ABSTRACT – This article discusses the importance of market structure as a determinant of inflation. The research analyzes part of those called “necessary structural reforms” announced in recent years in Mexico. Taking into account the long tradition in openness generated in recent decades, I capture the sectoral level differences between openness and competition by considering 15 of 23 manufacturing sectors into the OECD industrial classification over the period 1990-2009. Estimations using panel data models shows that openness has a positive effect on inflation, this is, firms that import the most tend to increase the costs on their final products. However, inflation decreases when market competition increase.

KEY WORDS: inflation, market competition, trade openness, Mexico

Introduction

Researchers commonly conclude that Mexico’s slow growth, despite its reforms, is a consequence of its inefficient financial system and lack of contract enforcement. Hence, in recent years, the Mexican government has tried to implement a series of economic reforms to strengthen the country’s fundamentals and increase its ability to cope with external shocks. The return of the Institutional Revolutionary Party (Partido Revolucionario Institucional, PRI) to the presidency, after twelve years out of power, promises an agenda of free enterprise, efficiency and accountability. This new government is pushing for reforms that could bring major new private investment; re-configure the labor market; promote the educational development; break with monopolistic markets and a banking reform bill to boost growth and lending.

Because of the progress that has been made, the government is confident that Mexico will be able to leave recent crisis behind and start the new agenda with a stable and growing economy. Thus, the aim of this article is to evaluate how the market competition structure as well as the globalization (openness trade) influences the behavior of inflation dynamics. Identifying this relationship, it is possible to reason about potential reform impacts on the competitive structure may have on the price level. This paper offers the first empirical evidence for the role of market competition and openness in explaining inflation in Mexico.

Since Mexico is one of the most liberal of the medium sized economies in the world, the domestic price level cannot remain immune to external shocks. Consequently, this paper
provides an overview of key aspects in how those called necessary structural reforms impact in Mexican economy. The document, empirically explores the effect of market structure and openness on inflation using panel data for manufacturing sectors over the period 1990-2009. The study recognizes that market structure changes can take place independently of the effects of globalization, and so can productivity changes. In addition to the analysis related to trade openness, this study shows that, increased globalization is still found to increase inflation, suggesting that globalization can affect inflation through other channels beyond trade-related channels. This particular outcome is an interesting result, helpful to policy makers, in order to measure the influence of openness on the price levels.

This article is organized as follows. The first section reviews the background for this research by pointing out the methodological issues involved in measuring inflation, market competition and trade openness. Empirical model specification for analyzing this process is defined in the second section. The third section presents the results of the analysis. Final section concludes the paper.

Background

The effect of inflation on economic performance is a complex topic. It is important, because if the inflation has real effects, governments can influence economic performance through monetary policy. Thus, there is a little theoretical consensus on how inflation affects economic performance; several empirical works look for a negative influence of inflation on growth. In the aftermath of important inflationary episodes in developed countries during the late 1970s and early 1980s, the mainstream economics concluded that inflation was one of the major burdens to economic growth. Therefore, the best policies to follow were to struggle against it; consequently, the autonomy of central banks would become the key factor for economic growth in the long run. Classical dichotomy claims there are no real long run effects coming from demand shocks or expansionary demand policies. Typically, a central bank can carry out a combination of three main functions. First, it might have a macroeconomic function both through the exercise of a discretionary monetary policy which affects price levels and, in some cases, through its exchange rate policy. Second, it might have a sector-level and microeconomic function of providing support and regulatory and supervisory services oriented towards maintaining the health of the banking sector. Third, the central bank often has a special relationship with the State and can carry out several secondary functions, among which acting as its banker and fiscal agent, or its economic consultant.

