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Original Research Article

Export-led growth and inflation targeting: Foreign and internal restriction of growth in Mexico

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The aim of this article is to demonstrate that in Mexico, the growth strategy that is based on the export-led growth hypothesis and the policy to control inflation through the well-known inflation-targeting regime are incompatible. In fact, both become the external and internal restriction of growth, respectively. From the construction of a simple model of four equations inspired by Kalecki's ideas, we discuss the effectiveness of these two strategies in the Mexican economy, while also using a graphical analysis based on official statistics. Our key findings show that this incompatibility arises because an increase in exports requires a competitive exchange rate, and the import of inputs- which represent over 70% of the raw material used in the production of export goods- has inflationary effects. We also point out that the key to solving this dilemma is in the real wage, which until now has remained constrained, contributing to the internal restriction of growth.

Key words: Economy growth in open economies, exchange rate, monetary policy

JEL Classification: F43, F31, E52

INTRODUCTION

In the last two decades of the XX century, it was necessary for Mexico to make adjustments in many economic matters as a consequence of not having achieved desired success with the substitution of the imports model, as well as with failed expectations in hoped-for future profits after the discovery of new sources of oil.

On the latter topic, it was necessary to contend with a brutal fall in oil and other commodity prices during the 1980s. Additionally, the income that was coming from Mexican exports was not sufficient to cover the financial agreements that Mexico entered during the 1970s (Moreno, 2011).

Under this framework, it was necessary to make severe adjustments of economic policy in the country. These changes have been built upon two important pillars: the first being the commercial opening supported by the export led-growth hypothesis, and the second pillar based on the framework known as inflation targeting, both of with which Mexico hopes to enhance the economy. The first pillar promotes a strong external market because of higher activity in the export sector, while also pushing a strengthening in the internal market as a consequence of better wages, which will be caused by the economy opening up (See Salinas, 2000). The second pillar is used in the hope of taming the serious inflation problem and helping to reduce the uncertainty caused by high inflation (Sheridan, 2001 in Galindo y Ros, 2006). Combined, these work to strengthen the internal market on the one hand, and on the other, they create the basis of offering macroeconomic stability, contributing to the reactivation of economic growth.

20 years after adopting the strategy of growth guided by exports and 15 years after following the inflation-targeting regime, the results seem to suggest that both are

incompatible, at least in Mexico. This hypothesis will be supported throughout this work under the reasoning that the growth strategy for exports needs a competitive exchange rate to make Mexican products attractive abroad. This is especially true in a market where there is such a strong rivalry, such as China, with its main comparative advantage being low prices. Besides this, the inflation-targeting regime requires an appreciated exchange rate, and given the structure of the Mexican economy, it is necessary to import inputs to be able to export. In total, the implication is that if Mexican exports want to be stimulated via a depreciation of the national currency, there will be inflationary pressures due to the large amount of imported raw materials. This has ended up becoming the external restriction of growth in terms of Thirlwall (1979).

Moreover, price controls have also achieved tying up real wage growth, which has prevented the domestic market from growing enough to offset the failures of the growth strategy driven by exports, and at the same time, the inflation-targeting regime has become an internal restraint to growth in Mexico.

Therefore, this article aims to show how the export-led growth strategy and the inflation-targeting regime are incompatible in Mexico. To achieve the objective of this paper, this document has been divided in the following way: The first section talks about what theory and literature say regarding the export-led growth and inflation-targeting regime. In the second, we develop a methodology in which a simple theoretical model of four equations helps to understand what the weight of each of the variables is that determine growth in the country. The third discusses the principal results, in which we argue why the hypothesis of export-led growth and the inflation-targeting regime are incompatible. Finally, we close with a brief section of conclusions.

Theory and literature discussion

We are going to divide this section in two parts, with one side giving the explanation for why the Mexican economy (as per its promoters) should be open, while in the other, we talk about the inflation-targeting regime.

Commercial opening and export-led growth

The opening of the Mexican economy occurred after the success witnessed in the Asiatic countries of South Korea, Hong Kong, Singapore and Taiwan (Heras and Gómez, 2015), which was explained by the export-led growth hypothesis. This refers to the correlation between economic growth and dynamic exportation (Rodríguez and Venegas, 2010). This approach argues that international commerce may bring a country benefits such as increases in competitiveness (Balassa, 1978). This is due to the exposure of national producers to foreign entrepreneurs, because if the former want to gain more market share, they need to be more efficient in their processes. Another benefit is that scale economies are generated with special benefits for small economies (Helpman and Krugman, 1985). This is because, according to the theory, many industries of small economies have increasing returns to scale, including higher production volumes that require better processes, thereby reducing costs and increasing profits. A third benefit is the access to better technology and more capital (Mc Kinnon, 1964). An additional benefit is that, with international commerce, it is hoped that economies will gravitate toward a wage convergence (Krugman, Obstfeld and Melitz, 2012).

The last benefit was the most polemic topic centered around the experience of the opening of the Mexican economy, as there were those who maintained that as consequence of lower wages in Mexico, many enterprises could migrate to and set up in the country. Others maintained that Mexico was not going to use this condition as a competitive advantage, but rather that it has been hoped that the opening will cause an increase in real wages, that with the passage of time, will converge with United States wages.

The reason for expecting wage convergence is in an extension of the Heckscher-Ohlin theorem (Samuelson, 1971), which can be summarized by the following Figure 1.

The previous figure[1] shows the existence of two economies, which we will name one local and the other foreign. We will assume that the capital and land factors are given; in addition, each country has a technology also given. Let us also suppose that only one good is produced and it is the same in both nations. For its part, the labor factor is considered mobile, which is given the property of being able to move from one economy to another, and this is necessary to suppose that, there are no barriers to migration.

The amount of work is measured on the horizontal axis of the graph. The point L symbolizes the number of workers in the local market, while with L* the number of workers in the foreign market is represented. The sum of L plus L* is the total global labor supply. On the other hand, the real wage paid in the local market is W, measured on the left vertical axis, while the wage paid abroad is given by W*, counted on the right vertical axis. The PMgL* curve represents the marginal productivity of foreign labor, while the PMgL curve refers to the marginal productivity of national labor. Both curves find their maximum level of efficiency at point A, where given the conditions of land, labor, capital and technology, a level of production can be reached that meets the needs of both economies, even at this level it is also necessary to real wages are the same, because each country produces at its optimum point.

Now, let us suppose we are originally at point L^1. In this case, the amount of work in the national market is given by $L-L^1$, while the amount of employment in the foreign market goes from L^1 to L*. If we assume that we are in a

[1] The explanation of this figure is based on Krugman, Obstfeld and Melitz (2012) and Samuelson (1971)

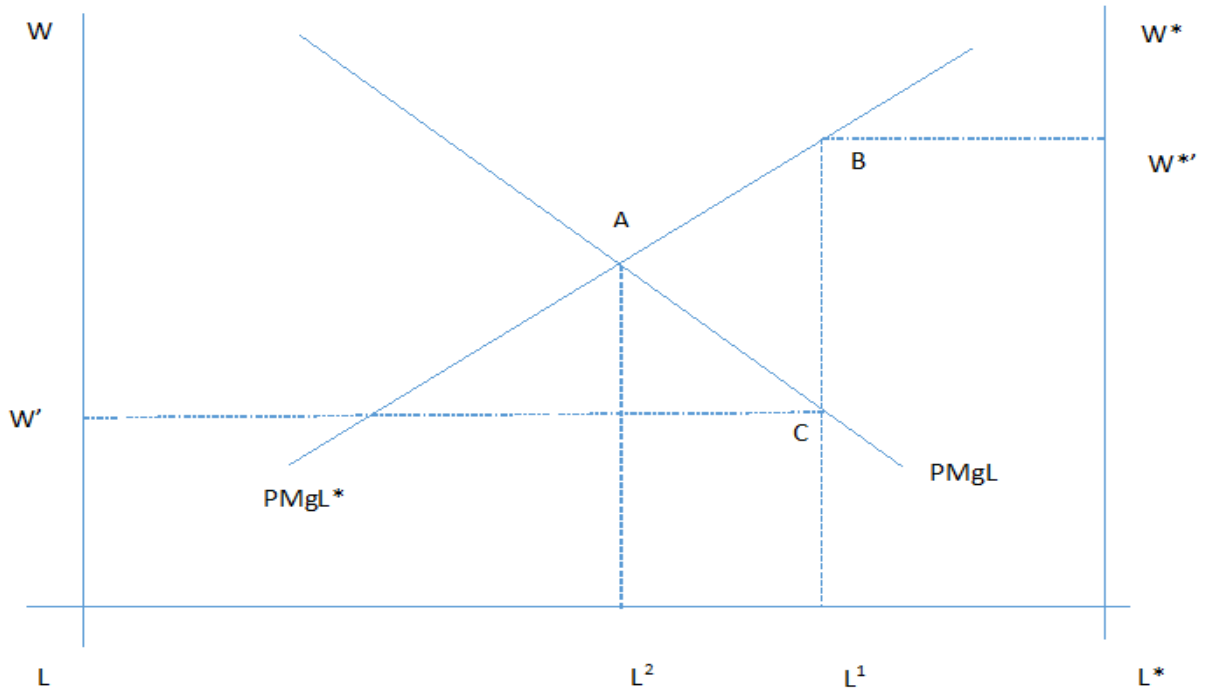

Figure 1: Wage convergence

Source Krugman, Obstfeld and Melitz (2012)

