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Incertidumbre, rentabilidad e inversión en México
Uncertainty, profitability, and investment in Mexico

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Resumen

El objetivo es discriminar la disyuntiva entre la necesidad empresarial de invertir para crear valor y la cautela o postergación de las inversiones a causa de mayor incertidumbre. La teoría postula que la inversión depende positivamente de la rentabilidad y negativamente de la incertidumbre. En México, como en muchos países, después de la crisis de 2008, persiste más incertidumbre y menos rentabilidad y, contrario a lo esperado, la inversión mantiene su trayectoria ascendente. El contraste estadístico se realiza mediante vectores autorregresivos con datos trimestrales para México. Los resultados sugieren que, descontando la incertidumbre, solamente el efecto volumen impacta en más inversión, sin importar la tasa de ganancia. El indicador utilizado de rentabilidad puede reflejar los efectos de la alta concentración de mercados que ha sido un determinante significativo en las estimaciones de otros autores.

No se halló evidencia de incentivos a invertir derivados de un aumento de la tasa de ganancia. Por lo que el efecto consumo o volumen sobre la inversión domina al impacto de la tasa de ganancia sobre la inversión. La falta de dinamismo del mercado interno no ha contribuido con la tendencia creciente de la inversión. Se concluye que una economía con baja propensión a innovar, y baja tasa de descuento, crean las condiciones para invertir buscando un mayor monto de ganancias y no, como predice la teoría, una mayor tasa de rentabilidad. Si bien las empresas exportadoras presentan una mayor propensión a innovar y a invertir, nuestros hallazgos sugieren que las exportaciones generan un efecto desplazamiento de la inversión en el largo plazo.

Palabras clave: Inversión, rentabilidad, incertidumbre, exportaciones, México

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Abstract

The purpose of this paper is to distinguish between the corporate necessity of investing to create value and the discretion exercised to postpone investing because of higher uncertainty. The theory holds that investment is positively related to profitability and negatively linked with

uncertainty. In Mexico, as in many other countries, there is still more uncertainty and less profitability after the economic crisis of 2008, but contrary to expectations, investment has maintained an upward trend. In this paper, a statistical comparison is performed using vector autoregressions on the quarterly data for Mexico. The evidence seems to suggest that, discounting uncertainty, only volume effect induces more investment regardless of the profit rate. The profitability indicator could reflect the effects of high market concentration, which has been a significant determining factor in other authors' estimates.

We did not find evidence of incentives to invest resulting from an increase in profit rate. Therefore, the consumption or volume effect exceeds the profit rate impact on investment. The lack of domestic market dynamism does not contribute to the growing investment trend. I conclude that an economy with a low innovation propensity and a low interest rate creates conditions for investment to seek a higher total profit and not, necessarily, a higher rate of return. Although export firms have a greater propensity for investing and innovating, our evidence suggests that exports seem to crowd-out investment in the long-run.

Keywords: Investment, profitability, uncertainty, exports, Mexico

If you don't go after what you want, you'll never have it.
If you don't ask, the answer is always no.
If you don't step forward,
you're always in the same place.
Nora Roberts

The investment dynamics in Mexico collapsed at the end of 2008, and the fall was extremely disruptive. From peak to trough, the pace of the contraction was rapid, playing out over only four months. The recovery was stretched out over four years, after which investment flows returned to their 2008 levels. Volatility and a slow recovery are indicative of a profound transformation in the business world. Firms respond according to their environment, although investment theories describe processes of slow change (Skott, 2012).

Including uncertainty in estimates helps to achieve a more complete description of the evolution of investment (Stockhammer *et al.*, 2010), despite the intrinsic difficulty of quantifying the dimension of inherent uncertainty. An analysis could be performed from within the firm instead of from the viewpoint of its environment. DeMarzo *et al.* (2012) analyzed optimal investment decisions versus inefficient decisions that occur due to agency and incentive compatibility problems. According to the agency theory, observed investment levels depend on a firm's results from previous periods, as opposed to the optimal choice where past results do not have any influence.

An intermediate level of analysis could specify investment levels as a function of firm value and of the signals that can be sent to the market. Arye *et al*. (1993) proposed two time horizons: short and long term. Administrators can choose among three options: they can make investments at an efficient level, they can overinvest, or they can underinvest in each period. The choice depends on whether the model specifies a hidden action or hidden information. When information is known, for example, on an investment's future yield, the decision-makers try to differentiate themselves by overinvesting in the short term. Conversely, when future yield is unknown, the signal used by productive firms to be differentiated is to overinvest in the future; meanwhile, low-productivity firms invest efficiently to avoid creating expectations that imply higher costs (Arye *et al.*, 1993).

To a certain degree, the investment trend in Mexico could be explained by the models of hidden action and hidden information. First, deteriorating and volatile expectations can generate incentives to postpone investment, which implies a lack of overinvestment in the short term in the

model. Second, there is a low percentage of firms listed on the stock market in Mexico that has an incentive to overinvest in the long term to send a signal to the markets about favorable profitability perspectives. In the absence of agency problems, the large majority of average-productivity firms, and maybe even the low-productivity firms, choose efficient levels of investment to avoid the costs implied by overinvestment. When taken together, both effects could explain the slower growth in Mexican investment between 2009 and 2012.

The purpose of this paper is to quantitatively differentiate the elements of the corporate need to invest to create value for the organization and the discretion exercised to postpone investment because of greater uncertainty. The article is structured as follows: the first section discusses the decision rule to invest and the inaction threshold that is generated due to uncertainty. The second section describes the low-growth environment post 2008 in Mexico.