Three conditions have been identified by the economic literature that requires governmental intervention through some form of regulation. The first condition is related to the possible existence of natural monopolies and is generally considered to bear scarce relevance for the case of financial service regulation. The second condition relates to the possible existence of externalities due to financial and banking crisis; the potential negative consequences for the whole sector have been advocated to justify regulations in support of the system. Finally, the last condition involves information asymmetries between the seller (who has more information) and the investor (Papi, 2005).
However, the inflation concept has been an interesting topic for both, economic theory and public policy. According to the standard time-inconsistency theory (Kydland and Prescott, 1977; Barro and Gordon, 1983), discretionary policymaking has an inflationary bias. This leads to the proposition that greater central bank independence reduces inflation (Rogoff, 1985), and its empirical relevance is a subject of much research: Cukierman (1992) provides a valuable comprehensive analysis of central bank decisions, of the various effects of policy on inflation, and of the feedback from inflationary expectations to policy choices; Alesina and Summers (1993) investigates whether one can find a correlation between central bank independence and the level and variability of real economic variables such as growth, unemployment, and real interest rates concluding that central bank independence promotes price stability; Campillo and Miron (1997) explain the differences in inflation performance across countries finding that institutional arrangements play almost no role in determining inflation outcomes. Thus, central bank independence and the nature of exchange rate arrangements are not empirically important determinants of inflation rates; Fuhrer (1997) takes a critical look at the theory of inherent inflationary bias and the proposed solutions to the bias, focusing particularly on mechanisms for ensuring central bank independence and on inflation targeting. It then examines the robustness of the empirical results that are often used to support the validity of the solutions. Finally Brumm (2000) presents evidence purporting to show that if an inflation regression equation is expanded to include not only their proxy for central bank independence but other regressors as well, then the negative correlation between inflation and central bank independence vanishes.

The empirical evidence from 1990s based on theoretical precepts from 1980s, proved to be an important reference in order to re-configure the measures of monetary policy, especially in developing countries such as Mexico\(^2\). Therefore, central bank’s strategy (\(^3\)) was limited inflation targeting (Mexico’s case in particular). As a nominal anchor for monetary policy with a public and explicit commitment to maintain economic discipline, inflation targeting is being promoted as a general framework in order to reduce and control the inflation rate, improve predictability, accountability and transparency (Sheridan, 2001). It is also argued to improve the output-inflation trade off (Clifton, Leon and Wong, 2001), as well as to reduce output variability (Svensson, 1997).

On the other hand, with the global economy being increasingly integrated and having soaring cross-border trade and capital flows, much attention has been directed in recent studies to examining the effects of trade openness on inflation. It is possible to identify two main approaches. Borio and Filardo (2007) and Ball (2006) argue that the inflation rate that the monetary authorities consciously aim at may not be independent of the real structure of the economy. For example, more flexible labor markets and nominal wages may lower the

\(^2\) From 1970s through the mid-1990s the economy lurched from one crisis to another, its monetary and fiscal framework a source of instability that impeded long-term growth. By adopting best practices in central banking later 1990s, Mexico began installing a framework that has proven remarkably successful.

\(^3\) Although an historical outline of the Bank of Mexico shows different modalities, or levels, of autonomy. The current one is called “Institutional Autonomy”, based on a constitutional mandate that determines the central bank’s functions, a self-governing directive body, and administrative and budget independence (Turrent y Díaz (2007)).
costs of bouts of deflation, and hence allow the authorities to aim for more conservative inflation rates. Likewise, more competitive goods and services markets may reduce the incentive for monetary authorities to resort to „surprise inflation” as a means of keeping output or employment above its „equilibrium” level. Also, the authorities may have less than full control over the inflation dynamics over short term horizons. Central banks may not have the appropriate „model” of the economy, may be unable to identify accurately the sources of the forces affecting it and/or may be unable to offset them completely. Finally, across currency areas, exchange rates may fail to fully reflect inflation conditions. In steady state, as a first approximation, differences in desired inflation rates by those central banks setting policy in the various areas will translate into differences in the rates of change of exchange rates across them.

In the approach of Rogoff (2003), Sachsida, Galrão and Loureiro (2003), Loungani and Razin (2005), Helbling, Jaumotte and Sommer (2006), Pain, Koske and Sollie (2006), Cox (2007) and Sbordone (2008) it is arguable that the market structure influences the levels of inflation notoriously, hence, the market power increases the product’s value. The role of product market reforms in achieving the objective of higher and sustainable noninflationary growth has recently received a lot of attention amongst policy makers and academics. The economic literature has explored quite extensively the link between product market competition and the price level, concluding that higher competition leads to a lower price level. Hence, the basic channel emphasized both in policy debates and empirical studies as potential carrier of globalization effects on inflation dynamics is trade integration, which especially when accompanied by policy incentives, is argued to bolster competition. Increased competition, the argument goes, creates two effects: a direct effect of containment of costs, by restraining increases in workers’ compensations and reducing real import prices, and a second, indirect effect of creating pressure to innovate, which contributes to increasing productivity. Higher productivity in turn further lowers production costs: if markups are constant, lower production costs reduce the pressure on prices.

