obtained from Banco de México (Central Bank), and the accounting date from Economatica database; all observations are quarterly. The period from 1990Q1 to 2023 Q2 was chosen for our analysis because the Mexican exchange regime went through different stages: from a fixed parity up to 1989 to a programmed slip in a part of 1990, crawling-peg from 1990 to 1994, and as of December 1994 and effective to date the Mexican peso adopted a managed free-floating system. The subperiod 1990Q1-2019Q4, before COVID-19 pandemics, was considered to analyze the model's parameter sensitivity. Not all the sampled companies were listed during the entire period, so that the number of observations for each individual company differs.

Financial ratios measuring investment in intangible assets, the recent acquisition of fixed assets, investment in real property, plant and equipment, working capital and debt in foreign currency, as well as the peso/dollar exchange rate were selected as independent variables. With the accounting data of financial statements such financial ratios were built. Details of these variables can be seen in Table 1. All variables are in US dollars, including the value of the dollar. Gains from the exchange rate balance (SCUN) of the firms being researched varies from a minimum (negative) value to a maximum (positive) value, including a value of zero or a balance with no gains or losses.

Table 1
Variables of the Model

Variable	Formula	Description
SCUN* Gain (Loss) derived from exchange rate balance	Exchange Rate Balance ÷ Net Profit	A negative sign means currency losses; a positive one, gains. It reflects the impact of exchange rate mismatches on total gains.
AIAT	Intangible Assets ÷ Total Assets	This quantifies the amount of investment in patents and trademarks from the total investment.
AIPERG Long-term Investment	Real Property, Plant & Equipment ÷ Investment Activities	This measures the percentage of investment made in real property, plant and equipment over the last year.
CTNPC Working Capital	Net Working Capital ÷ Current Liabilities	This compares short-term investment to short-term debt.
DMEAT Foreign Currency Debt	Foreign Currency Debt ÷ Total Assets	Percentage of assets funded in foreign currency.
DOLLAR	Dollar Fix, as published by Banco de México	US dollars
IPEAT Long-term Assets	Real Property, Plant & Equipment ÷ Total Assets	Amount of investment in fixed assets from the total investment expressed in times.

* SCUN is the dependent variable; all other are independent

Source: Our calculations based on the definitions found in Normas de Information Financiera, A.C.-CINIF. (2018).

Following Koenker and Basset (1978), we adopt a quantile regression for the analysis of Mexican companies' currency gains in order to take advantage of the fact that this tool does not require restrictive assumptions about the generating data process and is able to provide us with a more comprehensive view of the relationships between the currency gains and the explanatory variables.

The τ conditional quantile, $0<\tau<1$, of y given x is defined a:

$$Q_y(\tau|x) = \min\{\eta|\mathbb{P}(y \leq \eta|x) \geq \tau\}. \quad (1)$$

$Q_y(\tau \mid x)$ can be estimated by quantile regression assuming the linear relationship $Q_y(\tau \mid x)=x^T \beta(\tau)$, where x^T is a matrix of observable variables covarying with y, $\beta(\tau)$ is a vector cointaning the parameters to be estimated.

Accordingly, results the quantile regression model as:

$$y=x^T \beta(\tau)+\xi(\tau),$$
$$Q\ \xi\ (\tau \mid x)=0.$$

(2)

In our analysis, y is the vector of currency gains (losses) derived from firms' currency balances and x is a matrix cointaning the observed independent variables. $\beta(\tau)$ is the vector of parameters to be estimated depending on τ, ξ is a vector of random errors about whose probability distribution no assumptions are made. To estimate $\beta(\tau)$ it is necessary to solve the optimization problem:

$$\hat{\beta}(\tau) = \underset{\hat{\beta}\in\mathbb{R}}{arg\,min}\ \frac{1}{n}\left\{\sum_{y_i \geq x_i^T} \tau\left|y_i - x_i^T\hat{\beta}\right| + \sum_{y_i < x_i^T}(1-\tau)\left|y_i - x_i^T\hat{\beta}\right|\right\}.$$

(3)

According to the classic linear regression model, given x values, the conditional quantile functions of y are parallels and, as consequence, the coefficients of the slopes for the regressions of the different quantiles will be identical.

Panel A in Table 2 shows currency losses up to quantile 0.40, after that there are gains. Almost all the parameters associated with independent variables are significant. AIAT coefficients show an inverse relationship regarding the currency gains, with a stronger negative influence on the extreme quantiles (0.20 y 0.99) and weaker effects in the interval of quantiles 0.60 to 0.80, suggesting a non-linear relationship. All the coefficients associated with AIRPEG are highly significant but small, except in the quantile 0.99, all are negative. IPEAT coefficients corresponding to 0.20 and 0.99 are insignificant, the others are significant, negatives in the 0.10 and 0.20 quantiles and increasingly positive in the higher quantiles until reaching its maximum value in the quantile 0.99. The peso-dollar parity has significant effects in the quantiles above 0.20 becoming increasingly more negative. All the DMEAT coefficients exhibit high significance, being negative in the lower quantiles, become positive signed from quantile 0.50 onwards. CTNPC has very low effects and only significant in the 0.10-0.30 quantiles interval.