Sections three and four present the VAR model, and the impulse response functions for investment. Section five discusses the obtained results and concludes that investment in Mexico has depended positively mainly on the volume effect created by demand, whilst uncertainty shocks severely reduce investment. The rate of return on investment does not seem to impact investment significantly.

1. Financing and the present value of the firm

From an analytical point of view, the goal of management is assumed to be creating value with profits and achieving favorable prospects in the medium term. Value creation implies investment decisions. Modigliani and Miller (1958) created a theoretical framework of a world in which funds are used to acquire assets whose returns are uncertain. The optimal decision calls for investing until the marginal return of the physical assets is equal to the interest rate in the market. There are two approaches to rationalize investment:

a) According to the criterion of profit maximization: a physical asset justifies its acquisition if it increases the net benefit for the owners of the asset; this occurs when the expected rate of return or yield on this asset is greater than the interest rate.
b) According to the criterion of market value maximization of a firm: a physical asset justifies its acquisition by a firm if it increases the value of the firm's shares; that is, if the asset adds more to the market value than its acquisition cost.

The equivalence between the two criteria is breached because of market uncertainty;

consequently, the profit variable becomes a random variable. Of the two rational investment criteria, the market value maximization of a firm is more consistent with reality (Modigliani *et al.*, 1958). Therefore, investment decisions have a fundamental determining factor: investing is beneficial if the investment project increases the market value of the firm's shares in an amount greater than its cost, and if its return is greater than the marginal cost of capital for the firm. Modigliani and Miller postulate that the market value (V_j) of firm *j* is given by the capitalization of its expected return at the rate p_k and is independent from its capital structure:

$$V_j \equiv (S_j + D_j) = \frac{\bar{X}_j}{p_k}$$

where S_j is the market value of the ordinary shares of firm j, D_j is the market value of the debt of firm j, and $\bar{X}_j$ is the expected yield of the assets of firm j before deducting interest.

When trying to increase the value of a firm, an investment will be made only if the rate of return of investment p^*, is equal to or greater than the capitalization rate of the expected return p_k. The determining factors of firms' investments are therefore p_k and p^*, independent of the type of financing used for the investment, i.e., debt (bond) issuance, issuing shares, or retaining profits. If the firm borrows I dollars, for example, through bond issuance to finance an investment that reports a yield of p*, the new market value is (Modigliani *et al.*, 1958, p. 289):

$$V_1 = \frac{\bar{X}_0 + ((p^*)I)}{p_k} = V_0 + \frac{(p^*)I}{p_k}$$

This implies that an investment is profitable only if $p^* \geq p_k$. Compare this result with the following, where profit retention is used, rather than debt issuance, to finance an investment. When using amount I in new assets with p^* being the expected rate of return, the benefit for the shareholders after the investment would be:

$$W_1 = S_1 = \frac{\bar{X}_0 + ((p^*)I)}{p_k} - D_0 = S_0 + \frac{(p^*)I}{p_k}$$

where S_0 is the value of ordinary shares before the investment. The investment is viable only if $p^* \geq p_k$, independent from the capital structure.

The traditional postulate of Modigliani and Miller holds that investment decisions are made if and when their return is greater than a determined critical rate. To achieve $p^* - p_k > 0$, and for the investment to be made, the first term must be greater than the second or the second term must be reduced, for any value of p^*. Considering the position of the global recovery in the years following 2008, a plausible explanation would be that the discount rate for investors was reduced to the extent of the amounts involved in anti-crisis programs, quantitative easing, and looser monetary policy.

There is also a possibility that an investment carried out in the analyzed period simultaneously responded to two processes. The first process was the lower return on investment projects, and even though the lower return reduced the gap with p_k, a positive gap was still maintained. The second process was the reduction of p_k caused by a monetary policy that maintained low interest rates and that made lower discount rates a widespread phenomenon in the post-crisis stage. Together, both processes drove a higher investment volume characterized by lower rates of return, though not necessarily with a smaller profit volume.

In an environment of uncertainty, an investment can be characterized in terms of the marginal product of capital and the threshold created between its lowest investment level and its highest investment level (Bloom *et al.*, 2001). When undertaking irreversible investment decisions when market demand is uncertain, decision thresholds between investing and not investing are created, and the uncertainty and irreversibility conditions can increase and change the optimal investment decisions.

The dominant premise of investment behavior under conditions of uncertainty and partial irreversibility in the short term is that firms become more cautious and less sensitive to demand shocks with a higher level of uncertainty (Bloom *et al.*, 2001). Assuming a negative relationship between uncertainty and investment, firms could miss a good investment opportunity, which has the effect of reducing economic growth and inhibiting the development of new production technologies.

Conventional economic theory argues that agents always prefer the mean to the extremes (convexity principle). This theory also applies to investment decisions. The theory asserts the existence of sporadic episodes of investment and disinvestment that ensure that the capital stock remains within a threshold that is a function of the degree of uncertainty and irreversibility and the state of current demand. Therefore, greater uncertainty engenders a higher threshold and

inaction gap because it increases the likelihood of costly mistakes and consequently causes a more cautious investment policy.