model with decreasing returns to scale and given that we are above the optimal working point for the local economy (L^2), then, the marginal productivity of it will decrease, situating us at point C, causing to turn a contraction of the real wage, so this will be placed in W'.

Moreover, foreign economy, has an employment level far below the optimum (L^2), which makes it still is in the phase of increasing returns of marginal productivity of labor, which is why labor productivity and the wage level are higher indicated by points B and W*' respectively.

Now, as workers have the power to move from one market to another, national workers observing a higher real wages abroad, migrated to that market causing labor supply is reduced in the domestic market, moving on the PMgL curve to the left, which increases marginal productivity and therefore comes with a higher real wage in the local economy. On the other hand, the supply of labor will grow abroad causing a shift on the PMgL* curve to the left as well, resulting in a fall in the marginal productivity of labor abroad and a reduction in the real wages of that economy. This process should occur in such a way that at some moment converges on point A, where there will be no more incentives for migration.

In a scenario where countries produce more goods and where perhaps each one can specialize as indicated by the Heckscher-Ohlin model, the results would have to be the same. Because if it were the case where the local country produces manufactures and foreign technology goods. In this case, if it is known that in the local country wages are lower than those from abroad, then work as a mobile and malleable factor, would specialize to produce technology goods, probably receiving an academic or technical training to guide it to be able to perform in the technology industry. In this way, once its preparation is completed, they would migrate abroad. However, the same process of workforce accumulation will cause the marginal productivity of labor in this industry to be reduced and, therefore, real wages will again fall to the point where they converge with those of the manufacturing industry. That by the way, the marginal productivity in this industry would be given in a gradual increase, because the shortage of labor workforce generates an opportunity to increase the productivity of these workers and therefore receive increases in their wages. This adjustment process in both industries and both countries would be given for a period, but at the end of the adjustment, no longer exist incentives for future generations of workers to specialize in the production of technological goods, being the same for workers labor in one or another industry.

These adjustments and wage equalization in both markets would end up eliminating migration, at the same time, since for workers there would be no difference in working in one or the other market.

In the background we can deduce that Mexico's commitment to the export-led growth model was in two ways, on the one hand our producers would find a great

opportunity to do business with one of the largest markets in the world, thus having an engine of growth supported abroad. On the other hand, wage convergence would strengthen the domestic market, which would make producers oriented to the national market, also benefited from this dynamic by increasing the purchasing power of inner consumers, finding in this a growth strategy inward oriented too.

This strategy went along with another major reform in economic policy, the way of handling monetary policy, which from the theoretical point of view is supported by the ideas that will be explained below

Inflation targeting in Mexico

Mexico formally adopts as a strategy to contain inflation, the statements known as "inflation targeting" from 2001 (Banxico, 2002). Which consists of: 1) making an explicit announcement of an inflation target, which for Mexico is 3% with a margin of plus minus one percent and 2) a mechanism of high transparency where the central bank constantly informs economic agents about their actions. All this seeks that agents can build anchored expectations that avoid inflationary shocks due to the lack of trust in the central institution (Aguilar-Argaez et al., 2014)

In the inflation targeting scheme, it is argued that a central bank can infer inflation behavior when it is the product of demand shocks, this means that when the effective product get closer to the potential GDP, or the gap GDP closes, inflationary pressures are generated (Arestis, 2009). In the face of such a scenario, an increase in the interest rate would be sufficient to discourage demand, which would contain the increases in prices given by an increase in the level of employment (Carlin and Soskice, 2006).

Notwithstanding what the model mentions, in economies such as Mexico, inflation managed to control itself thanks to the stability of the exchange rate and to anchor the growth of real wages, as we will show below and as other authors indicate. The interest rate has only been an instrument of indirect control to influence the exchange rate, and to keep it appreciated, in order to contain the transfer to prices that could arise from the importation of inputs. Evidence of this is shown by Mantey (2011), Aizenman and Hutchison (2008), Ibarra (2008) and Cruz et al., (2011).

Furthermore, in Mexico, price control forced to maintain a solid fiscal stance (Banxico, 2002) which was nothing more than the disappearance of the participation of fiscal policy as a mechanism to promote economic activity (Mantey, 2011; Galindo and Ros, 2006).

Thus, as the years go by, there are conflicting positions regarding the effectiveness of the inflation targeting strategy to control the rise in prices. While some argue that inflation control has been thanks to the adoption of this mechanism, such as the Banco de México itself in its annual reports[2], or positions such as those of Ramos Francia and Torres (2005), Nogueira (2007), Capistrán et al. (2012) and Cortés (2013), others argue that there are various elements that can account for this result and not necessarily the inflation targeting (see Ball and Sheridan (2005), Brito and Bystedt (2010), Gonçalves and Salles (2008)).Having explained the above, in the following section we will focus on the methodology followed on this article.

METHODOLOGY

The methodology that will be followed in this article is analytical-descriptive, starting from the construction of a simple macroeconomic model of four equations, which are elaborated from Post Keynesian ideas, but mainly from Kalecki ideas, so we will make some assumptions of the behaviors of each dependent variable respect of the exogenous variables. All the assumptions are supported both theoretically and empirically from other published works.

Once stated the above, our model proposal is the following:

$$J = J(\theta, Y_{t-n}, Y^*), \quad J_\theta, J_{Y^*} > 0; J_{Yt-n} < 0 \qquad (1)$$

$$C = C(w), \quad C_w > 0 \qquad (2)$$

$$I = I(Y_{t-n}), \quad I_{Yt-n>0} \qquad (3)$$

$$Y = C+I+G+J, J=X-M \qquad (4)$$

Where:

J = Net balance of the trade balance; θ = Real exchange rate; Y* = United States GDP; Y_{t-n}= Mexico's GDP lagged behind; C = Internal consumption; w = Real wages; Y= Mexico´s GDP; I = Investment; G = Public expenditure; X = exports; M = imports.

In (1) the net balance of the trade balance is defined according to the real exchange rate θ, the United States GDP (Y*) and the lagged Mexican GDP (Y_{t-n}). The partial derivative of J with respect to the real exchange rate is given by the expression J_θ,> 0, which implies that there is a positive response of the trade balance to movements of the real exchange rate. That is, to a depreciation (increase of θ) exports will increase, and imports will decrease, so that the balance will be favorable for the trade balance; on the contrary, an appreciation of the peso against the US dollar would reduce the amount of exports and encourage imports. This according to the Marshall-Lerner condition, which we assume is fulfilled for Mexico in the long term, as Galindo and Guerrero (1997) or more recently Arriaga and Landa (2015) find. However, we will also assume that the effect of a depreciation is limited in Mexico, so that:

[2] See http://www.banxico.org.mx/publicaciones-y-discursos/publicaciones/informes-periodicos/anual/indexpage.html (Accessed November 23, 2017)

$1>Y_\theta > 0$ (1.1)

In other words, the partial derivative of the GDP with respect to the trade balance is bigger than zero but less than one. It means that facing a depreciation of the real exchange rate, there will be an improvement in the trade balance, but this improvement will be diminished by the dependence of the exporter growth of imports as proposed by Vázquez and Avendaño (2012). An increase in exports is accompanied by an increase in imports, since Mexican export goods are produced with a high content of imported inputs, which causes part of the wealth to be spilled abroad.