Drawing on this literature, this paper utilize the deflators of manufacturing industries as inflation rates following the works such Neiss (2001), Cavelaars (2003) and Binici, Cheung and Lai (2012). The investigation of the relationship between product market competition and inflation is however less prominent in the literature and represents the focus of this paper. Concentrating on price levels rates rather than inflation, I am interested in finding possible links between product market competition and price formation which persist for a prolonged period of time.

Estimation

For the Mexican case in the 1990s, the country experienced a variety of monetary and exchange rate regimes. Empirical and theoretical works (Esquivel and Razo, 2003 and García, 1999) postulated that monetary aggregates, the nominal wages and the exchange rate are the main factors that have the highest impact on inflation.

\[ \pi = f(p, w, a) \]
where $\pi$ are the inflation, $m$ the monetary supply, $w$ the nominal wages and $s$ the exchange rate. In all the studies, the relation between the explanatory variables and the inflation are positive. Despite the classical theoretical models, as I mentioned above, it is reasonable to assume that these factors are not the only causes which influence the dynamics on the prices. According to Binici, Cheung and Lai (2012), I consider the following function:

$$\pi = f(m, w, a, r)$$

(2)

where $\bullet$ includes factors as trade openness and market structure.

Following Sarel (1996) and a Khan y Senhadji (2001), I transform the inflation rate to logs in order to avoid that the extreme observations distort the regression results. Hence, the inflation of sector $i$ in year $t$ is given by:

$$\pi_{it} = \begin{cases} 
\pi_{it} - 1 & \text{if } \pi_{it} \leq 1 \\
\ln \pi_{it} & \text{if } \pi_{it} > 1 
\end{cases}$$

This function is linear for inflation rates less than unity, and logarithmic for rates larger than unity. This approach is focused on the nonlinearities and threshold effects of inflation on growth. Hence empirical research found a significant negative effect of inflation on economic growth and also found that there exists a nonlinear relationship, this transformation is suggested. The log transformation also helps in smoothing time trend in the dataset and provides best fit in panel data regression controlling inflationary gaps among the manufacturing sectors.

On the other hand, the price-cost margin (PCM) is used as a proxy for the intensity of market competition. This indicator is a popular measure of market competitiveness where a high PCM suggests a low level of market competition, formally the PCM for the sector $i$ in the year $t$ is given by: $\text{PCM}_{it} = (\text{VA}_{it} - \text{LC}_{it})/\text{OV}_{it}$ where VA is the value added, LC the labor compensation and OV the value of total output. This proxy for the intensity of market competition has widely been used to measure monopolistic markup (Domowitz, Hubbard and Petersen, 1986; Prince and Thurik 1992; Campa and Goldberg, 1995 or Boulhol, 2008).

The import openness (IMO) and the import penetration index (IMPI) are used in order to capture other effects of globalization not explained by market structure and productivity changes; formally the indicators for the sector $i$ in the year $t$ are given by: $\text{IMO}_{it} = \text{IM}_{it}/\text{OV}_{it}$ and $\text{IMPI}_{it} = \text{IM}_{it}/(\text{OV}_{it} + \text{IM}_{it} - \text{EX}_{it})$ where IM and EX are the value of total imports and exports respectively. These variables measures sectors’ openness or integration in the world economy. The indicators represent the combined weight of total trade in its economy, a measure of the degree of dependence of domestic producers on foreign markets and their trade orientation (for exports) and the degree of reliance of domestic demand on foreign supply of goods (for imports). A large share of imports would indicate a greater importance of foreign produces relative to domestic producers, in other words, a higher share of imports in domestic demand would indicate stronger import competition in the sector.