2. A low economic growth environment

Expansión Magazine annually publishes a ranking of the 500 most important firms in Mexico. This group of firms belongs to a wide range of sectors and is an important sample of national economic activity because of the country's high market concentration. Observations of the ranking between 2006 and 2011, both before and after the crisis, reveal a decrease in asset profitability (net income on assets). Consider the case of the six private firms that lead the list, in descending order: América Móvil, Walmart de Mexico, Fomento Económico Mexicano, Cemex, Grupo Alfa and Grupo BAL.

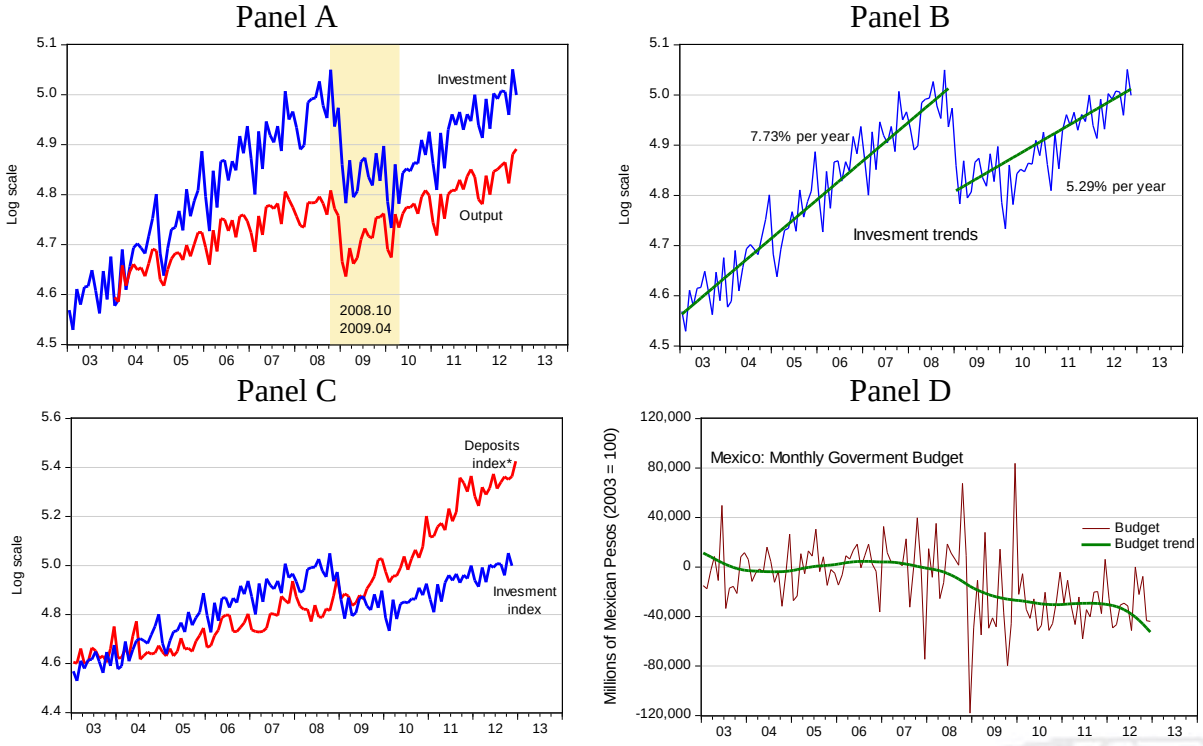
These top six firms registered asset profitability of 9.6% in 2006, a rate that had not been achieved in 2011. The profitability between 2009 and 2011 is 6.9%. These firms seem to have felt the effects of the slowdown one to two years before the rest of the economy; between 2007 and 2008, they achieved 4.4% net income on assets and partially managed to recover their profitability reported for 2006, most likely by following a strategy of smaller investments.

At the country level, investment plummeted in the last months of 2008 and the beginning of 2009 (Figures 1A and 1B). Since then, investment returned to a growth path, but with a rate that was 35% lower than the previous period (5.29% vs. 7.73%). Recovery from the crisis has not only been slow in Mexico. Ben Bernanke (2012) described the economic recovery of the United States as disappointingly slow. The American economy bottomed in 2009, approximately at the same time as Mexico.

The explanations that attempt to explain the weak recovery range from a climate of mistrust (Taylor, 2009) to profound negative effects on the financial system (Bernanke, 2012; Reinhart *et al*., 2009). The evidence in Mexico points to a volatile economic climate and a cautious and mistrustful attitude; this hypothesis is confirmed by the growing gap between firms' investment amounts and their immediate demand deposits made in national commercial banks (Figure 1C). This recent phenomenon of not investing the cash flow was not observed in the pre-crisis period. By the end of 2012, the financial account (of balance of payment) published by the Bank of Mexico registered a net outflow of capital due to the repatriation of profits by foreign firms and foreign investments made by Mexican firms. The arrival of large amounts of investment maintained a positive balance in the financial account, but that does not diminish the

importance of the amount of Mexican capital invested abroad since 2008 that we can assume negatively impacted domestic investment.

Figure 1 Mexico: Deceleration of total investment, more cash, and budget deficit.



Note: *Deposits = Real index of demand deposits in national commercial banks. Monthly data. Sources: Panel A and B - The Mexican National Institute of Statistics and Geography (INEGI, its initials in Spanish), System of National Accounts, Mexico; Panel C - INEGI and Bank of Mexico; Panel D - Ministry of Finance and Public Credit, Mexico.