Keeping on to the analysis, (1) it shows that the trade balance will be sensitive to the income elasticity of both: exports (given by $J_{Y^*} > 0$), and imports ($Jy_{t-n} <0$). It is, to a greater growth of the US economy, the balance in the trade balance will be favorable, due to a greater demand for our exports (Galindo and Guerrero, 1997; Arriaga and Landa, 2015). In this order, we can express the following:

$Y_{Y^*} > 1$ (1.2)

To wit, the partial derivative of the GDP with respect to the GDP of our main commercial partner is bigger than one, which is given from the fact that facing an increase in the economic growth of that country, our exports will grow, favoring the commercial balance and both causing effects on the national GDP slightly higher than the growth of that country, as reported Caballero and López (2013).

It is important to highlight at this point that although the depreciation of the exchange rate and the larger growth of foreign GDP seem to leave the same results, given that higher exports imply higher imports, the difference is that with a depreciated exchange rate, the cost of imported inputs increases. So that, the effect of a stimulus to demand via prices has a contractionary effect in the short term as indicated in his seminal article Krugman and Taylor (1978). Since as it was explained above, a depreciation of the peso provokes inflationary pressures, something that if we link with equation (2), it will allow observing that there would be a fall in the real wage, which will end up contracting the consumption and therefore will slow down the economic growth. So that, the possible expansionist effect that had caused a larger volume of exports will end up dissipating due to the contraction in the domestic market. In fact, this situation would leave a redistributive effect of income, since those agents involved in the export sector would improve their position within their share on the GDP, while the agents that make the internal market would lose share on the GDP.

Notwithstanding, when the expansion occurs through a better performance of the foreign GDP, this leads to higher exports that also come with more imports, but at this time without changes in relative prices, so there are no second-order effects on domestic prices. With this situation the increase of Y*, leads to an increase of X and M, but with X> M, so J improves, while the real wage remains constant as well as consumption, leaving a positive effect in the national GDP.

Moreover, there will be a point where further growth of Mexican GDP, will lead to a contraction in the net balance of trade balance in future periods, caused by increased demand for foreign products, leading to a fall in the domestic GDP. It is compatible with the idea of the external restriction to the growth of Thirlwall (1979). This suggests that internal growth has a limit that, if exceeded, would cause a flight of wealth abroad.

What we are presenting here also means that the effects on the growth on the income elasticity of our exports are greater than the effects of price elasticity, in other words:

$Y=Y(\theta, Y^*)$, where $Y_\theta < Y_{Y^*}$ (1.3)

Continuing, in (2) it is defined that the internal consumption depends directly on the real wage, for which reason we are implicitly including the effect of the inflation rate. In this order, we can express that:

$Y_w >1$ (2.1)

That is, if a change of one percent in real wages is faced, consumption will increase so that it is reflected in an increase of the GDP bigger to one, as assert López and Caballero (2013).

In (3) the investment is defined based on the performance of the Mexican GDP of previous periods, to which we will suppose that:

$Y_{Y-n} >1$ (3.1)

This is so because of the multiplier effect of the investment as explained in Kalecki (1954) and Keynes (1936).

Finally, in (4) the identity of GDP is expressed, in which we will make an additional assumption, because of which the participation of fiscal policy has disappeared, we will assume that G is constant, so (4) it can be re-expressed as follows:

$Y=C+I+J$ (4.1)

So we will have that the economic growth will depend on:

$Y= Y(\theta, w, Y^*, Y_{t-n})$, with $Y_\theta < Y_{Y^*}$; Y_w and $Y_{Y-n} >1$ (5)

To wit, the GDP depend positively on the real exchange rate, of real wages, the foreign GDP and the growth of the national GDP of previous periods. Nonetheless, we must warn of inefficiency when trying to grow through a depreciation of the exchange rate, because as explained above, to make cheaper our exports causes an increase in demand for them to be accompanied by an increase in imports. But it should be noted that this phenomenon is a consequence of the weak structure of the Mexican industrial apparatus since the lack of national suppliers for exporting companies makes them look for supplies abroad, coupled with fiscal policies that encourage the consumption of imported goods such as the IMMEX[3] program. On the

[3] In this program, manufacturers exporting companies are asked to purchase imported inputs in Mexico and return them as final goods abroad, generating at that time a right to reclaim the Value Added Tax (VAT) that caused the importation. This puts national suppliers of inputs at a disadvantage, since they are obliged to transfer VAT to their consumers by making national products more expensive compared to foreign ones (see http://www.2006-2012.economia.gob.mx/comunidad-

other hand, the dependence on imported inputs to produce export goods makes the inflation rate very sensitive to the depreciation of the exchange rate, so trying to stimulate demand along this path not is the most efficient.

If we explained different way, trying to stimulate the growth through exports is incompatible with domestic growth, since it slows down national consumption. In this sense, the most efficient tool is that the export sector grows because of an expansion of foreign GDP, however, it is evident that it is a variable not handled by the national policy, so this situation makes the national growth endogenous to the foreign.

Another course can be found with an increase in the real wage, because if any policy is created that seeks to increase wages, it would be found that national consumption would increase (equation 2) causing growth in the GDP (equation 4) and in next periods, this strength of the domestic market would lead to greater investments (equations 3), causing the national GDP to grow again (equation 4).

This phenomenon may well continue like this, until the external constraint to growth be found. That is, when the increase in national wealth, and it has the consumption of imported goods increases. But this leakage would happen as long as Mexico will not be able to produce certain type of goods, which causes its need for importation, so that is not just a policy necessary to increase the wage, but it must be accompanied by an industrial policy that frees the country from dependence on the outside.

In the next segments of this document, a graphic analysis will be done from official statistics. The objective is show evidence about the incompatibility of the export-led growth strategy and the inflation-targeting regime; all this without leaving out our reference framework.

RESULTS DISCUSSION

In this section, we are going to show statistic evidence and we will create some indicators using the official data. The idea is contrast the information with the idea to prove our hypothesis.

External restriction

From the equation (1) it was discussed that the Mexican economy seems to suffer from an external restriction to growth in the sense of Thirlwall (1979), which intensifies when the problem that Galindo and Ros (2006) call "external domination", referring to the dependence of the internal prices of the exchange rate. In both cases, the problem exists when an economy has a high propensity to consume imported goods, so it can be measured through the volume of products imported from the country. To get an idea of this, see Figure 2.

Figure 2 shows the growth of imports and exports from one period to another in volume. The importance of doing so in volume is that we can set aside a monetary effect that can occur due to a rise in prices or exchange variations.

Then, if we divide the period before and after the NAFTA (1994), we will find that before its beginning, exports already had an important dynamic, since they grew on average 13.78% per year. In regarding the imports, these ones had an average annual growth rate of 7.53%. It highlights at first glance that imports behave in a more volatile way in relation to exports, but what we mainly want to emphasize is that there does not seem to be a dependence between both variables. In fact, in the great crisis periods for Mexico imports fall significantly, while exports seem to have slight recoveries, which can be explained by equation (1), since the contraction of national income, makes them stop consuming foreign products, while the evolution of exports is given more by the exchange rate and the growth of the foreign GDP.

If we graph the imports growth and Mexican GDP growth, both against their previous period, we will observe that in effect these large falls in both variables coincide, as shown below in Figure 3.

Returning to Figure 2, and if we now turn our attention to the evolution of both exports and imports after the beginning of NAFTA, it is on 1994, we will find that the average annual growth dynamics of exports is 7.58%, while that of imports is of 7.23%. That is, later the beginning of NAFTA and after more than 20 years, the dynamics of exports did not improve, in fact in average term, it is worse. Regarding the dynamics of imports did not have great variation, however if we pay attention to the joint behavior of both variables, we will notice that a close relationship begins to form since the year 2000. So that two points are clear: On the one hand, trade liberalization did not stimulate the Mexican export sector as expected, and on to the other one, the issue of external domination is seen through the large income elasticity of imports. To give more certainty of this, let us observe the following indicator:

This indicator must be interpreted as follows: for each percentage point that economic growth varied (up or down), how much changed the imports. In other words, in 1982, for each percentage point that GDP declined in Mexico, imports did so at 64.63%.

