Food price inflation and growth constraints: the Mexican experience

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Abstract

Using dynamic panel techniques this paper evaluates the extent to which Mexico's CPI will be affected by food price inflation in the long term. We argue that sharp increases in international food prices (of the type seen since 2001) are likely to persist and reinforce domestic growth constraints in Mexico. This is because that for an economy with a high dependency on imported food (like Mexico), the consumer price index is very sensitive to food price increases. The conduct of monetary policy without reference to the structural issue of food price inflation is therefore likely to be ineffective in controlling inflation and damaging in terms of its impact on demand and growth. Thus, the revitalization of the Mexican agricultural sector should be a centrepiece of future counter-inflationary policy.

Key words: Food international prices, domestic inflation, food dependency, growth constraints, Mexico.

1. Introduction

Primary international commodity real prices increased by around 131% during the 2001-7 period. Food prices, in particular, soared by 58.2% (IMF, 2008, see also CEPAL 2008), reaching unprecedented levels. Food price inflation cannot be viewed as a temporary phenomenon given the nature of the factors that are driving it. On the demand side, pressure on food prices is stemming from the sustained and rapid growth of key emerging economies (mainly China and India) as well as from the generation of new sources of energy derived from basic food grains such as corn. On the supply side, global climate

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change and lags in technological developments are adversely affecting attempts to increase production. It is expected, therefore, that in the near future the demand for food will largely overhaul its supply. This, in turn, has led to predictions of rising international food prices for at least the next ten years (OECD-FAO, 2008). The era of cheap food, in other words, has come to an end (see The Economist, 2007, 2008, 2009).

At the same time, the demand for food from net importers of food, according to Bruinsma (2003, p. 235), will continue growing: "The outlook for 2030 suggests that the agricultural trade deficit of developing countries will widen markedly, reaching an overall net import level of US$31 billion. Net imports of food will increase to about US$50 billion". These two prospects represent bad news for developing economies that are net importers of food. On the one hand, food price inflation will increase poverty. According to the Inter-American Development Bank (2008), for example, in Latin America there is the risk that more than 26 million people will be pushed into extreme poverty due to food price inflation (see also FAO, 2008, for a broader international view along the same lines).

On the other hand, an important, although hardly discussed and analysed, negative effect of food price inflation and food dependency is its impact on the demand growth constraints. Unlike rich countries, food has a heavy weight in developing countries' consumer price indices (CPI) and in aggregate private consumption.[1] Thus, food price inflation is very likely to pass-through to the CPI of developing economies that are net importers of food. Faced with rising domestic inflation, the authorities are likely to respond through conventional monetary and fiscal means to tame inflation pressures. If, however, the source of inflationary pressure is structural, such efforts might well prove ineffective. The direct consequence of fighting inflation by conventional means will be to constrain

growth through lower levels of investment. In other words, food price inflation might materialize (or at least reinforce) the so-called domestic demand growth constraint (see Kalecki, 1954).

In the same vein, food price inflation and food dependency, might also exercise indirect upward pressure on inflation through the external accounts. This might occur in two different ways. First, when international prices of food are soaring, more foreign exchange is needed to satisfy the demand for imports of food. A shortage of foreign exchange coupled with a (large and chronic) current account deficit might generate expectations regarding the government´s intentions to devalue the currency in the near future in order to correct the external deficit. Expectations of a future devaluation will feed inflation expectations. This, in turn, will make authorities tighten monetary and fiscal policy, restricting growth as a result. Second, if domestic inflation increases as a result of food price inflation, the real exchange rate will appreciate causing the economy to lose international competitiveness. Exports would fall and imports, most likely, would increase. This would lead to a deterioration of the external accounts. To rectify this disequilibrium the authorities might decide to reduce aggregate demand, a decision likely to further constrain growth.

Against this background the objective of this paper is to explore the growth constraining effects of food price inflation. In particular, this paper seeks to illustrate the extent to which food price inflation might impact domestic inflation and thus result in - or reinforce - domestic growth constraints. The Mexican economy is used as a case study in this paper since its food dependency (particularly for imports of basic food grains) has been steadily growing since the mid 1990s, following the launch of the North American Free

Trade Agreement (NAFTA). As a result, Mexico runs the risk of being caught in a dilemma, with international food price inflation causing domestic inflation to rise and the authorities finding it continually harder to keep inflation within its target range; their response here being growth constraining macroeconomic policies. To measure the extent to which food price inflation will affect Mexico´s CPI in the long term, we apply dynamic panel techniques.

The paper is set out as follows. Section 2 describes how food price inflation and food dependency can give rise to and/or reinforce the demand growth constraints. Section 3 presents evidence regarding Mexico's high dependency on imported food and its influence on its CPI. Section 4 then presents the dynamic panel estimates. The final section sets out our concluding remarks.

2. The macro effects of food price inflation and food dependency: materializing the demand growth constraints

A primary objective among developing economies is to expand output (and employment) rapid and sustainably.[2] A *sine qua non* condition to achieve this goal, generally ignored by the literature, consists in reducing (or if possible eliminating) the demand growth constraints because generally "they tend to bite long before supply constraints are ever reached" (León-Ledesma and Thirlwall, 2002, p. 242).[3]

These constraints are related to excessive inflation and balance-of-payments disequilibria, both the consequence of aggregate demand expansionary policies. The former is generally identified, for obvious reasons, as the domestic demand growth constraint whereas the latter is recognised as the external one. Much of the seminal theoretical

literature concerning both growth constraints does not mention food price inflation and/or food dependency. However, the growing influence and importance of these phenomena in developing economies' growth processes makes it clear that they should be considered as key sources of potential demand constraints.