As investments lag behind, economic growth weakens, and favorable prospects that can induce sustainable expansion processes are not formulated. In Mexico, the post-2009 recovery stage has been both slow and fragile. To the increase of cash with lower levels of investment, we may add a growing public deficit, which has had a negative trend since 2008 (Figure 1D). From a corporate perspective, an analysis of public finances regarding the government's contribution to uncertainty and the persistent volatility in the economy could be relevant. International studies reveal that financial crises generate great pressures on public resources (Reinhart *et al.*, 2009). The Mexican case seems to follow a pattern between 2010 and 2012 of weakening public finances during which investment and economic growth have not reduced the fiscal deficit. Such a situation is most likely a sign of weak economic growth. The mechanism to achieve fiscal equilibrium or surplus is a growing economy.

3. Model specification: What induces investment dynamism?

The purpose of this section is to empirically compare the magnitude and the sign of the determining factors for investment using impulse response functions. Following the conventional economic approach, the strategy consists of estimating an investment function using profitability as a central explanatory variable. In addition, the contribution to investment of uncertainty is contrasted.

Investment is specified as a function of a profit rate (π_t), total demand (Y_t), and uncertainty (σ_t).

$$I_t = \Delta k_t = I(\pi_t, Y_t, \sigma_t)$$

Profits are directly related to Y_t and inversely related to cost, so it is proposed the reciprocal of unit labor cost as a proxy profit rate

$$\pi_t = \left(\frac{1}{w_t L_t}\right) \times Y_t$$

We split the demand into two components: the domestic consumption (D^c) and exports (D^x). Government spending was not included in the model. By applying logarithms and a linear specification, we separately estimate the profit elasticity (α_1), the uncertainty impact (α_4) and the elasticity of external and domestic demand (α_2, α_3) for investment

$$\Delta k_t = \alpha_0 + \alpha_1 \pi_t + \alpha_2 D^c + \alpha_3 D^x + \alpha_4 \sigma_t + \epsilon_t$$

The first three elasticities α are expected to be positive, such that a higher profit rate in either the domestic market or a foreign market induces more investment, we expect $\alpha_4 < 0$, insofar as risk aversion is derived from uncertainty. The main variable of interest is Δk = Total Gross Fixed Investment (2008=100, physical volume index). In addition, the Machinery and Equipment Investment index was used. A *proxy* profit rate (π) was the reciprocal of Unit Labor Cost $(= 1/ULC)$, where ULC equals Real Output divided by Labor Costs. Real output = Gross Domestic Product; Labor Costs = Payroll of Social Security Mexican Institute (IMSS, in Spanish), measured by Formal Employment x Real Mean Wage (2010=100). Two demand components were included: D^c=Private Consumption of Domestic Goods (2008=100, physical volume index), and D^x = Non-oil Exports (2008=100).

The peso-dollar Exchange Rate Uncertainty (σ_t^E) equals $\sqrt{(\Delta E^6 - Trend)^2}$ where ΔE is the first-difference of exchange rate, ΔE^6 is the moving average of six-month ΔE, and $Trend$ is the Hodrick-Prescott filtered ΔE. This is a usual strategy outlined in the literature. The procedure follows Stockhammer *et al.* (2010), who analyzed the impact of financial turmoil on investment decisions in the real economy. Measuring uncertainty should incorporate or reflect multiple factors, such as demand and productivity shocks, the future prices of goods for sale and inputs, wage rates, exchange rates, technologies, consumer preferences, and government policies. Econometrically, Bloom *et al.* (2001) found a strong negative correlation between the investment rate and its uncertainty measure. The coefficient for sales growth was significantly lower for firms with high volatility in their stocks returns, and under more uncertainty, the sales were less dynamic. The authors' measure of corporate uncertainty used the standard deviation of daily yields of capital, which included a daily profit base due to return on capital, and dividend payments, apart from providing expectations on future volatility in the firm's environment and implicitly weighting the impact of these variables on profits.

The investment equation Δk_t is a conventional function where investment depends on total profit, that is, on total demand and, simultaneously, on the profit rate. However, investment decisions also depend on uncertainty and firm expectations. Both variables are difficult to quantify because of the complex network of factors in the environment and the subjectivity of decision-makers. We consider expectations relevant to an investor's decision. Uncertainty is a debated subject because it should incorporate elements from both the economy and institutions. In addition, there are the substantial differences between uncertainty and risk as well as between unpredictability and uncertainty. Therefore, measuring the volatility of a statistical series can reflect aspects of uncertainty, but not necessarily to its fullest extent. In particular, an exchange rate uncertainty indicator is proposed to reflect the unexpected variations of profits and thus quantify risk aversion (Baum, *et al*., 2001).

We run a simple 5-variable, 4-lag VAR on Mexico quarterly data from 2002 to 2014. Data was collected from the Mexican National Institute of Statistics and Geography (INEGI, for its acronym in Spanish). Vector Autoregression (VAR) models are estimated to provide empirical evidence on the response of macroeconomic variables to various exogenous impulses. This simple framework provides a systematic way to capture rich dynamics in multiple time series.

Expressing all variables in logarithms and collecting them in two vectors X_t^i we specify the VAR models

$$\Delta X_t^i = \alpha + A_1 \Delta X_{t-1} + \cdots + A_p \Delta X_{t-p} + U_t$$

where $i = \{X_t^0, X_t^\sigma\}$, $X_t^0 = (\Delta k_t, \pi_t, D_t^X, D_t^C,)'$ and $X_t^\sigma = (\Delta k_t, \pi_t, D_t^X, D_t^C, \sigma_t^E)$'. To examine the stationary properties of the individual time series, we employ the unit root-test of augmented Dickey-Fuller test and Phillips-Perron test (table 1). The results indicate that all series are integrated of order one. The cointegration analysis show that the trace statistics and maximum Eigen values are greater than the critical values at 5 percent level of significance for one cointegration $(r = 1)$ and less than the critical values for two cointegrations $(r \leq 2)$.