With these data, it is possible to conclude that imports are highly sensitive to the movements of the country's GDP, with a greater response to periods of economic contraction. In addition, in Figure 4 we see that in the periods prior to the start of NAFTA, imports were more resilient to GDP, while in 2015 the ratio had a value of 0.73. It means, for each percentage point that grew the Mexican economy, imports did it at 0.73%, so although in general terms we observe a negative trend, the value of the ratio does not stop being high.

We will close this idea by showing the following table, in

business / industry-and-trade / foreign-trade instruments / immex (accessed November 23, 2017).

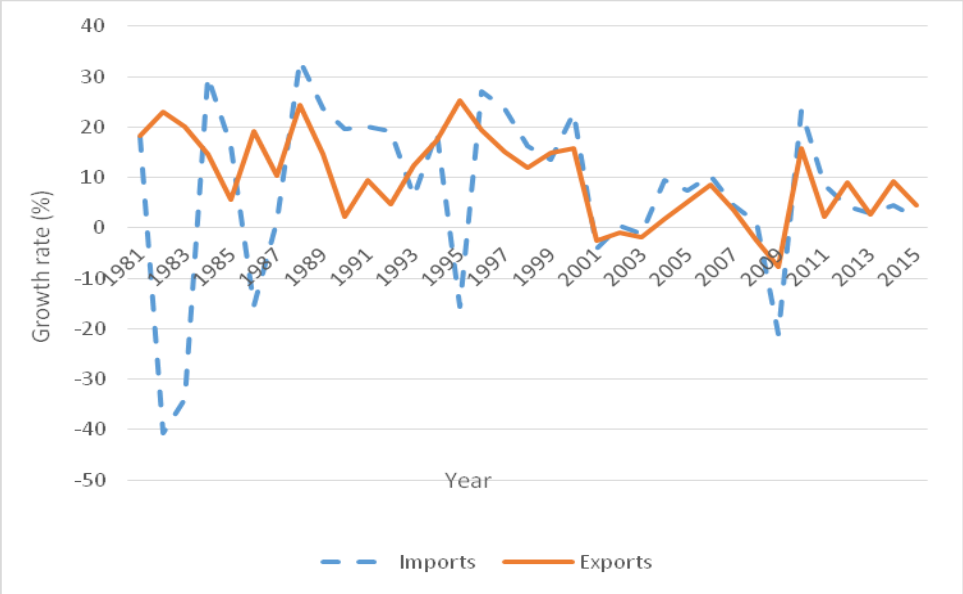

Figure 2: Rate of variation of imports and exports in volume

Source: own elaboration,with data from the World Bank.

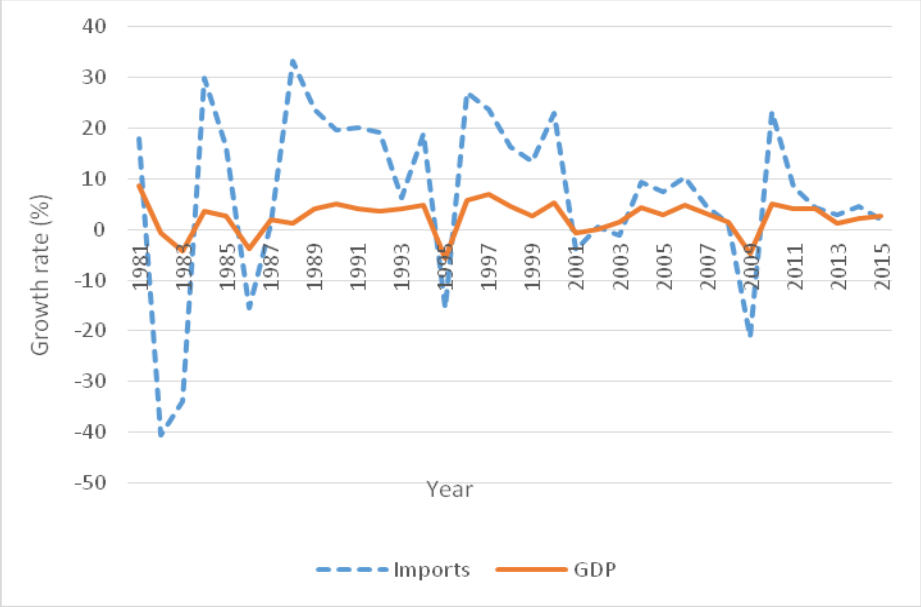

Figure 3: Growth rate of imports and GDP in Mexico

Source: own elaboration,with data from the World Bank

which a causality test has been applied in the sense of Granger where imports and the Mexican GDP are subject to evaluation:

From the Table 1 is possible conclude that at least 90% accept that Mexican GDP causes imports and not vice versa, which reinforces the idea that the Thirlwall hypothesis applied to Mexico is fulfilled. This fact has been documented by empirical works applied to our country, to name a few: Moreno-Brid (1999) and López and Cruz (2000) who conclude that in the long term the income elasticity of demand for imports, restricts economic growth.

Another element that adds to the external constraint to growth, is the high imported component required for the export of goods, since in Mexico more than 70% of the

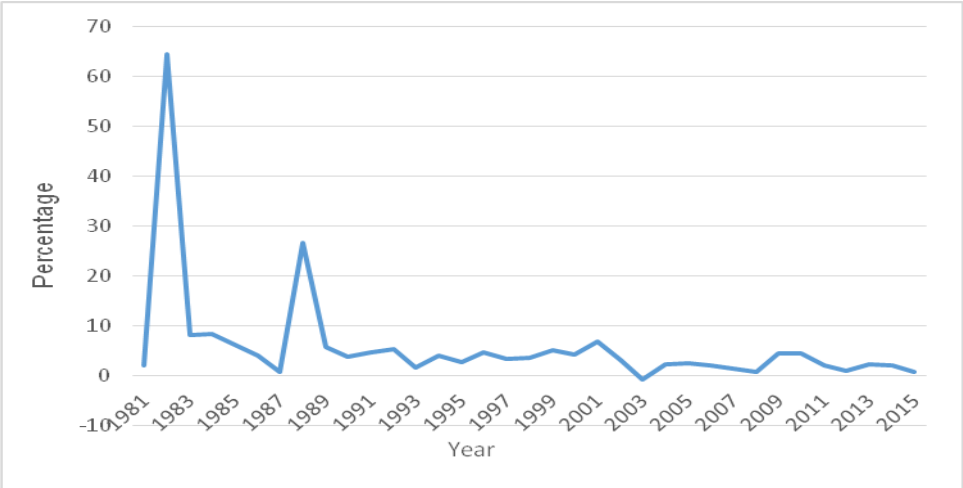

Figure 4: Import variation rate / GDP variation rate

Source: Own elaboration,with data from INEGI.

Table 1. Causality in the sense of Granger of Mexican imports

Mexico's GDP does not cause imports	Imports do not cause Mexico's
0.0817	0.7257

Source: Own elaboration,with data from the INEGI.

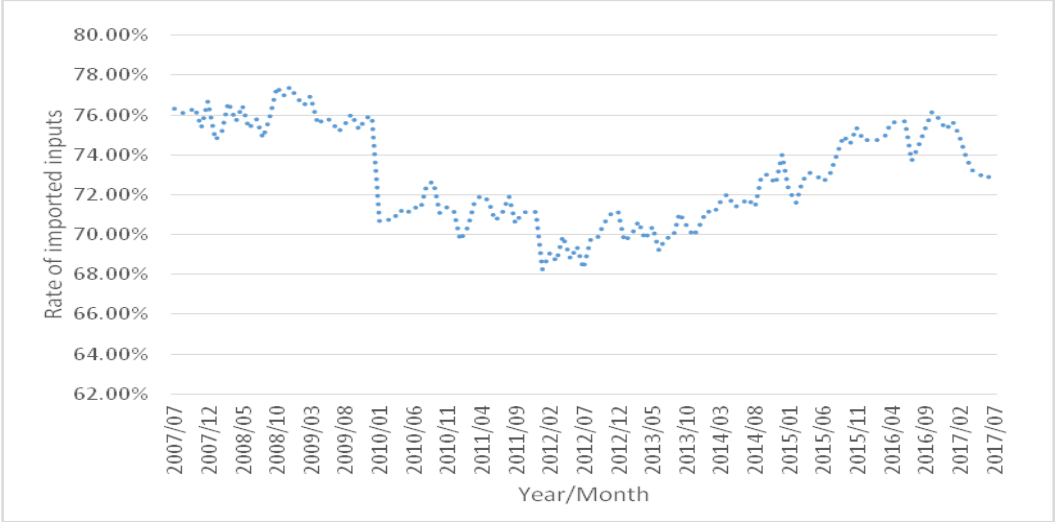

Figure 5: Rate of imported inputs in export goods

Source: Own elaboration,with data from the INEGI.

inputs used to generate export goods are of foreign origin as can be seen in the following graph:

Figure 5 shows that in July 2007 the ratio of imported inputs to the total was more than 76%. The indicator experienced its best moment in 2012, when it was below 70%, however on July 2017 Figure 5 reaches more than 73%, which means that of each dollar that is spilled in the production of export goods, 73 cents are paid to foreign suppliers. This justifies why the commercial opening has not delivered the expected results in terms of economic growth.