One of the pioneers in drawing attention to the domestic growth constraint was the Polish economist, Michał Kalecki. Kalecki put forward the idea that an economy that is expanding might face excessive inflationary pressures if the supply of the primary sector, particularly foodstuffs, is limited. More specifically, he argued that one important obstacle that a developing economy might face when investment is increasing considerably is to have an "… adequate supply of necessities to cover the demand resulting from the increase in employment" (Kalecki, 1966, p. 16), which, in case of not being adequate, might generate inflationary pressures. In this sense, inflation, as Noyola (1956, p. 604) remarked, is chiefly "… the result of real imbalances". In other words, "… the crucial point of whether a certain level of investment creates or does not create inflationary pressures is the possibility of expansion of supply of consumer goods in response to demand" (Kalecki, 1954, pp. 25-26). If the supply of the primary sector is indeed rigid, prices will increase making real wages to fall. As a result, "The reaction of workers to the reduction of real wages will be a demand for higher money wages, and thus a price-wage spiral will be initiated" (Kalecki, 1954, p. 26). As can be seen, for Kalecki, inflation is in fact the result of a structural problem (a real imbalance), one being the limited productive capacity of the primary sector to satisfy a growing demand for food. In particular, institutional and structural rigidities in the agricultural sector mean that relative and absolute rises in agricultural prices do not stimulate an adequate supply response.

The inflationary pressure that results from having a rigid supply of food leads to constraints on growth via investment. However, the mechanism through which investment is negatively affected differs in each case. On the one hand, in order to reduce the demand for food, policymakers might decide to reduce aggregate demand so that investment would shrink as a result (i.e. consequence of reducing public investment, but also as a result of shrinking public expenditure, which in turn reduces firms' sales). On the other hand, generally, monetary authorities alike in both developed and developing economies, strongly believe that inflation is exclusively a monetary problem. To fight inflation pressures, therefore, they apply conventional policies that consist of fiscal and monetary tightening. Both policies, in the long term, act to rein in private investment thus reducing actual and potential growth.

In the context where inflation arises from a real imbalance, the cost of taming it by shrinking demand (merely in order to reduce the quantity of money) will be very high since this implies output (and thus employment) reductions. At the same time, it is important to note that there is no guarantee that inflation will cease through the use of the policy measures described.

In sum, under conditions where an economy expands and faces domestic supply shortages of edible commodities, it is likely that growth will be constrained at some point. This result, it is important to stress, will be unavoidable when an economy is a net importer of food and international food prices are rising (a scenario that, as we have stressed, has been forecasted to predominate over the next few years for many developing economies). Under these conditions, any output expansion (via higher employment) will necessarily

generate inflationary pressures thus giving rise to a domestic growth constraint.[4] The economy, as a consequence, will not be able to grow sustainably.

We have assumed so far, in line with Kalecki´s arguments, that in order for the domestic growth constraint to bite, the economy must be expanding while facing a rigid supply of edible commodities. However, food price inflation might reinforce or give rise to a constraint in economies that are net importers of food (that is, have a rigid supply of food), but that are, paradoxically, not growing. This occurs because food in these economies weighs heavily on the CPI, making it very sensitive to international food price movements. Even under conditions of weak growth or economic stagnation, the demand for food tends to be very stable (rising only as a result of population growth), so any increase in international food prices will generate inflationary pressures (countries will be in fact in this sense "importing" inflation) inducing the authorities tighten macroeconomic policy. If growth is stagnating (or, even worse, negative) these sorts of macroeconomic policies will aggravate the deterioration of the real economy. Additionally, as mentioned, since the source of inflation is the result of a real imbalance (which in this case reflects in "imported" inflation), inflation is unlikely to be controlled.

It is important to stress that food price inflation cannot just give rise to or reinforce the domestic growth constraint directly; it can also do so indirectly in two related ways. On the one hand, food price inflation implies a larger foreign exchange requirement to cover a given amount of food imports. If the economy in question maintains a large and chronic current account deficit[5] and there is a shortage of foreign exchange, expectations of a future devaluation to correct the external imbalance will start growing. As is well-known, expectations of currency depreciation feed inflation due to the expected associated increase

in the costs of imported capital goods and of other inputs into production. Given this scenario, workers will demand a monetary wage that takes into account not only the increase in food prices, but also other prices increments. The resulting wage-price spiral could, as a consequence, feed itself this time faster producing much higher inflation and, as a result, the authorities might respond by applying tighter demand constraint measures, affecting output and growth accordingly.

On the other hand, the increase in domestic inflation as a result of food price inflation will impact negatively on the economy's international competitiveness. In other words, growing domestic inflation, *ceteris paribus*, will revalue the real exchange rate. An appreciated domestic currency will worsen the current account, because exports will decrease while imports will increase. If the resulting external deficit is sufficiently large, agents will expect the government to devalue in order to correct the deficit.[6] As could be easily deduced, a similar process as the one just described above will start, with severely restricted economic growth as the final result.

It is important to stress that food dependency is able to reinforce the external or balance-of-payments demand growth constraint, initially proposed by Harrod (1933) and Prebisch (1951), but refined by Thirlwall (1979). This constraint states that an economy will be compelled to correct a (relatively large and chronic) current account deficit by shrinking the domestic demand when such a deficit cannot be externally financed any longer and/or when exchange rate adjustments are not able to rectify the external disequilibrium. As is well-known (see Keynes, 1936), and as we have previously stressed, changes in output (and employment) follow effective demand adjustments. An induced reduction in effective demand in order to correct the trade balance will therefore affect

negatively growth. In this sense, an economy that is expanding faces a potential balance-of-payments growth constraint.