Hence there are two cointegrating vectors among the four variables included in the model $\{D_t^C, \Delta k_t, \mu_t, D_t^X\}$. Results from statistical tests are not presented in the paper. The lag structure for the VAR is chosen by comparing the six lag-order selection criteria most commonly used in applied work. The lag structure must achieve a balance between allowing sufficient dynamics and avoiding over-parameterization. Four criteria (LR, FPE, AIC, HQIC) indicate the X_t^0 optimal VAR has four lags. Including the uncertainty measure reduces the X_t^σ structure to three lags. Both models are estimated.

Table 1. Stationarity test results

	Level		First Difference	
	ADF Test Statistic	PP Test Statistic	ADF Test Statistic	PP Test Statistic
Log of Total Investment	-1.494 p=.528	-1.821 p=.366	-4.469 p=.001*	-4.539 p=.001*
Log of Investment in Machinery and Equipment	-0.525 p=.877	-0.629 p=.854	-5.452 p=.000*	-5.365 p=.000*
Log of Domestic consumption	-0.463 p=.889	-0.594 p=.862	-5.024 p=.000*	-5.026 p=.000*
Log of Exports	-0.736 p=.827	-.596 p=.862	-4.351 p=.001*	-10.711 p=.000*
Log of (Output / Labor Costs) †	-3.531 p=.0116	-0.396 p=.985	-4.760 p=.002*	-19.657 p=.000*
Exchange Rate Uncertainty	n/a	n/a	-8.433 p=.000*	-10.019 p=.000*

Exogenous: Constant. † Exogenous: Constant & Linear Trend. * One tail p-values. ADF = Augmented Dickey-Fuller, PP = Phillips-Perron. Sample: 2002-2014. Minimum lag length that eliminated the autocorrelation was selected in the lag length selection.

4. Results: volume effect and profitability effect

Using impulse response analysis, we investigate the effects of an increase in all the variables in the system on capital investment (Δk_t). VAR impulse response estimates are derived from estimated VAR coefficients. Impulse responses traces out the response of current and future values of each of the variables to a unit increase in the current value of one of the VAR structural errors, assuming that this error returns to zero thereafter. Figure 4 displays the impulse response functions of the Δk_t in response to a shock to each of the variables in the VAR. Motivated by the Granger causality results, we use a Cholesky ordering $\{\sigma_t^E, D_t^C, \Delta k_t, \mu_t, D_t^X\}$.

Not surprisingly, the top panel of figure 4 shows that a shock of the exchange rate uncertainty reduces investment. The impact increases gradually until it reaches the long term impact in seven quarters. The uncertainty measure has a greater incidence in the machinery and equipment investment. The recent 2010-2014 higher volatility of the uncertainty measure can be an explanatory factor of the deceleration of investment in Mexico. In the period 2010-2014, the median of the exchange rate uncertainty is 12% higher than in the period 2002-2007, and the coefficient of variation (the ratio of the standard deviation to the mean) is 75% higher between the periods (see figure 3f).

Unexpectedly, a one percent shock in profit rate does not increase investment. There was some non-significant evidence of a negative impact for total investment. The negative impact became significant for machinery and equipment investment only when the exchange rate uncertainty variable was included in the model. The uncertainty variable has a negative effect on investment starting from the fifth quarter. There is a null effect in the first four quarters. This means that a one percent shock increase of the profit rate tends to reduce the volume of investment one third of a percentage point in the long run without affecting the investment level in the short run.

We did not find evidence of incentives to invest resulting from an increase in profit rate. This may be due to a preference of firm's decision makers to capture profits from higher sales volume. This could happen in markets where the new opportunities for business are limited. Some authors have found the concentration coefficients to be negative and significant regarding investment amounts (Ruíz-Porras et al., 2011; Romo et al., 2006). This result suggests that the market power of a firm and its rate of return do not require higher investment, in contrast to the

notion of highly competitive markets whose firms seek to invest in order to increase their market share.

The consumption effect exceeds the profit rate impact on investment. This is plausible for an economy with low levels of innovation and low productivity, such as Mexico's. In Mexico, the total factor productivity has decreased since the 1980s (Loría, 2009; Gobierno de la República, 2013), so it would make sense to assert the predominance of the volume effect, given the low efficiency that prevails in the country. The evidence seems to suggest that, discounting uncertainty, only volume effect induces more investment regardless of the profit rate.

The uncertainty measure in the model shows the negative effect of the profit rate on investment. The exchange rate volatility also reveals that both domestic and export demands have a lower positive effect on investment, compared to the effect found without the uncertainty variable (figures 4b and 4c). Controlling for uncertainty, a one-percent shock in domestic consumption increases a third of a percentage point the total investment. Results also suggest a unitary elasticity in the long run between consumption and investment in machinery and equipment.

A possible wage rebound could underpin increases in investment and economic growth. The maximum value for salaries was recorded in 2007, and has remained stagnated since then. This finding makes wages relevant as a decision variable. Although the external sector in Mexico is important, as stated by De la Cruz et al. (2006), there is no identification of the domestic variables that could serve as investment drivers. In this context, we found wages could contribute as a potential domestic transmission channel.