To conclude this section, we will show another exercise

Table 2. Causality in the Granger sense. Imports vs. exports

Exports do not cause the imports	Imports do not cause the exports
0.046	0.1775

Source: Own elaboration,with data from INEGI.

on causality in the Granger sense, where evidence is given of what is graphically possible to observe:

The Table 2 shows that the causality test in the sense that more exports involve more imports, must be accepted at 95% confidence.

In short, the external constraint to growth is within the export-led growth strategy itself, because paradoxically to grow we need to import, which makes the growth given by international trade slow and far from the expected effects. Finally, this evidence corroborates the approach made in (1.1), which states that an improvement in the trade balance given by an increase in demand for exports, provides a favorable balance for growth, but lower than the unity.

The internal restriction to growth

As mentioned above, in 2001 Mexico adopted as a disinflation strategy that known as inflation targets. It was based on two main pillar: on the one hand, the tendency towards an appreciation of the exchange rate (see Mantey, 2011; Aizenman and Hutchison, 2008, Ibarra (2008) and Cruz et al. (2011). On the other one, in the containment of real wages, for the belief that wage increases are inflationary (see Esquivel and Razo, 2003 and CONASAMI, 2017). These two tools have had very strong impacts on the stagnation of the GDP. In one way because, the appreciation of the exchange rate has the opposite nature to that which seeks to grow thanks to exports, this is since exports become more expensive and imports become cheaper. By other side, the loss of purchasing power of employees has been very harmful to the growth of the domestic market. Before to start with the discussion of the wage, we want to show what has been the role of the exchange rate within the control of prices in Mexico. The importance of this idea is because, even though it seems evident that there is a high degree of connection between domestic prices and the exchange rate, there are positions such as Ramos Francia and Torres (2005), Nogueira (2007), Capistrán et al. (2012) and Cortés (2013) who argue that the pass-through effect in Mexico gradually disappeared after adopting the inflation targeting strategy.

The role of the exchange rate

We begin this discussion by showing a graph screening the behavior of the nominal and real exchange rate before the signing of the NAFTA and until 2016.

The graph shows that practically throughout the period, the peso remained overvalued, maintaining a smooth slide between 1999 and 2013, and then starting a marked process of depreciation, which was even more serious than that experienced in the 2009 crisis. This behavior of the Mexican currency curiously resembles much the behavior of inflation, as shown in the following graph (Figure 6).

Figure 7 shows the growth rate of the Mexican price index, as well as the rate of variation of the exchange rate in nominal and real terms, so we have the inflation rate and the rate of depreciation (appreciation) of the exchange rate.

From the series, it is possible to draw two important conclusions. On the one hand, between 1993 and 2013, there is a clear tendency to the appreciation of the Mexican currency, which caused Mexican products lose competitiveness abroad. This situation was dangerous for the Mexican economy growth, and become seriously when came on the scene countries like China that clearly use as a competitive advantage, lower prices. This trend, although favorable for the containment of inflation, played against the strategy of growth-led by exports, as consequence of a weak dynamic of the exportable industry.

In a different way, there is a positive correlation between the exchange rate and the inflation rate, gives certainty to all those who claim that has been the exchange rate one of the instruments for controlling inflation in Mexico.

Although, may be is for some people obviously think that a depreciation causes inflation, there are many economists that are not agree. Probably, the strength of this argument was in doubt after 2014 when the exchange rate start a very marked depreciation process, while the inflation rate did not respond to it.

In an interview for the newspaper "El Reforma", the Governor of the Bank of Mexico, said that the reason for the zero effect of the exchange rate on the price level was that "the high historical correlation between inflation and the depreciation of the exchange change was broken more than one decade ago thanks to the autonomy of the Bank of Mexico"[4]. In the same event the Governor continues explaining that since inflation was the lowest in four decades in Mexico, inflation expectations in the future remained low and well anchored, going together by interest rates, also the lowest ones in history, and a growth in real wages according to productivity, had caused companies' costs do not to increase due to depreciation (El Reforma, 2015). This empirical evidence supports what some others

[4]http://www.reforma.com/aplicacioneslibre/preacceso/articulo/default.aspx?id=69308&urlredirect=http://www.reforma.com/aplicaciones/editoriales/editorial.aspx?id=69308 (Accessed November 20, 2017)

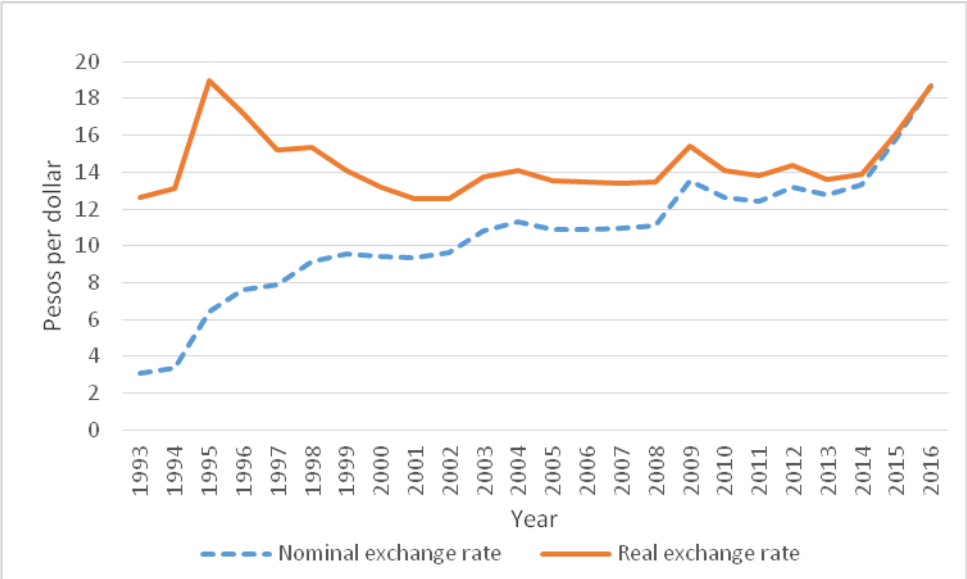

Figure 6: Nominal and real exchange rate. 2016 = 100

Source: Own elaboration,with data from INEGI and world Bank

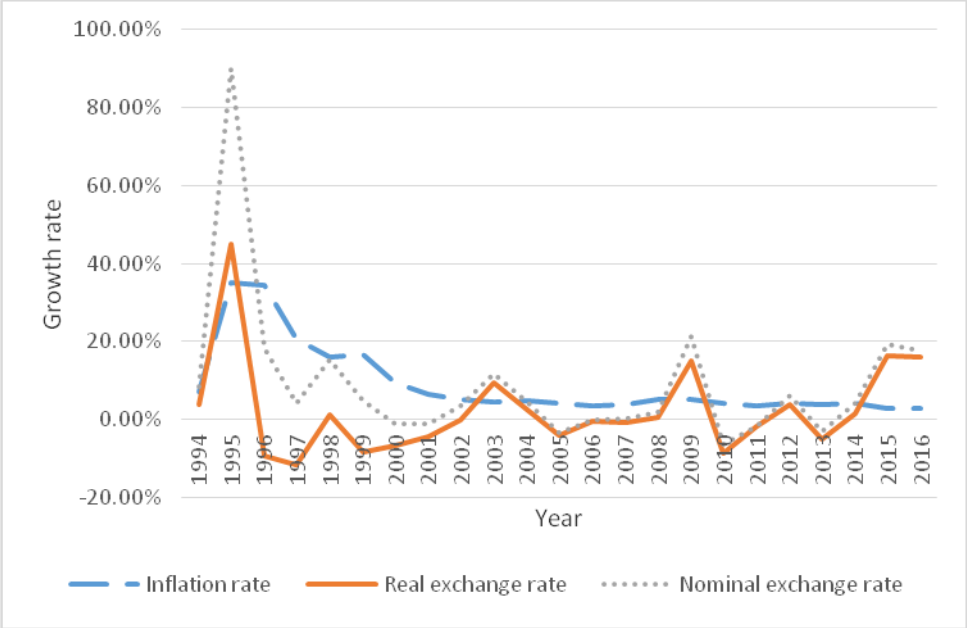

Figure 7: Inflation rate, and nominal and real exchange rate variation.