Similar to the seminal domestic growth constraint theory, a pillar of the external demand growth constraint approach is the fact that the current account deficit deteriorates as a consequence of economic expansion (provided imports grow faster than exports).[7] For an economy that is food dependant, therefore, any output expansion will lead to a deterioration of the agricultural trade balance which will potentially worsen the current account. At any point, with the current account deteriorating, growth will be constrained when policies to reduce the aggregate demand are applied. It is clear in this sense that food dependency contributes directly to the appearance of the balance-of-payments growth constraint.

To sum up, food price inflation and food dependency represent a negative combination for growth since they are a potent source of domestic demand and external growth constraints. If any of these constraints materialise, economic growth cannot be long sustained. It is important to note, however, that in practice policymakers frequently respond quicker to inflationary pressures than to current account deficits. This is often because policymakers are bound by inflation targeting frameworks and tend not to be preoccupied about external deficits so long as they are relatively small and can be financed. Furthermore, they expect (often wrongly) that exchange rate adjustments will rectify the external deficit.[8] Given the predicted evolution of food price inflation over the coming decades, the question that naturally arises is to what extent this phenomenon will impact domestic inflation and thus give rise to the domestic growth constraint.

To shed light on this question we use as our case study the Mexican economy. There are two reasons for this. First, Mexico is an economy that has steadily increased its food dependency since the mid 1980s; that is since the adoption of trade liberalisation policies. Second, its domestic inflation has been under pressure since international food prices started to soar, as has been recognised by Mexico´s Central Bank. This is despite the fact that economic growth in Mexico since the early 1980s has been, on average, low and unstable. In this sense, in line with our argument above, the decision of the authorities to fight inflation has, and will continue to, constrain the expansion of output during the recent past, without succeeding in taming inflation. We argue that the Mexican experience could illustrate that when the source of inflation is a real imbalance, fighting inflation by conventional means implies both ineffective results and/or severe real costs in terms of output and employment.

We now turn to estimating the expected long term effects of food price inflation on Mexican inflation. However, just before we do this, we present a brief overview of Mexico´s food dependency and its role in the evolution of the CPI.

3. Mexico's dependency on imported food and its relationship Consumer Price Index (CPI).

Nothing in the growth literature suggests that the primary sector should be neglected by the government as economies climb up the ladder of development, (meaning removing trade protection and reducing technological and financial support). Nor should increasing development suggest a shift from growing food self sufficiency to food dependency.[9] It is therefore surprising that Mexico's dependency on imported food started to increase steadily

around the time its income per capita was precisely at its highest ever at the time: around US$7,400 in real terms in the early 1980s. Furthermore and equally surprising, despite income per capita remaining stagnant throughout the following decade, Mexico´s food dependency started to intensify.

Mexico's growing food dependency can be traced to both declining state support and the launch of the North American Free Trade Agreement (NAFTA) with the USA and Canada. The combined result of the decreasing support of the government and the NAFTA-driven trade liberalisation strategy has been an ever growing gap between the domestic production of food and its demand (a demand that has grown essentially because of population growth[10]). This gap has been filled with increasing amounts of imports of food, which have increased steadily food dependency.

Part of the reason for the stagnation of domestic food production under trade openness stems from the inability of domestic producers to compete with imports. Another reason, however relates to the fact that many farmers shifted production towards more profitable products (see Calva, 2007). Additionally, trade liberalisation further deepened the abandonment of the government support for the primary sector, a process had started during the early 1980s with the debt crisis and the adoption of IMF and World Bank stabilisation and adjustment programmes. In effect, both public expenditure and investment to support the primary sector sharply declined: as a portion of GDP, public expenditure to support the primary sector fell from 0.89% in 1990 to 0.57% in 1999, whereas public investment fell from 0.31% to 0.09% in the same period (Calva, 2001). Moreover, even in nominal terms, credit to the agricultural sector has been increased poorly since 1990, and decreasing since 1998.

The fact that the domestic production of five basic grains (beans, corn, wheat, sorghum and rice) increased by a negligible 4% from 1994 to 2005, imports of these foodstuffs have kept significantly growing (imports of food increased by 66% from 1994 to 2005) and that, since 1999, Mexico has imported practically half its food (see Table 1) underscores our argument.

<<Table 1 here>>

Since the domestic production of food has remained stagnant, little is produced for the external markets whereas the demand for food imports has kept increasing. It is not therefore surprising that Mexico has been facing a chronic and ever-growing agriculture trade deficit (see figure 1). This has contributed to the overall current account deficit, which has, in turn, put pressure on the domestic currency. This has fed inflationary expectations, giving rise to the possibility that the government, sooner rather than later would apply measures to reduce aggregate demand and thus rein in demand for imports in general, (as occurred during 1995 crisis) and for imports of food in particular.

<<Figure 1 here>>

With the above in mind it is important to stress that food is still extremely important in Mexico's CPI, accounting for almost 25% of the index. Given Mexico's food dependency, variations in international food prices can clearly exercise a direct effect on its CPI. Furthermore, it is also important to note an indirect effect on inflation might exist through the implied higher costs of production for commodities which use food as an input.

Thus the influence of food on the CPI could be indeed larger than is suggested by its 25% weight in the index.