Exports, just as domestic consumption, are components of the demand. Both types of demand have a positive effect on investment in the short run, i.e. a year or less. The effect of non-oil exports on investment becomes negative in the long run when we include the uncertainty variable in the model. We offer two possible explanations:

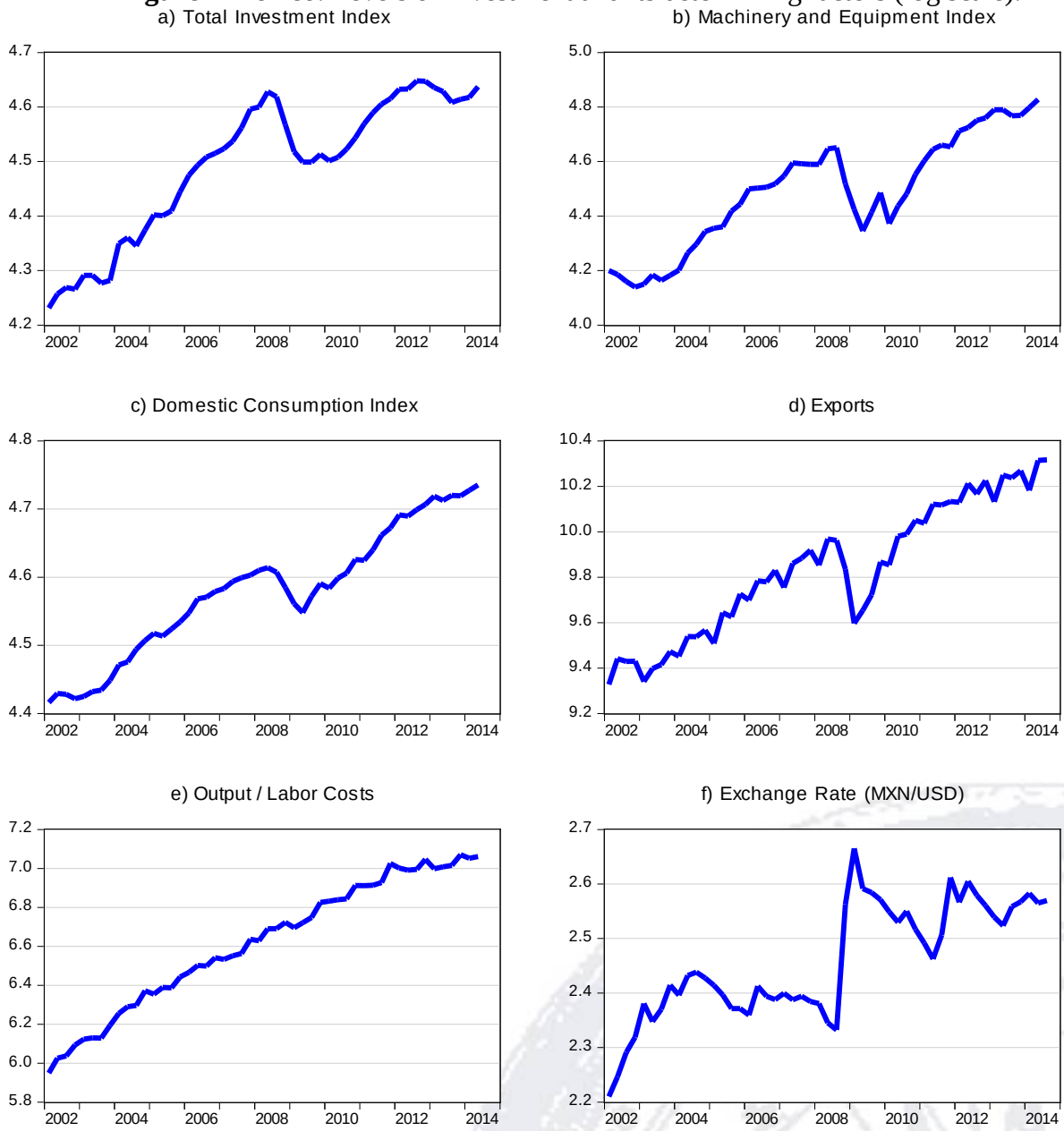
a) Exports have a much bigger rate of growth and a bigger coefficient variation than consumption. Exports volatility in interaction with exchange rate volatility inhibits subsequent investments;

b) Export demand leads to investment and strengthens the export specialization of a country. The increase in investment caused by an increase in exports should lead to new rounds of investment with a positive long-term effect if and only if there are industrial linkages. On the

other hand, lack of linkages could trigger a crowd-out effect that causes the negative sign in the long-term (figure 4c). Evidence of the crowd-out effect on total investment is found in Kato (2013). It is known that an economy with a great number of microbusinesses hinders exporting industries' positive spillovers.