Source: Own elaboration,with data from INEGI

like Ramos Francia and Torres (2005), Nogueira (2007) and Capistran et al. (2012) already claimed from long time ago, and it is that, as per their statements, the pass-through effect of the exchange rate to prices had been fading after the adoption of the inflation targeting strategy, because according to their defenders, it was thanks to the agents had anchored their inflationary expectations that caused these results. This idea is also consistent with Aguilar-Argaez et al. (2014), who affirm that "a low and stable inflation product of a credible monetary policy, which generates well-anchored inflation expectations among economic agents, it moderates the propensity of companies to transfer to consumers the increases of costs associated with a depreciation of the exchange rate".

Then, well the regime of inflation targeting seemed to have been successful in controlling inflation, leaving an annulment of the transfer effect. However, there is another explanation to this phenomenon, and it is the following:

In an internal market contracted by the low purchasing power of consumers, entrepreneurs use their market position to not increase prices for as long as possible because they fear a contraction in demand that leads to lose market share, and, this can be reflected in two possible scenarios:

1. Large companies have sufficient inventories, so they are not forced to raise prices in the short term, since sales made in current periods will come at past costs, which does not affect their rate of profit, even without increase their prices and even suffering an increase in their variable costs[5].

2. If smaller companies do not have inventories, they are willing to temporarily sacrifice their profit rate in exchange for not losing market share because of an increase in their prices, since large companies do not reflect this increase, those of smaller size if they decide to do so can be expelled from the market.

In either of the two scenarios, prices will end up rising as a result of the exchange rate depreciation, but we will observe a phenomenon where the price response will lag behind in time. Also is very probably that the increase will be less than one, it means, for each percentage point that exchange rate increase, inflation rate will growth less than one. Once again, it happens because the market has not the purchasing power for support higher prices, and of course, as the entrepreneurs are rational agents, they know that higher prices will cause less sells and lower profits. So, the reason why the depreciation started in 2014 was not reflected in higher inflation is this, and not because agents have anchored their expectations.

Additionally, we need to say that the effects in the short term will be very different depending on the type of industry and market structure. For example, in basic goods such as food, businesspersons have a greater market power that the consumers since they are goods with a little elastic offer (Kalecki, 1954), which gives the bidders faculty to be able to take the transfer to prices of practically 100% of the increase in the costs come by the depreciation. If this kind of market, we add that there are barriers for new suppliers, then the market power of these grows and therefore their capacity to transfer costs increases.

Now, if we analyze other kind of market, such as household furniture, the conclusion is different. Since these are not essential goods, an increase in the prices can make a difference in the decision of consumption of families, because they can live without these goods. In addition, in this kind of market usually there are no much barriers for new suppliers. Other point is that is a market of low relative demand, which mean that food is a good that everyone has to consume, so all spend part of their income to this type of products, however home furniture are not goods that all consume, so not necessarily all spend part of their income to consume them.

Everything contributes to that in industries like these, the market power of consumers is higher, which inhibits the increase in prices causing a lag in the same or if prices increase, they do it in smaller proportion than depreciation.

In the following Figure, evidence is found about what is described here, that is, although the rate of change was depreciated between 2014 and 2016, the annualized inflation rate remained at its target; even in December 2015 the inflation rate was reached lowest in all history. However, we can see how inflation in the food industry remains well above general inflation, except for the month of December that had a drastic fall. But, that also has an explanation of seasonality, since it is a month where the income usually grows, and that increase is usually destined to goods that are not of primary necessity, as in the case of furniture. Note that in almost all the points the food inflation rate is above the general inflation and that of the furniture, even well above the inflation target, that is, the effect of the depreciation if it was observed immediate, but not in all industries equally.

Therefore, in industries where the producer has more market power than the consumer, we find it easier to transfer the effect of depreciation to prices.

On the other hand, if we analyze the behavior in the furniture industry, the prices stayed even below the general index. The points with which we started this discussion can explain it. That is, the existence of inventory or the willingness to sacrifice rate of profit temporarily, but it should be clarified that this industry behaves in this way because in this case consumers have greater market power than producers, so that an increase in the price could result in non-consumption from them(Figure 8).

Thus, the problem of inflation is a conflict also of a distributive nature (Argitis and Pitelis, 2001).

In summary, what we are arguing is that price control is achieved through maintaining an appreciated exchange rate, but it will also depend on the distributive structure of each economy. Influencing the second variable is very complicated in the short term, since almost entirely depends on the historical context that has given life to the productive structures of each nation. However, influencing the exchange rate is a possible objective, so at the end of the story it will be the easier to anchor prices appreciating the exchange rate.

The role of wages

The Bank of Mexico, at the beginning of its attempt to deflate the economy, pointed out that wage increases had to be in line with inflation objectives (Banxico, 2003). In fact, the Governor of the Bank of Mexico ratified in the interview cited sections back, because it explained that the real wage could not grow above the productivity because this would

[5] This accounting method to record the costs and control of inventories is known as "first entries, first outlets" (FIFO)