Figures 2 and 3 indicate that there is a strong positive link between food prices and the CPI, both in the short and in the long term. This, coupled with food dependency, suggests that in effect food price inflation might have a significant impact on overall domestic inflation. In fact, Mexico's Central Bank has been arguing that since 2001 international factors, in particular growing international food prices, are the main cause of domestic inflation (see Informe Anual del Banco de México, several issues). Seen from this perspective, inflation and its control, independently of its monetary nature, is becoming a structural problem. In this context, it is very likely that efforts to tame inflation by conventional means (i.e. tightening the money supply by contracting public expenditure and increase the interest rate) will have little or no effect and would instead reduce economic growth, output and employment.

<<Figure 2 here>>

<<Figure 3 here>>

Given Mexico's increasing dependence on imported food and the expected continuation of food price inflation over the near term, it is important to ascertain quantitatively the degree to which food price inflation affects Mexico's CPI, this giving rise to a domestic growth constraint. The next section sheds light on these issues by applying dynamic panel techniques.

3. Estimating the long term elasticity of food prices on Mexico´s CPI using dynamic models with panel data

To determine the size of the impact that the increase on food prices might have on Mexico's CPI, we estimate a price equation using panel data for 1997-2004 on 32 Mexican provinces and a set of different types of dynamic panel estimators. The estimators employed include the Anderson-Hsiao estimator (1981, 1982), the Arellano–Bond (1991) difference GMM estimator and, its augmented version, the Arellano-Bover (1995) and Blunder-Bond (1998) System GMM estimators. The use of such estimators is appropriate, in this context, because prices are often modelled as dynamic processes and the OLS and the within-group estimators are both biased and inconsistent when used to estimate highly persistent data.

More specifically, to determine whether international shocks to local commodity prices have a lasting impact on Mexico´s CPI would imply estimating price equations that combine individual specific effects with dynamics. We estimate the following equation:

$$(1)\quad p_{i,t} = \delta p_{i,t-1} + x_{i,t}\beta + \alpha_i + u_{i,t}$$

where $p_{i,t}$ stands for Mexico's CPI, α_i is an unobservable province-specific effect which is constant across time, $x_{i,t}$ is a vector of explanatory variables and $u_{i,t}$ is a random disturbance term. In other words, we estimate an equation in which the CPI is the response variable, whereas lagged CPI, money supply, GDP, the nominal exchange rate and the prices of four basic grains (corn, wheat, sorghum and rice), meat (red and poultry) and milk are the regressors.

Our model includes lagged CPI reflecting that prices are often considered persistent phenomena. Money supply is a variable typically used in the price modelling literature, (see Welsh, 2003, and IMF, 1996), as it measures the extent to which inflation is a monetary phenomenon, particularly in the long term. We include GDP in our equation in order to measure the impact of demand on prices and the nominal exchange rate and to capture how inflation is affected by the exchange rate (depreciations). (Recall that in our theoretical framework we mentioned that inflation feeds the exchange rate which, if depreciated, feeds in turn back inflation). The remainder of the variables are introduced to measure the effect of domestic food prices on the CPI and thus to identify the extent to which the evolution of prices might give rise to the domestic growth constraint. We assume that domestic food prices fully reflect the movements of food prices on international markets.

It is important to note that from an econometric point of view, equation 1 faces two problems: 1) food prices, GDP and the nominal exchange rate are likely to be endogenous given that they might be jointly determined with CPI (simultaneity), which implies that such regressors may be correlated with the error term. 2) There is the possibility of unobserved province-specific effects correlated with the explanatory variables, including lagged CPI. Thus it seems desirable to control for such individual effects to obtain unbiased and consistent parameter estimates.

To obtain consistent estimates of the parameters of interest a better approach would be to transform equation (1), by taking first differences of the data, to eliminate the problem of correlation between lagged CPI and province specific effects. Thus, the alternative specification to equation (1) would be:

(2) $\Delta p_{i,t} = \delta \Delta p_{i,t-1} + \Delta x_{i,t}\beta + \Delta u_{i,t}$

where the province-specific effects (α_i) have been eliminated but, by construction, there is still correlation between the lagged first difference of CPI and the error term. To purge this correlation we can use the Anderson and Hsiao estimator (1981, 1982) which suggests we use either lags of the level of CPI or lags of the first differenced CPI ($p_{i,t-2}$ or $\Delta p_{i,t-2}$) as valid instruments. However, the Anderson and Hsiao estimator is inefficient because it does not use all the existing instruments. It can be improved by using the Arellano and Bond first differenced GMM estimator, which uses the price equation (2) and all the orthogonality conditions that exist between lagged values of CPI and the disturbances.

Nevertheless, the Arellano and Bond first differenced GMM estimator is less efficient than the Arellano and Bover system-GMM estimator provided that the latter exploits additional moment conditions by combining, in a single system, the price equation in differences and levels. Each is provided with a specific set of instrumental variables as follows:

(3) $\Delta p_{i,t} = \delta \Delta p_{i,t-1} + \Delta x_{i,t}\beta + \Delta u_{i,t}$

(4) $p_{i,t} = \delta p_{i,t-1} + x_{i,t}\beta + \alpha_i + u_{i,t}$

Equation (4) denotes the price data generating process in levels in which the province-specific effect is not eliminated but must be controlled for by the use of instrumental variables. Therefore, this setup is superior since it exploits additional moment conditions

and gives us substantial efficiency gains over the first difference estimator. Although the dynamic panel estimators are an improvement over cross sectional estimators, not all of them will perform equally well. To judge the reliability of our price equation estimations it is advisable to carry out specification tests.