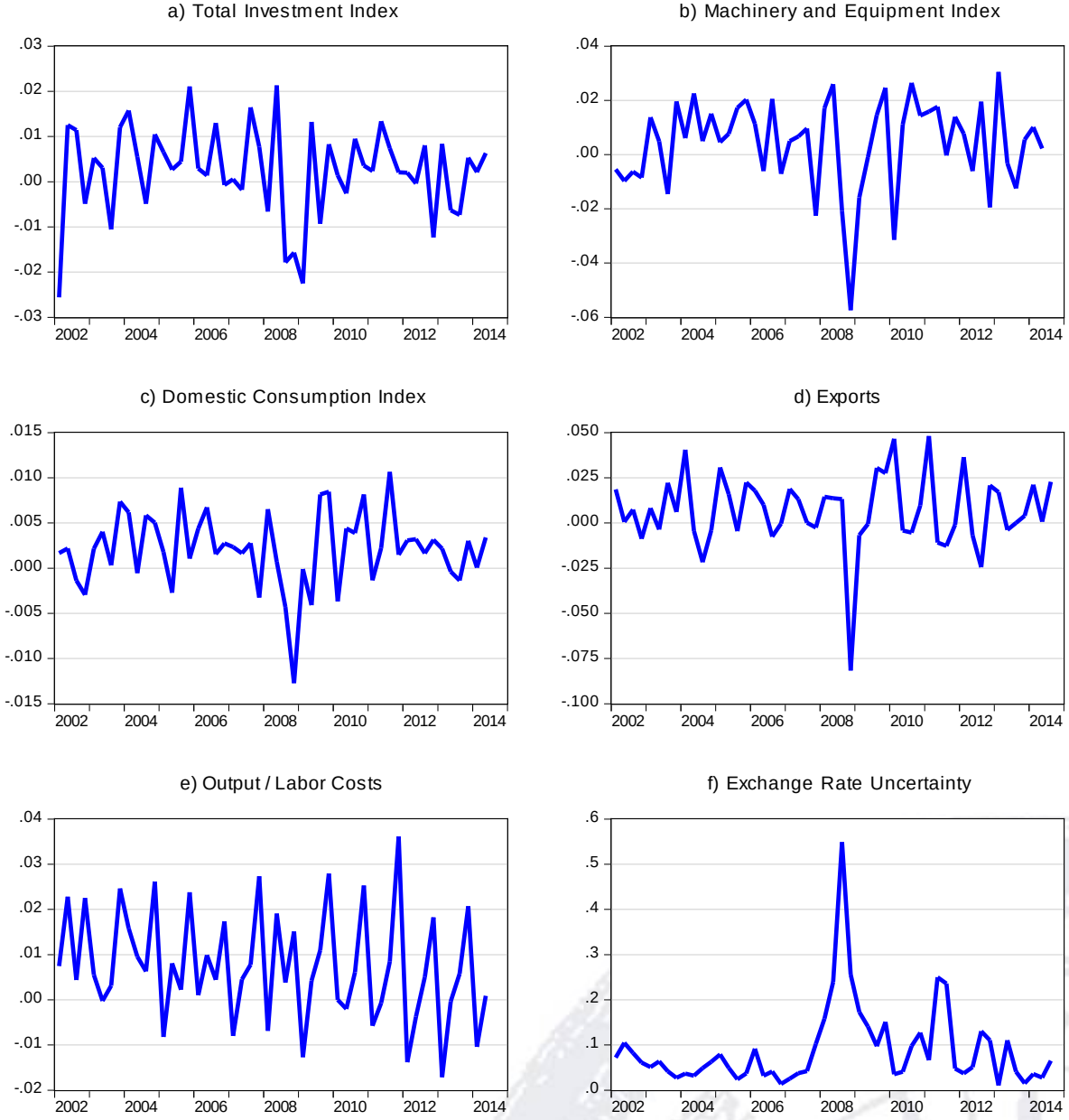
It is noteworthy that innovative firms involved in export activities are statistically more likely to innovate with a higher degree of novelty. A study by Romo et al. (2006) used information from the Mexican Innovation Survey to find that 43% of the resources allocated for innovation are spent in capital expenditures, concluding that investments are strongly related to innovative processes.

Figure 2 Mexico: Levels of Investment and its determining factors (log scale).



Note: Source: System of National Accounts, quarterly data, the Mexican National Institute of Statistics and Geography (INEGI, its initials in Spanish).

Figure 3 Mexico: First difference of investment and its determining factors (Log scale*).

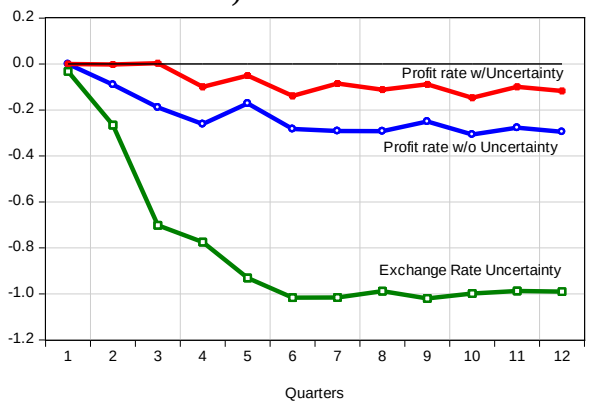


Note: (*) First difference of the log (variable), except for exchange rate uncertainty measure. See text for reference.
Source: System of National Accounts, quarterly data, the Mexican National Institute of Statistics and Geography (INEGI, its initials in Spanish).

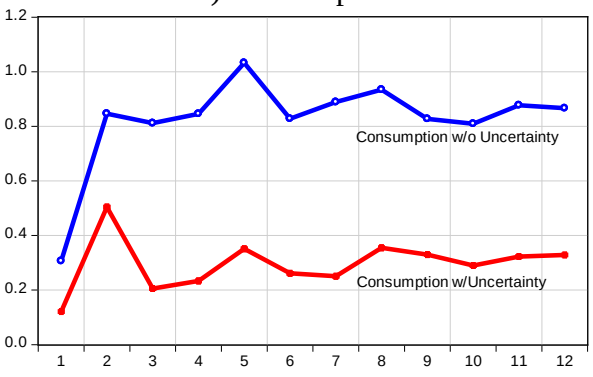
Figure 4 Accumulated response of investment (in percent) to a one-percent shock of selected variables.