Panel B in Table 2 shows that currency losses are negative up to the quantile 0.40 becoming positive from the 0.5 quantile onwards. The estimated coefficients are mostly highly significant. The AIAT coefficients denote an inverse relationship with the currency gains, exhibiting a greater negative influence in the extreme quantiles (0.10 and 0.99) with a lower influence in the 0.60-0.80 quantiles intervale, suggesting a non-linear relationship. Although small, all the AIRPEG coefficients are highly significant in all the currency gains quantiles and negative, except in the quantiles 0.90 and 0.99 where their impacts are positive. All the estimated IPEAT coefficients are highly significant, except for the 0.20 quantile, being negative in the first quantiles and increasingly positive in the subsequent ones until reaching a relatively high value in the 0.99 quantile.

Table 2
Estimates from quantile regression 1990Q1-2019Q4

Panel A: 1990Q1-2019Q4										
Quantile →	0.10		0.20		0.30		0.40		0.50	
SCUN[1)]	-0.2395		-0.0741		-0.0239		-0.0038		0.0010	
AIAT	-0.0867	***	-0.1048	***	-0.0831	***	-0.0690	***	-0.0410	***
AIRPEG	-0.0001	***	-0.0001	***	-0.0001	***	-0.0001	***	-0.0001	***
IPEAT	-0.0460	***	-0.0036		0.0048	*	0.0054	**	0.0069	***
DOLLAR	0.0299		-0.0079		-0.0139	*	-0.0153	**	-0.0202	***
DMEAT	-1.4190	***	-0.5056	***	-0.1970	***	-0.0417	***	0.0145	***
CTNPC	0.0011	***	0.0005	***	0.0002	*	0.0001		-2.7E-06	
Constant	-0.0285	***	-0.0088	***	-0.0030	**	-0.0001		0.0017	
Quantile →	0.60		0.70		0.80		0.90		0.99	
SCUN[1)]	0.0121		0.0373		0.1040		0.3470		2.3011	
AIAT	-0.0296	***	-0.0233	***	-0.0355	***	-0.0658	***	-0.4562	***
AIRPEG	-0.0001	***	-0.0001	***	-0.0001	***	-3.8E-05	***	0.0001	***
IPEAT	0.0150	***	0.0278	***	0.0379	***	0.0828	***	0.3435	
DOLLAR	-0.0394	***	-0.0610	***	-0.0900	***	-0.2791	***	-1.1935	**
DMEAT	0.1558	***	0.4060	***	0.8299	***	1.5279	***	11.0796	***
CTNPC	-0.0001		0.0003		0.0006		0.0013		0.0774	
Constant	0.0038	***	0.0058	***	0.0144	***	0.0609	***	0.4732	***
Panel B: 1990Q1-2023-Q2										
Quantile →	0.10		0.20		0.30		0.40		0.50	
SCUN[1)]	-0.2527		-0.0786		-0.0260		-0.0050		0.0007	
AIAT	-0.1064	***	-0.1054	***	-0.0807	***	-0.0635	***	-0.0326	***
AIRPEG	-0.0001	***	-0.0001	***	-0.0001	***	-0.0001	***	-0.0001	***
IPEAT	-0.0366	***	-0.0032		0.0056	**	0.0058	***	0.0063	***
DOLLAR	0.1328	***	0.0135		-0.0070		-0.0130	**	-0.0176	***
DMEAT	-1.5296	***	-0.5080	***	-0.1963	***	-0.0454	***	0.0110	**
CTNPC	0.0010	***	0.0004	***	0.0002	**	0.0001		0.0000	
Constant	-0.0453	***	-0.0135	***	-0.0046	***	-0.0007		0.0015	
Quantile →	0.60		0.70		0.80		0.90		0.99	
SCUN[1)]	0.0115		0.0367		0.1035		0.3461		2.5616	
AIAT	-0.0238	***	-0.0135	***	-0.0234	***	-0.0590	***	-0.7139	***
AIRPEG	-0.0001	***	-0.0001	***	-0.0001	***	-3.8E-05	***	0.0001	***
IPEAT	0.0153	***	0.0280	***	0.0365	***	0.0775	***	0.6487	**
DOLLAR	-0.0379	***	-0.0576	***	-0.0912	***	-0.2830	***	-2.7378	***
DMEAT	0.1443	***	0.3853	***	0.7873	***	1.5247	***	9.8011	***
CTNPC	-0.0001		-0.0002	*	-0.0003	***	0.0002		0.1103	
Constant	0.0035	***	0.0061	***	0.0171	***	0.0661	***	0.7783	***