Among such tests is the so-called Sargan test of overidentifying restrictions, which allows us to ensure the validity of the instruments by analyzing the sample counterparts of the moment conditions used in the estimation process. Another important specification test is a non-serial correlation test. This test verifies whether the residual of the regression in differences is first or second order serially correlated. We expect that the differenced residuals are first order serially correlated, unless they follow a random walk. However, we also expect to find that such residuals are not second-order serially correlated so as to ensure the validity of the postulated instruments.

We now consider the estimation of equation (2) by using the three aforementioned dynamic panel estimators to ensure the robustness of our results. In Table 2 we report dynamic panel estimates of the long term elasticities resulting from the static long term solution of our price equation.[11] It is worth mentioning that the lagged dependent variable in levels and first differences are used as instruments in the Anderson-Hsiao estimates in the first two columns. Column 3 shows the Arellano and Bond GMM estimates where money supply is treated as being strictly exogenous and all the other explanatory variables and their lags are used as instruments. Column 4 shows the System GMM estimates where money supply is treated as exogenous and the rest of the explanatory variables and their lags (predetermined variables) are included as instruments. The instruments we use passed the Sargan tests and the AR(1) and AR(2) tests.

As can be seen in Table 2, all variables are statistically significant and the estimated results from the different panel data techniques are similar. They all confirm that, as expected, in the long term, prices of food will have an important influence on the CPI. Due to the fact that the System GMM estimates are more efficient than the Anderson-Hsiao estimates, we use the latter estimated parameters to draw inferences.

The first point worth noticing is that, at the first sight, one could argue that the CPI will not be significantly affected by international price movements of food because the elasticities associated with each food item are relatively low. However, this conclusion might be misleading. If, for example, we sum up the elasticities of three basic grains like wheat, corn and sorghum (0.0573, 0.0548 and 0.0537 respectively), the resulting figure (0.1658) easily overwhelms the elasticity of the CPI with respect to changes in money supply. This implies that an increase of 10% of these food grains will push inflation up 1.7%. This is not, by any means, a negligible impact and shows that much of the inflation pressures that Mexico will face in the future will be of structural character. This means that inflation in Mexico is indeed quite sensitive to the prices of basic grains. In fact, if we aggregate the elasticities of each foodstuff, the resulting figure more than doubles the response of the CPI to changes in money supply. In this sense, food prices will put considerable pressure on domestic inflation and, as a consequence, the domestic growth constraint is likely to materialise. At the same time, *ceteris paribus*, the international competitiveness of exports is likely to be negatively affected by the rise in prices. This would lead to a deterioration in the current account and feed back of inflationary pressures. If this occurs, policymakers are likely to fight inflation through conventional means, affecting growth negatively.

Our findings suggest then that, given the dependency on imported food, Mexican inflation will largely transform itself into a structural problem (a real imbalance). Under these circumstances, it is very likely that the authorities will find it difficult to tame inflation through their conventional tools, instead negatively affecting output and economic growth.

Another point worth noting is that the estimated long term elasticity of the CPI to GDP is very low (0.0306), suggesting that expansionary policies can be applied without much risk of generating inflation. In particular, expansionary policies to support the primary sector and expand its production could be implemented without the risk of generating inflation.

<<Table 2 here>>

The policy recommendation that derives from our estimates indicates that the best way to control inflation in the long term is to eliminate its structural component. Evidently this cannot be done by imposing price controls or restrictions on exports or by augmenting further food imports. Neither can it be done by tightening the money supply or maintaining an appreciated exchange rate. These policy options, though real and feasible alternatives, will only solve the problem of food dependency and imported inflation on a short term basis. The long term policy solution to this problem consists, as developed nations have shown (see Chang, 2009), in putting the primary sector on the agenda of national priorities, providing support until a greater degree of self-sufficiency in food is achieved. This can be realised through several mechanisms which include land (reform) policy, research, education and information policy, credit policy, inputs policy, such as canal irrigation, infrastructure transport, marketing and processing and the maintenance of producers'

income stability through price guarantees, warehousing, trade protection, insurances (see Calva, 2002, and Chang, 2009). Kalecki (1954, p. 30) advocates the adoption of the policies suggested, stating that "the expansion of food production… is of paramount importance in avoiding inflationary pressures", particularly when economic expansion and industrial development is in motion.

4. Conclusions

International food prices have soared since 2001, reaching unprecedented levels. Food price inflation is expected to persist over the near future as demand for food continues to overwhelm its supply. Countries with a high dependency on imported edible commodities and for which foods weigh heavily on the CPI are (and will be) adversely affected in terms of their domestic inflation. This in turn will give rise to a binding domestic growth constraint. Mexico is an economy that lacks food self-sufficiency. It is also one in which food accounts for a large weight in its CPI (around 25%). Since the mid 1990s, food dependency has intensified and domestic food production has stagnated. In this paper, using dynamic panel techniques, we investigated the extent to which rising food prices affect Mexico's CPI, and thus affect the point at which the domestic growth constraint is likely to bite.

Our estimated long term elasticities indicate that domestic prices will be severely affected by food price inflation. In the long term we established that the responsiveness of the CPI to changes in food prices will be more than double its reaction to changes in the money supply. This indicates that the root of domestic inflation will be structural rather than monetary. In this context, without reference to the agricultural price issue, monetary policy is likely to fail to control inflation and would instead place further constraints on

economic growth. Effective control of inflation should therefore prioritize the primary sector with the aim of restoring its supply capacity and enhancing self-sufficiency.