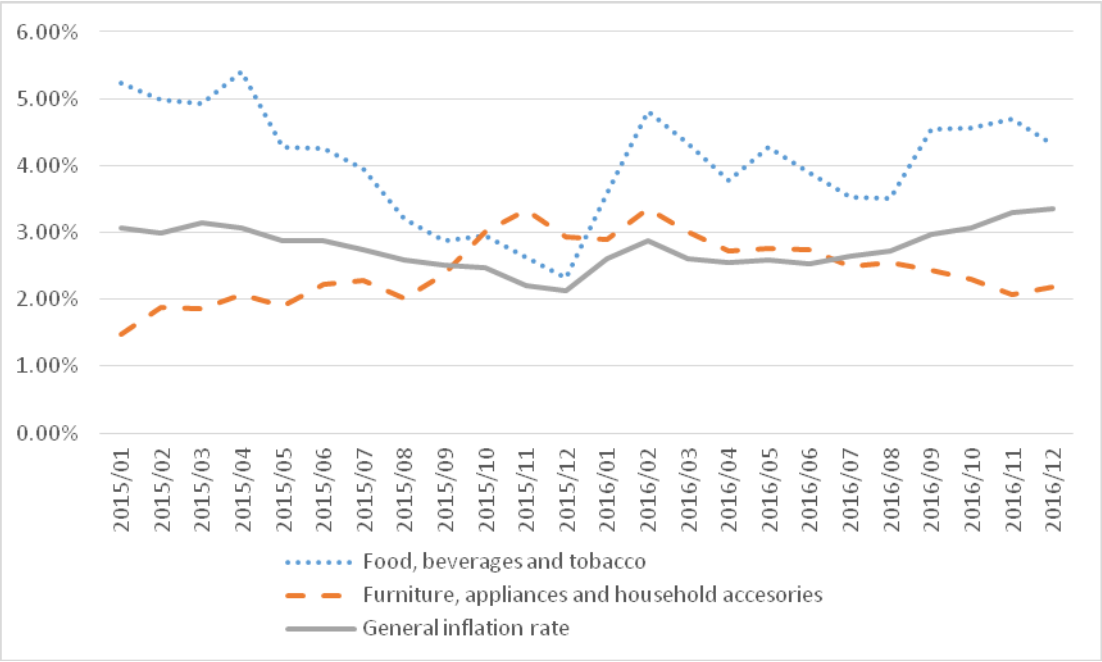

Figure 8: Inflation rate of industries with different market powers

Source own elaboration from INEGI data

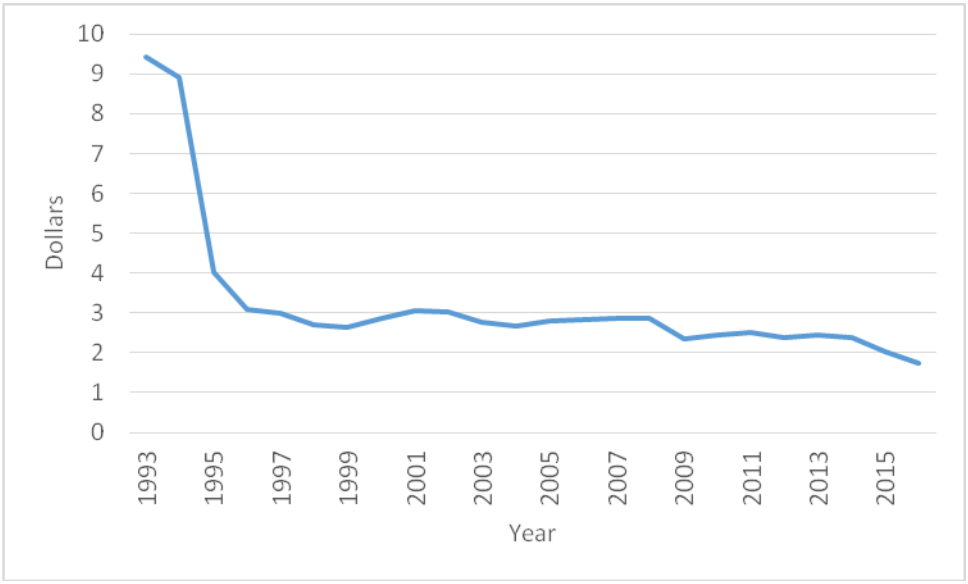

Figure 9: Real wage per hour in the manufacturing industry in Mexico

Source own elaboration with INEGI data

cause inflationary pressures.

The belief in this argument led to a real contraction of the real wage in Mexico after the 1994 crisis, as can be seen in the following graph:

Looking at the graph,(Figure 9) we can see that after the great crisis of 1994, there was a very strong contraction of the real wage, as a consequence of the great depreciation of the exchange rate, this contraction was of such magnitude that to date it has not been possible to recover (Polaski, 2003).

This vast blow to the purchasing power of workers leaves two important conclusions:

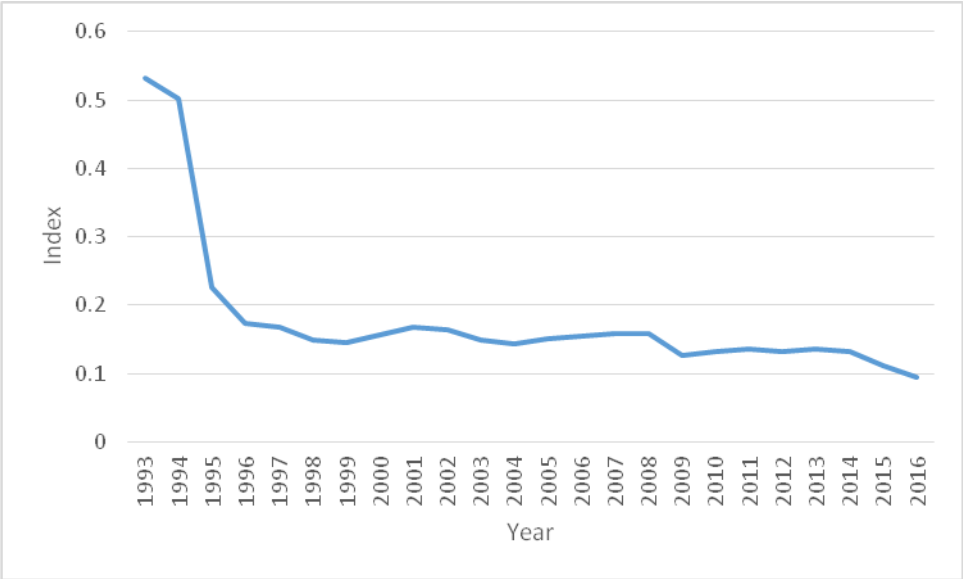

Figure 10: Mexico-United States wage convergence index.

Source: own elaboration from INEGI data.

The first is that, Mexican and American wages did not converge as the theory said, on the contrary, they diverged, as can be seen below:

Figure 10 shows the ratio of dollars paid per working-hour in the manufacturing industry between the United States and Mexico, in real terms. It runs from zero to one, so its reading is that a value of one corresponds to an equal remuneration, and at a value of zero, the remuneration is more unequal, that is, the closer the indicator is to one, the bigger will be the convergence of wages, and the closer to zero the divergence will be bigger.

The foregoing allows to see that before the beginning of NAFTA, the degree of convergence was much greater than after the implementation of the agreement, because in 1993 for every dollar paid in the United States, in Mexico they paid 0.53 dollars, while in 2016 the ratio drops suddenly to 0.09 dollars.

The reason is not necessarily the cause of the NAFTA itself, because as it was already seen, after the great crisis, the Mexican wage did not recover again. To this, we must add that an attempt to increase the real wage, according to the ideas already shown by the Bank of Mexico would have resulted in an increase in inflation, so the control of real wages was undoubtedly in this period a tool to achieve price stability in the economy

The second point to be rescued can be seen in the following graph showing the evolution of real wages in Mexican pesos of both nations, but as a variation rate with respect to 1993.

The evolution is regarding the hourly wage. On the left side, the evolution of the wage paid in the United States is counted, while on the right side the wage paid in Mexico. The great difference is remarkable, because in the United States in 2016, 529.31% more than in 1993 were paid, while in Mexico the increase was only 11.03%, which shows the great difference in the wage policies of both nations and an evident stagnation of the real wage in Mexico(Figure 11).

Summary

We have shown how exchange rate and wages have help to tame inflation, however this great reaching has been, at the same time, the great restriction to growth, since the inflationary containment has been given thanks to maintain a tendency of appreciation of the peso and a stagnation of the real wage.

In the appreciation case, it has caused that Mexican products lose competitiveness in international markets to be more expensive. While at the same time, imports become cheaper by encouraging their higher consumption. It has caused the export-led growth strategy yield different results than expected. At the same time, this strategy is not compatible with the inflation targeting strategy, because if it is sought to favor the competitiveness of exports, the exchange rate would have to be artificially depreciated, which would end up causing inflationary pressures to the interior, given the great dependence on imported inputs that Mexico has. In addition, our possible higher growth due to an increase in the demand of our exports would be held back by the external restriction to growth given by the income elasticity of imports (Thirlwall, 1979). Then, Mexico must prioritize between two objectives of economic policy, on the one hand greater growth with more inflation and a

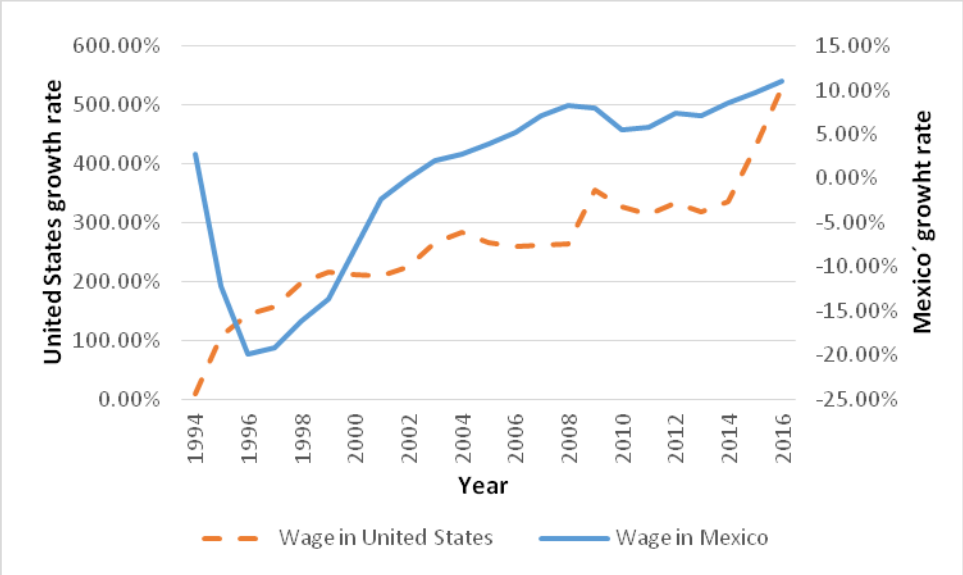

Figure 11: Variation rate of real wages in pesos, with respect to 1993.