Panel A. Total Investment

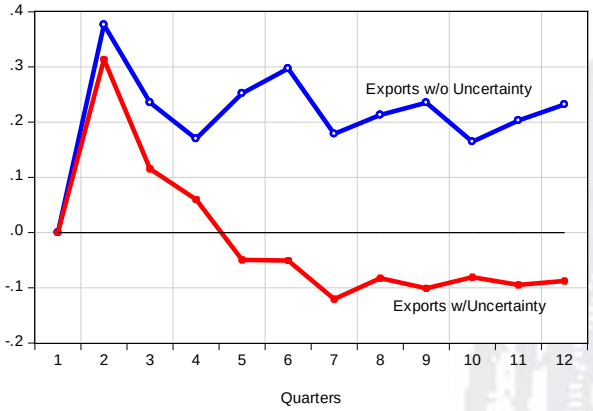
a) Profit rate



b) Consumption

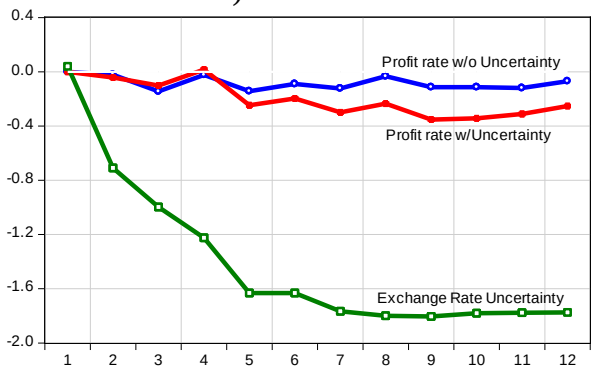


c) Exports

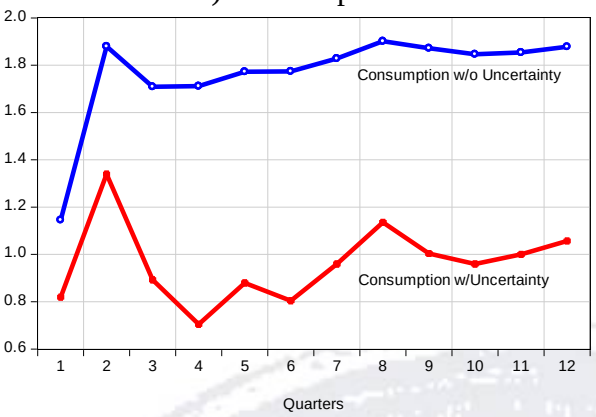


Panel B. Machinery and Equipment

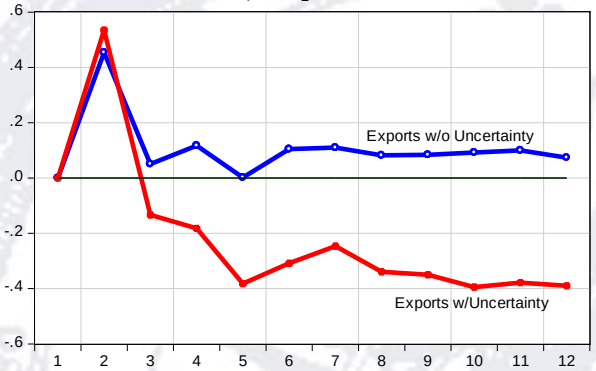
a) Profit rate



b) Consumption



c) Exports



5. Conclusions

The growing trend of investment in Mexico after 2008 is weaker than the investment observed during the pre-crisis period. The approach used to explain this consists of distinguishing between the corporate need to invest in order to create value and the cautious and deferred behavior towards investment due to greater uncertainty. Using quarterly information to estimate two VARs, with and without an uncertainty variable, we found that the current increasing amount of investment is explained by firms seeking value not through a higher rate of profit but through a higher amount of profit; *v. gr*., domestic consumptions yields a volume effect.

To recover a higher rate of investment growth as observed in the years prior to 2008, higher productivity or higher innovation intensity is required in the various productive sectors to positively impact job pay and domestic demand. Impulse response functions suggest that an increase in exports crowd-out investment in the long-run. Innovation should serve to increase profit margins through more productivity, higher value or increases in the demand for goods with high-income elasticity, such as services and modern goods. A structural change in the economy is needed to change the sign of the relationship between profitability and investment from negative to positive.

To achieve this structural change, the innovative firms should be expanded among corporations as well as small enterprises and micro-businesses. The threshold to achieve this transformation is not small, thus we assume that great efforts in the areas of technological development and innovation are necessary. The Innovation Survey reports that innovative activities are conducted in approximately one out of four firms in the medium and large firms' sector, which are owned by foreign capital. The mechanisms to achieve innovation and enhance knowledge transfer in the Mexican context are thoroughly discussed by Feria et al. (2010).

The goal of a dynamic economy that is driven by investment, that generates increasing income for the population, and that demolishes social backwardness implies that investment cannot solely depend on export specialization. An increase in labor productivity and accumulation of national technological capacities would lead more people and sectors to reinvest. The profit reinvestments would then serve to establish the link predicted in the theory between higher profitability, more investment, and higher economic growth.

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