In addition, I consider the usual economic factors as the logarithm of GDP per capita to control for the potential impact of a country economic development on inflation; the growth
in the exchange rate; the M2 money supply growth as a proxy for stance of monetary policy; and a time dummy variable for the year 1994 which controls the structural change after the economic crisis.

Using panel data, the empirical relationship between the inflation for sector \( i \) in year \( t \) and its possible determinants are given by:

\[
\pi_{it} = \nu_i + \beta' X_{it} + \epsilon_{it}
\]

where \( \nu_i \) represents the sectoral fixed effects, \( X \) is a matrix of sector-specific explanatory variables and \( \epsilon \) the random error. The method of panel corrected standard errors is used in order to taking into account the complexity of error process and deal with contemporaneous correlation, panel heteroskedasticity and serial correlation\(^4\).

The desegregation sectoral-level is given by the OECD Structural Analysis Industry Database. This article examines annual data for 15 from 21 total manufacturing sectors over the period 1990-2009. The sectors considered are: 15 Food products and beverages; 16 Tobacco products; 19 Leather, leather products and footwear; 20 Wood and products of wood and cork; 21 Pulp, paper and paper products; 22 Printing and publishing; 23 Coke, refined petroleum products and nuclear fuel; 24 Chemicals and chemical products; 25 Rubber and plastics products; 26 Other non-metallic mineral products; 27 Basic metals; 28 Fabricated metal products, except machinery and equipment; 29 Machinery and equipment, n.e.c. (not elsewhere classified); 34 Motor vehicles, trailers and semi-trailers and 35 Other transport equipment.

Results

Figure 1 presents a mapping of the growth rate of inflation over the period 1990-2009 as well as the average of PCM, IMO and IMPI by manufacturing sector. From the figure it is seen a homogeneous process of inflation growth rate (around 0.11), but not on market competition and openness. It is interesting the dynamic of sectors 16, 20, 22 and 26 where the high market concentration is associated with a lower level of openness. On the contrary, the sectors 24, 25, 28, 29 and 35 present the opposite, less market concentration and higher levels of openness. This initial results highlights the key point; the positive relationship between market competition and trade openness.

\(^4\) The F-test of fixed effects confirms the joint significance of sectoral effects, and then results of the Hausman test favour fixed effects over random effects. Results are not included but available upon request.
Figure 1. Sectoral development in inflation, market competition and openness, 1990-2009

Source: Author’s own calculation based on data from OECD Structural Analysis Industry Database.

As a preliminary exercise Figure 2 illustrate trend over time, the value reported is the annual average for each variable. The intensity of market competition reported no significant variation; the values fluctuate around the average, 0.27. This result suggests that in general, market power has not changed significantly in the last two decades. On the other hand, the trade openness variables present an interesting behaviour; for both of them, the level has increased since the early 1990s. It is remarkable that the levels are lower than the average for the period 1990-1997, they increased markedly since 1997. This perform illustrate the effects of the trade liberalization in Mexico from mid-1990s.

Figure 2. Indicators behaviour over time period

Source: Author’s own calculation based on data from OECD Structural Analysis Industry Database.

This, of course, does not imply that in the period the market structure remained relative constant for each sector. In other words, it is possible that it has been modified within sectors.
Table 1 reports the baseline regression results for model specifications. Model 1 tries to explain the inflation via market structure, PCM are used as a proxy. Models 2 and 3 accounts for the effects of trade openness; IMO and IMPI are included separately. Models 4-5 consider market competition structure and trade openness simultaneously, IMO is included in 4 and IMPI in 5. Finally, specification 6 includes all variables.