Notes

[1] In developed countries food generally accounts for about 10% of the CPI. In developing economies food can account for 50-60% of the CPI (The Economist, 2007).

[2] As Wolf (2008) clearly puts it: "Growth is not everything. But it is the foundation for everything. The poorer the country the more important growth becomes, partly because it is impossible to redistribute nothing and partly because higher incomes make a huge difference to the welfare of the poorest". Moreover, rapid and sustained growth implies increasing aggregate demand, which is the primary source of firms' sales and profits.

[3] Capital accumulation, productivity and the labour force are elastic to the evolution of effective demand. That is, when the aggregate demand is expanding, these three variables, which determine the productive capacity or the supply side of an economy, also expand. This is the reason why supply constraints are hardly ever reached (see Setterfield, 2002).

[4] Evidently, it could occur that at the same time the economy is expanding, international food prices are declining. In this case, the domestic growth constraint will not bite. However, even if food prices are declining, the current account could deteriorate as a result of the agricultural trade deficit. This fact, as we will see, contributes to materialize the external demand growth constraint.

[5] The agriculture trade deficit that certainly net importers of food register contributes to deteriorate the current account.

[6] Evidently, if the currency depreciates, domestic inflation will increase putting pressure on the domestic growth constraint.

[7] It is worthy mention that not all economies that expand shall undergo a current account deficit (a remarkable recent lead in this respect being the Chinese economy, however developed economies in general tend to keep healthy external accounts). The net trade balance depends ultimately on the income elasticities of imports and exports.

[8] Nothing guarantees that currency depreciation, even if the Marshall-Lerner condition holds, will improve the trade balance (see for example Thirlwall, 2003), at least in the short term (see Harberger, 1950, and Laursen and Metzler, 1950), and even if it does, it might produce severe real output looses (see Krugman and Taylor, 1978).

[9] In fact, empirical evidence shows (and this what the theory implicitly supports through the idea that exports of the primary sector should finance imports of the industrial sector during the early stages of development) that during its process of industrialisation, an economy should deploy the necessary measures to guarantee food self-sufficiency, and once industrialised, be able to leadership exports of edible commodities.

[10] Unlike other developing economies such as China and India, economic performance cannot explain Mexico's rising demand for imported food. During the period 1990-2005, for example, Mexico's average rates of growth of output and per capita income were just 3% and 1.6%, respectively.The main explanation, therefore for Mexico's growing imports of edible commodities has been population growth coupled with the stagnation of domestic production, particularly since the beginning of the 1990s.

[11] For comparative purposes, in table A1 in the appendix we also report OLS and Within estimates of the parameters, which are biased and inconsistent. It is worth mentioning that the OLS estimates are not very far from our dynamic panel estimates.

References

Anderson, T. W. and Hsiao, C. (1981). Estimation of dynamic models with error components. *Journal of the American Statistical Association*, 76, 598-606.

Anderson, T. W. and Hsiao, C. (1982). Formulation and estimation of dynamic models using panel data. *Journal of Econometrics*, 18, 47-82.

Arellano, M. and Olympia, B. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29-51.

Arellano, M. and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and application to employment equations. *Review of Economics Studies*, 58, 277-297.

Banco de México. (Several issues). *Informe Anual del Banco de México* [available at: http://www.banxico.org.mx/publicaciones/JSP/informeAnual.jsp].

Blundell, R. and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115-143.

Bruinsma, J. (2003). *World agriculture: towards 2015/2030, an FAO study*, Earthscan/James & James.

Calva, J. (2007). Políticas de desarrollo agropecuario. In J. Calva, ed., *Desarrollo agropecuario, forestal y pesquero*. *Agenda para el desarrollo*, vol. 9, Miguel Ángel Porrúa-UNAM, México, 17-33.

Calva, J. (2002). Políticas de desarrollo agropecuario. In J. Calva, ed., *Agenda para el desarrollo. Desarrollo agropecuario, forestal y pesquero*, vol. 9, Miguel-Ángel Porrúa-UNAM, México, 17-33.

Calva, J. (2001). *México más allá del neoliberalismo. Opciones dentro del cambio global*. Plaza & Janes, México.

CEPAL. (2008). *La volatilidad de los precios internacionales y los retos de política económica en América Latina y el Caribe*, Naciones Unidas, Chile.

Chang, H-J. (2009). Rethinking public policy in agriculture: lessons from history, distant and recent. *Journal of Peasant Studies*, 36(3), 477-515.

FAO. (2008). *The state of food security in the world 2008. High food prices and food security: Threats and opportunities*. FAO, Rome

Harberger, A. (1950). Currency depreciation, income and the balance of trade. *Journal of Political Economy,* 58, 47-60.