[1)] SCUN empirical quantiles.
***, ** and * denote, respectively 1%, 5% and 10% de significance level
Source: our own estimations

In contrast, the Mexican peso/USD parity has a high significant and positive effect in the quantile 0.10, decaying at an accelerated rate and becoming very negative in the upper quantiles of the probability distribution of the currency gain. DMEAT coefficients are also highly significant, but with a less and less negative until the 0.40 quantile 0.40, changing the sign from the 0.50 quantile with increasing

size that reaches a remarkably high value. The effects of CTNPC are significant and small with positive sign in the 0.10-0.30 interval, and again significant in the 0.80 quantile but now with negative sign but also small sized.

In terms of their impacts on currency gains quantiles, DMEAT, DOLLAR and AIAT show the stronger influence in the 0.10 quantile; DMEAT, AIAT and DOLLAR in the 0.20 quantile; DMEAT and AIAT in the quantile 0.30 and, changing the ordering, AIAT and DMEAT are the most influential variables in the quantile 0.40. In the quantile 0.5 of the currency gains the stronger effects come from AIAT and DOLLAR. DMEAT and DOLLAR exert the most important effects in quantile 0.60; and DMEAT, DOLLAR and IPEAT in the quantiles 0.70, 0.80 and 0.90; while DMEAT, DOLLAR and AIAT are the more important variables in the quantile 0.99.

Comparing both panels in Table 2, we can see that the size of almost all the coefficients is very similar, only the effects of AIAT, DOLLAR, DEMEAT and CTNPC are stronger in the 0.99 quantile of the whole period.

Results discussion

Except by the quantiles 0.40 and 0.50, DMEAT is the variable with the stronger impacts on currency gains, followed by DOLLAR from quantile 0.50 onwards, when currency gains start to happen. These results are consistent with Salama and Varela (2018) who detected a higher growth of Hungarian firms leveraged with foreign debt. After them, the respectively positive and negative impacts of IPEAT and AIAT follow in importance. These results could suggest that the greater the investment in PP&E, the greater the currency gains and, at the other hand, the investment in intangible assets reduces such gains. Benavente et al. (2003) also found similar results for Chilenean firms. The positive association of the USD parity with the currency gains could be an obvious result of foreign trade activities being carried by the companies analyzed.

Given the detected negative relationship of the currency gains with the USD parity, that risk management becomes more relevant if the company has an exporter or importer profile. This negative relationship could also be explained by the weight that imports of merchandise, machinery and equipment can achieve, as well as the effect of financing in USD independent of the level of debt in that currency, as suggested by Bleakley and Cowan (2005) and Banerjee et al. (2020).

Conclusions

The results of our analysis show that recent investments in fixed assets, intangible assets and real estate, plant and equipment, as well as debts in foreign currency and the USD parity are important variables to explain the currency gains of the Mexican companies sampled. It was also shown that the explanatory variables have a differential influence on the exchange earnings of that companies.

The inverse relationship between the currency gains and the debt denominated in USD is consistent with the findings of Caballero et al., Powel (2014), Chow (2015), Chui et al. (2016) and Giraldo and Turner (2022); so our result suggests the convenience of keep a low level of this kind of debt in local currency depreciation scenarios, in particular if it is the case that companies want to borrow in foreign currency because it could offer them better growth prospects as Salomao and Varela (2018) have found. An alternative for companies is to stablish an active currency risk management in order to prevent currency losses so as to take advantage of an aggressive capital structure in appreciation scenarios.

The negative impact of intangible assets suggests that investment in them should be limited to only what is strictly necessary for the company's operations, since they do not add value to companies. In this regard, with high stress scenarios, such as those typical in critical moments, greater caution could be exercised in investments related to R&D, trademarks and patents. Recent investments in assets have virtually no effect on currency gains, it could be an obvious response given these investments have not matured to the point of contributing to the profitability of the company, neither in gains in local currency nor currency gains.

At the other hand, the PP&E investment contribution to the enhancement of currency gains suggest its convenience, particularly by the fact that a local currency depreciation scenario can foster the foreign sales while an opposite scenario, appreciation of the local currency, could increase the revenue originated in USD sales raising in turn the currency gains, despite a lower level of sales in foreign markets. Furthermore, it is obvious that a higher utilization rate of these assets produces a higher level of operational efficiency and profitability, regardless of whether the company is focused on foreign sales.

Our results suggest keeping enough intangible assets, property, plant and equipment to have the needed capacity to cope with the expected increments in foreign demand when the local currency suffers depreciation. Obviously, it is highly recommended to design currency hedging programs, especially when the company has debts in foreign currency, at the same time avoiding idle current assets can help to get more currency gains.