Table 1. Market competition and trade openness; sectoral effect, 1990-2009

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCM</td>
<td>0.320*</td>
<td>0.537**</td>
<td>0.535**</td>
<td>0.540**</td>
<td></td>
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<tr>
<td></td>
<td>(0.173)</td>
<td>(0.240)</td>
<td>(0.234)</td>
<td>(0.241)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMO</td>
<td>0.069*</td>
<td>0.139**</td>
<td>0.018</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td>(0.060)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMPI</td>
<td></td>
<td>0.121**</td>
<td></td>
<td>0.185*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.058)</td>
<td></td>
<td>(0.084)</td>
<td></td>
<td></td>
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<tr>
<td>Log of real per capita GDP</td>
<td>0.957***</td>
<td>0.951***</td>
<td>0.943***</td>
<td>0.924***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.143)</td>
<td>(0.144)</td>
<td>(0.139)</td>
<td>(0.138)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Rate Growth</td>
<td>0.326***</td>
<td>0.329***</td>
<td>0.323**</td>
<td>0.303**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.114)</td>
<td>(0.114)</td>
<td>(0.111)</td>
<td>(0.110)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2 Growth</td>
<td>0.007</td>
<td>0.017</td>
<td>0.019</td>
<td>0.018</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.154)</td>
<td>(0.155)</td>
<td>(0.154)</td>
<td>(0.148)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994 Crisis</td>
<td>-0.167**</td>
<td>-0.174**</td>
<td>-0.172**</td>
<td>-0.162**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.081)</td>
<td>(0.081)</td>
<td>(0.080)</td>
<td>(0.078)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Source: Author’s own estimations.

The control variables not only help to account for spurious relationships, they measure the impact of any given variable above and beyond the effects of other variables. In all regressions, the controls have the correct sign and are significant at least at the 5 percent, except the money supply growth. For example, rising in real GDP per capita does indeed raise the prices in manufacturing products, which means that relative demands change with per capita income. In the same line, a fall in the exchange rate growth can cause cost push inflation because it leads to increase in the prices of imported products such as essential raw materials, components and finished products. The not significant coefficient for money supply growth can be explained by the fact that prices did not respond immediately to monetary shocks, suggesting that even the enterprises could anticipate an increase in the money supply; prices did not change instantly, but would take time as labor contracts are renegotiated.

Models 1 and 2-3 separately show the effect of trade sectoral competitiveness and trade openness, respectively. Over all, the results confirm the positive relationship between market structure and inflation; higher market competition tends to be associated with lower inflation (models 1, 4, 5 and 6). Note that this relationship is consistent with prominent literature, e.g.
Binici, Cheung and Lai (2012) show that inflation decreases as competitiveness, measured by markup, increase. On the other hand the results for models 2-6 overturn the conventional wisdom that there is a negative relationship between trade openness and inflation. The finding suggests that there is a statistically significant positive relationship between openness and inflation meaning that outward orientation is inflationary. The more open the economy, the stronger this effect, and the more costly it is to inflate. This positive relationship is possibly due to the importance of imports in total trade, especially since 1994 (see Figure 2). Here, however, export demand also affects the terms of trade. This implies that inflation is dependent on export demand and the impact changes in export demand have on inflation depends on the degree of openness.

Discussion

Product market reforms are likely to promote a more competitive economic environment. The results suggests that higher product market competition reduces inflation, therefore contributes to a more stable macroeconomic environment, this is likely to be beneficial for growth and would support the policy call needed structural reforms. Although on the agenda, initially being considered to spur telecommunications competition as well as provide lending incentives to local banks instead of imposing interest rate guidelines by decree. The plan would also increase the role of the development banks in fostering greater credit availability in Mexico’s economy and thus, manufacturing firms benefited from the reforms to the services sectors.

Despite the fact descriptive statistics present the positive relationship between market competition and trade openness. In other words, manufacturing sectors where the high market concentration is associated with a lower level of openness and the opposite, manufacturing sectors with less concentration and more openness trade. The estimations present statistical evidence for openness as a constraint on policymakers’ incentives to deflate. This interesting result, attached to the considerable degree of openness in Mexico to foreign trade, indicates that the traditional closed economy explanation for the inflationary process is no longer important. However, the evidence from the empirical literature on trade and inflation is mixed. Perhaps more surprisingly, theoretical predictions regarding trade and inflation are also ambiguous.

Finally, due to the given political situation in Mexico, it is essential to consider measures that denote the competitive dynamics of markets and promote productivity of the factors. Otherwise the benefits, in terms of inflation targeting, based on openness will not be exploited and used to push economic growth.

References


Inflacija, tržišna struktura i globalizacija. Sektorska studija Meksika


KLJUČNE REČI: inflacija, tržišna konkurencija, spoljna trgovina, Meksiko

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