Source Own elaboration with INEGI data

flight of resources given by an increase in imports, or a controlled inflation accompanied by lower growth.

To these scenarios we must add the performance of the real wage. Because the stagnation of this in Mexico was a weapon that helped to contain inflation, but at the same time, it was used as a competitive advantage to contend in the international market as Vázquez and Avendaño (2012) said. They also highlight the ineffectiveness of the export-led growth model, which is since the source of growth is ceded to the external market, while internal levels suffer from low internal demand. This contraction of the domestic market is represented in our equation (2), where it is pointed out that the drop in real wages will result in a fall in consumption. This notion was developed by Kalecki (1954), who asserts that being employees who have a propensity to consume high, to the extent that they practically do not save, a contraction in their share on the GDP tends to depress consumption, and this evidently slows economic growth.

The importance that Kalecki gives to consumption is not far from Keynes's conclusions, since in his General Theory it is read that the level of employment in the economy will be supported by the point where aggregate supply and demand are equalized, which would result in what Keynes called effective demand. This effective demand starts from a certain level of initial production that implies the determined use of both capital and employment resources. For this point of employment to be sustainable over time, it will be necessary for consumption to respond, since the realization of previously produced goods will determine the level of effective demand, which could be above or below the initial point (Keynes, 1936).

In short, the instruments of economic policy that Mexico has are on the one hand the exchange rate, and on the other hand, the real wage. In the first case, according to our model, a depreciation of the exchange rate would lead to an improvement in the trade balance (equation 1); in the second way, an increase in the real wage would encourage consumption (equation 2). In both cases, according to (4) the economy would improve. However, there is a strong difference between them, because the first measure in Mexico is inflationary. This conclusion is not according to the arguments of the defenders of the current monetary policy, that is, the reason for a rise in prices for this scenario is not a consequence of the observed GDP approaching or exceeding the potential GDP. Rather, it is because in Mexico there is still a high inflationary transfer, so the possible expansionist effect of an increase in the exchange rate could be contractionary in the short term as argued by Krugman (1978) and that for Mexico Caballero and López (2011) provide evidence.

The last authors have been pointing out that the depreciation of the exchange rate by one percent would lead to a contraction in investment of 1.63%, because of an increase in the cost of imported raw materials, machinery of foreign origin and affecting the balance sheet of companies that have foreign currency debt (Mantey and López, 2010). Of course, this contraction would end up slowing the economic growth. If we continue the analysis, and considering what is expressed in equation (3), a poor growth in the GDP of a previous period, would lead to a contraction in current investment spending, given the bad expectations formed by the businessmen concerned to the return of their investment (Kalecki, 1954).

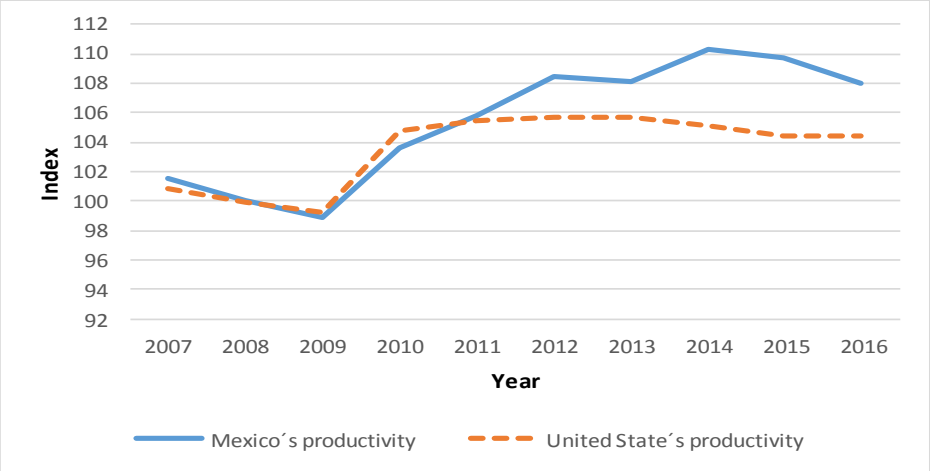

Figure 12: Productivity index for Mexico and United States. 2008=100

Source Own elaboration with INEGI data

However, this is not all. The depreciation of the exchange rate would cause employees lose share on the GDP (Kalecki, 1954), a fact that would cause a reduction in consumption. Evidence for this for Mexico show López, Sánchez and Spanos (2011).

So, looking for competitiveness through the exchange rate with the current structure of the economy does not seem to be the best option. That means that trying to grow through international trade, that is, attending to the growth model guided by exports, is not an adequate path for Mexico, which is consistent with the postulate by Blecker (2000) and Palley (2003) who point out that this type of strategy is not favorable for developing countries.

Thus, the solution is in the domestic market, which has been weakened after the adoption of the exports-led growth model and inflation targeting, since in both cases the stagnation of real wages was paramount. However, the recovery of this variable can help us to break the stalemate, since according to Caballero and López (2013), a 1% increase in real wages leads to an increase of 1.01% in the GDP. The recovery of purchasing power via an increase in wages will leave greater favorable effects than possible negative impacts for the economy. Because although this increase might cause some increase in prices, the bigger dynamic will cause the cost-benefit to be in favor of the economic growth, finally an economy with slight inflationary pressures, but with employment, is better than an economy with controlled inflation and without employment.

However, supposing that an increase in wages causes inflationary pressures, should not be entirely true, since in economies with idle resources it is always possible to increase productivity (López, 1998), which may contain the increase in the cost of labor and therefore not cause inflation. Then, as is the cost of labor which is a quotient between real wage and productivity, and no the only real wage, which is takin in account for adjust prices, we can say that if the real wage increase, but at the same time, productivity also increase, so there are not reasons for generate inflation.

Talking about the last point, in the next graph(Figure 12) it is possible to see that the productivity in Mexico has increase since 2009, even more than the productivity in the United States. So it is possible suggest that an increase in wage will not cause inflationary pressures in the current context.

If it is decided not to increase the real wage, the growth of Mexico, according to what is posed in (5), will be determined by the growth of the exterior. In fact, Caballero and López (2013) find that this is the main variable that determines the growth in Mexico now in such a way that, if the GDP of the United States has an increase in one percent, our economy grows 1.09%; of course, a contraction of them will also have strong repercussions on our economy.

Conclusions

The exports-led growth strategy became for Mexico its own external restriction to growth, because in the attempt to open the economy to international trade, the industrial policy and the domestic market were neglected, which now makes the producers of export goods, dependent on imported inputs. This situation has led to policies with tax incentives contrary to national interests, such as the IMMEX program. This has caused that the growth itself is conditioned both to the supply of imported inputs and restricted by the income elasticity of imports, so that there is a moment where growing one percentage point leads us to spill wealth abroad. In this order, it is not possible to use the exchange rate as an instrument to stimulate demand,

since a depreciation of the peso brings with it inflationary pressures. This is not consistent with that is sought by the country's monetary authority, given that, since the inflation targeting mechanism was adopted, it has been done everything possible to ensure that the observed inflation converges with its 3% target, this has caused an overvalued exchange rate and the growth of the real wage has been tied. All this has resulted in a contraction of the internal market, so that the inflation targeting strategy has become the internal restriction to growth. On this way, the exports-led growth strategy and inflation targeting are not compatible in Mexico, because the first one needs for works an exchange rate competitive, while the second needs an overvalued exchange rate. For finish to anchor the economy growth, the stagnation of the wage has helped to contend inflation and for contract the internal market.

Finally, in the actual economic context it is not possible for Mexico use the exchange rate for stimulate the demand, however it is possible to increase the wages, which is the key variable for reactive the economy growth.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of the paper.

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