Knowing how currency gains are related to the variables analyzed pages above can be useful for the Mexican firms, so as they can design policies and plans to take advantages of the peso-dollar exchange rate. On the other hand, there are important issues that this paper has left out of its scope. A natural

extension is to study the influence of the variables analyzed here in companies depending on their exporter/importer profile. In addition, it is also convenient to include the study of the specific effects of exchange rate volatility on currency gains given the profiles of the companies' foreign trade activities.

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Annex

Table A1
Sampled Companies

Ticker	Company	Ticker	Company	Ticker	Company
ACCELSA	ACCEL	CMOCTEZ	CORPORACION MOCTEZUMA	BACHOCOB	INDUSTRIAS BACHOCO
AGUA	GRUPO ROTOPLAS	COLLADO	G COLLADO	BAFARB	GRUPO BAFAR
ALFA	ALFA	CONVERA	CONVERTIDORA INDUSTRIA	BIMBO	GRUPO BIMBO
ARA	CONSORCIO ARA	CYDSASA	CYDSA	COMERCI	CONTROLADORA COMERCIAL MEXICANA
ARISTOS	CONSORCIO ARISTOS	GCC	GRUPO CEMENTOS DE CHIHUAHUA	FMX	FOMENTO ECONOMICO MEXICANO
ASUR	GRUPO AEROPUERTARIO DEL SURESTE	GMEXICO	GRUPO MEXICO	GIGANTE	GRUPO GIGANTE
CERAMICB	INTERNACIONAL DE CERAMICA	ICH	INDUSTRIAS ICH,	GMODELOC	GRUPO MODELO
DINE	DINE	SAB	MEXICHEM	GRUMA	GRUMA
GCARSO	GRUPO CARSO	MFRISCOA	MINERA FRISCO	HERDEZ	GRUPO HERDEZ
GEOB	CORPORACION GEO	PE&OLES	INDUSTRIAS PEÑOLES	KIMBER	KIMBERLY-CLARK DE MEXICO
GISSA	GRUPO INDUSTRIAL SALTILLO	POCHTEC	GRUPO POCHTECA	KOF	COCA-COLA FEMSA
GMD	GRUPO MEXICANO DE DESARROLLO	QBINDUS	Q.B. INDUSTRIAS	MASECAB	GRUPO INDUSTRIAL MASECA
HOGARB	CONSORCIO HOGAR	SIMEC	GRUPO SIMEC	MINSA	GRUPO MINSA

Ticker	Company	Ticker	Company	Ticker	Company
HOMEX	DESARROLLADORA HOMEX	ALSEA	ALSEA	SORIANA	ORGANIZACION SORIANA
ICA	EMPRESAS ICA	CIDMEGA	GRUPE	WLMEX	WAL-MART DE MEXICO
IDEAL	IMPULSORA DEL DESARROLLO Y EL EMPLEO EN AMERICA LATINA	CIE	CORPORACION INTERAMERICANA DE ENTRETENIMIENTO	AMX	AMERICA MOVIL
KUO	GRUPO KUO	CMR	CMR	AXTEL	AXTEL
LAMOSA	GRUPO LAMOSA	CMR EDOARDO	EDOARDOS MARTIN	AZTECA	TV AZTECA
OMA	GRUPO AEROPUERTARIO DEL CENTRO NORTE	ELEKTRA	GRUPO ELEKTRA	CABLE	EMPRESAS CABLEVISION
PASA	PROMOTORA AMBIENTA	GFAMSA	GRUPO FAMSA	MAXCOMA	MAXCOM TELECOMUNICACIONES
PINFRA	PROMOTORA Y OPERADORA DE INFRAESTRUCTURA	GPH	GRUPO PALACIO DE HIERRO	MEGA	MEGACABLE HOLDING
SARE	SARE HOLDING	HOCXF	HOTELES CITY EXPRESS	QUMMA	GRUPO QUMMA
URBI	URBI DESARROLLOS URBANOS	HIMEXSA	HIMEXSA	RCENTRO	GRUPO RADIO CENTRO
VOLAR	CONTROLADORA VUELA COMPAÑÍA DE AVIACIÓN	LIVERPOL	EL PUERTO DE LIVERPOOL	TLEVISA	GRUPO TELEVISA
AHMSA	ALTOS HORNOS DE MEXICO	POSADAS	GRUPO POSADAS	BEVIDES	FARMACIAS BENAVIDES
ALPEK	ALPEK	REALTUR	REAL TURISMO	FRAGUAB	CORPORATIVO FRAGUA
AUTLAN	COMPAÑIA MINERA AUTLAN	VASCONI	GRUPO VASCONIA	LAB	GENOMMA LAB INTERNACIONAL
CEMEX	CEMEX	AC	ARCA CONTINENTAL	SAB	GRUPO CASA SABA

Source: Own elaboration with data from the Mexican Stock Exchange.