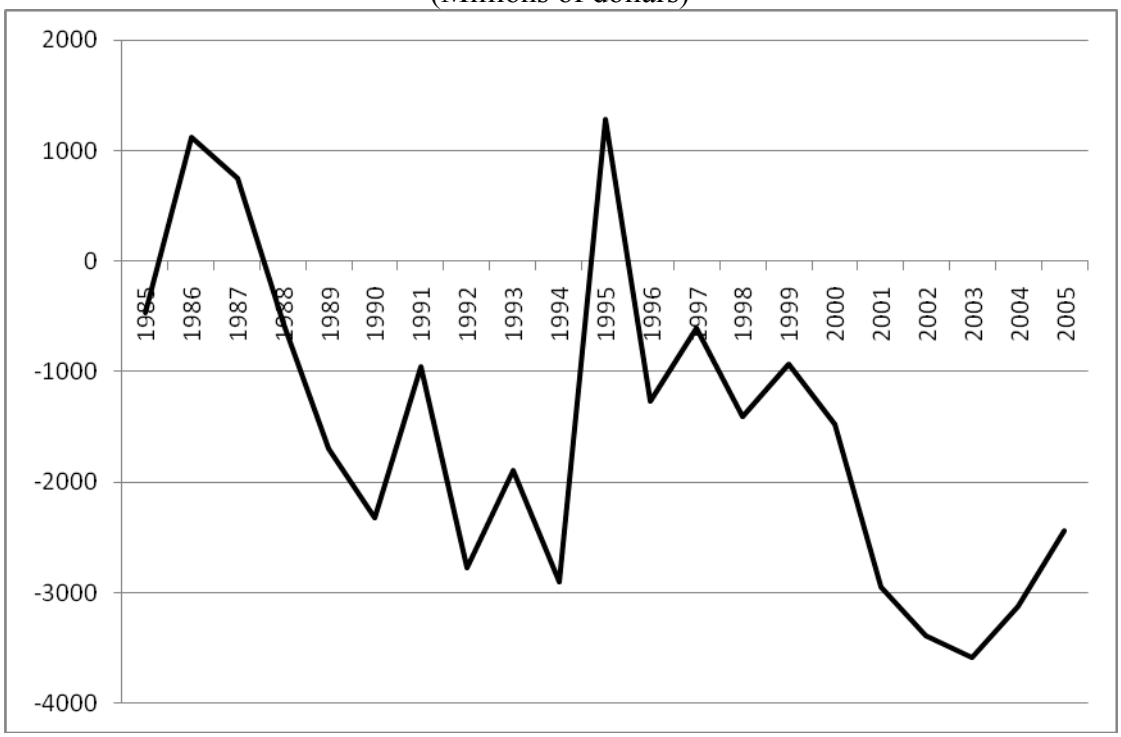
Harrod, R. (1933). *International Economics*, Cambridge University Press, Cambridge.

Inter American Development Bank. (2008). *Países necesitan invertir más para prevenir que la crisis alimentaria profundice la pobreza* [Available at: http://www.iadb.org/NEWS/detail.cfm?artid=4718&language=Sp&id=4718&CFID=4924426&CFTOKEN=96418290]

IMF. (2008). *International Financial Statistics*, online.
IMF. (1996). *Annual Report 1995,* Washington.
Kalecki, M. (1954). The problem of financing economic development. In J. Osiatynsky, ed., *Collected works of Michal Kalecki*, Vol. V, Oxford University Press, 1993, 23-44.
Kalecki, M. (1966). The difference between crucial economic problems of developed and underdeveloped non-socialist economies. In J. Osiatynsky, ed., *Op. cit.*, 13-19.
Keynes, J. (1936). *The general theory of employment, interest and money*, Harcourt Brace and Company, New York.
Krugman, P. and Taylor, L. (1978). Contractionary effects of devaluation. *Journal of International Economics*, 8, 445-456.
Laursen, S. and Metzler, L. (1950). Flexible exchange rate and the theory of employment. *Review of Economics and Statistics*, 32, 281-99.
León-Ledesma, M. and Thirlwall, A. P. (2002). The endogeneity of the natural rate of growth. *Cambridge Journal of Economics*, 26, 441-459.
Noyola, J. (1956). El desarrollo económico y la inflación en México y otros países latinoamericanos. *Investigación Económica.* XVI, 604-615.
OECD-FAO. (2008). *OECD-FAO Agricultural outlook, 2008-2017*, Paris.
Prebisch, R. (1951). Problemas teóricos y prácticos del crecimiento económico. In A. Gurrieri, ed., *La obra de Prebisch en la Cepal*, FCE, México, 1982, 248-297.
Setterfield, M. (2002). *The economics of demand-led growth. Challenging the supply-side vision of the long run*, Edward Elgar, Gran Bretaña.
The Economist. (2009). Whatever happens to the world crisis, June 2, [available at: http://www.economist.com/world/international/displaystory.cfm?story_id=13944900].
The Economist. (2008). The new face of hunger, April 17 [available at: http://www.economist.com/world/international/displaystory.cfm?story_id=11049284].
The Economist. (2007). Cheap no more, December 6 [available at: http://www.economist.com/displaystory.cfm?story_id=10250420].
Thirlwall, A. (1979). The balance of payments constraint as an explanation of international growth rate differences. *Banca Nazionale del Lavoro Quartely Review*, 128, 45-53.
Thirlwall, A. (2003). *Trade, the balance of payments and exchange rate policy in developing countries*, Edward Elgar, UK.
Welsh, C.E. (2003). *Monetary theory and policy*, MIT Press, Cambridge, Mass.
Wolf, M. (2008). Useful dos and don'ts for fast economic growth, *Financial Times* (online), June 3.

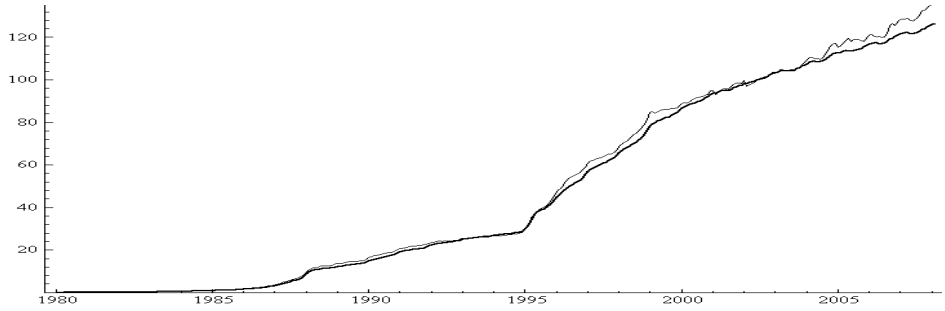
Figures and tables

Figure 1. Mexico's agriculture trade balance, 1985-2005
(Millions of dollars)



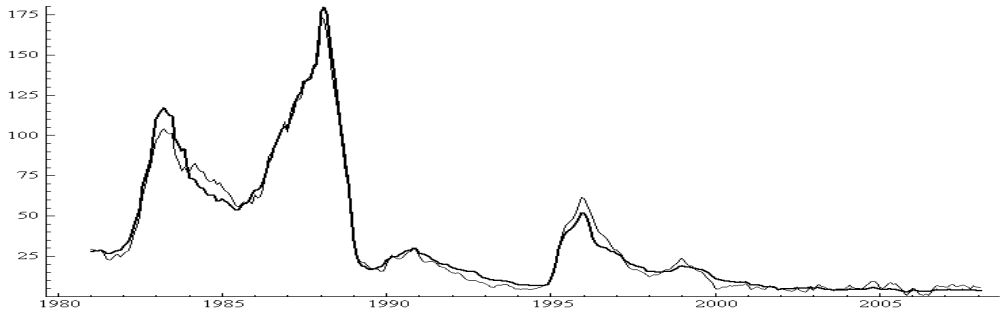
Source: ECLAC database on line [available at: www.eclac.cl].

Figure 2. Long term link between food prices and the CPI



Note: Index, 2002:06=100
Mexico's Consumer Price Index (Bold line).
Mexico's Food Price Index (Thin line)

Figure 3. Short term link between food prices and the CPI



Note: Index, 2002:06=100
Mexico's Consumer Price Index (Bold line).
Mexico's Food Price Index (Thin line)

Table 1. Mexico's domestic production and imports of food
(thousands of tonnes)

Year	Domestic	Imports	Dependency
1985	5109.99	27 633.90	0.18
1986	2889.23	23 144.90	0.12
1984	4860.16	23 954.30	0.20
1988	5683.10	21 469.90	0.26
1989	7031.67	21 450.10	0.33
1990	7783.27	26 226.30	0.30
1991	5312.54	24 345.70	0.22
1992	7368.63	27 015.60	0.27
1993	5977.63	25 863.70	0.23
1994	7987.05	27 825.60	0.29
1995	4991.12	27 628.90	0.18
1996	10283.33	29 953.80	0.34
1997	6908.88	28 459.10	0.24
1998	11402.73	29 883.40	0.38
1999	13303.50	27 833.30	0.48
2000	13796.98	28 131.70	0.49
2001	15179.77	31 265.50	0.49
2002	15278.69	29 516.20	0.52
2003	14360.34	31 864.50	0.45
2004	12999.98	32 453.30	0.40
2005	13284.35	28 996.40	0.46

Notes: [1] Includes five basic grains: beans, corn, wheat, sorghum and rice.
Source: ECLAC database [available at: www.eclac.cl]

Table 2. Long term elasticities of the CPI to money, GDP, NER and food prices

Independent variables	Anderson-Hsiao (Instrumenting differences)	Anderson-Hsiao (Instrumenting levels)	GMM-DIF (Instrumenting prices, GDP and NER*)	GMM-SYS (Instrumenting prices, GDP and NER*)
M2	0.1686	0.1597	0.0658	0.1291
	(0.0028)	(0.0023)	(0.0000)	(0.0000)
GDP	0.0398	0.0383	0.0166	0.0306
	(0.0004)	(0.0004)	(0.0000)	(0.0000)
NER	0.0411	0.0399	0.0345	0.0601
	(0.0005)	(0.0005)	(0.0000)	(0.0000)
Corn	0.0343	0.0329	0.0050	0.0548
	(0.0004)	(0.0004)	(0.0000)	(0.0000)
Wheat	0.0567	0.0554	0.0219	0.0573
	(0.0011)	(0.0011)	(0.0000)	(0.0000)
Sorghum	0.0353	0.0339	0.0142	0.0537
	(0.0006)	(0.0006)	(0.0000)	(0.0000)
Milk	0.0283	0.0276	0.0200	0.01598
	(0.0003)	(0.0003)	(0.0000)	(0.0000)
Poultry	0.0256	0.0245	0.0220	0.0196
	(0.0003)	(0.0003)	(0.0000)	(0.0000)
Red meat	0.0348	0.0338	0.0246	0.0337
	(0.0003)	(0.0004)	(0.0000)	(0.0000)
Rice	0.0205	0.0201	0.0092	0.0342
	(0.0003)	(0.0003)	(0.0000)	(0.0000)
Constant	0.1950	0.1832	0.1208	0.0040
	(0.0028)	(0.0026)	(0.0000)	(0.0000)
Wald joint	0.000 [21]	0.000 [20]	0.000 [29]	0.000 [29]
Wald dummy	0.000 [3]	0.000 [3]	0.000 [11]	0.000 [12]
Wald time	0.000 [3]	0.000 [3]	0.000 [3]	0.000 [3]
Sargan test	-	-	0.999 [94]	0.999 [193]
m2	0.559	0.570	0.022	0.928
m1	0.682	0.738	0.049	0.013
No. of observations	27	27	46	46

*A set of valid moment restrictions involving lagged prices, GDP and NER are exploited. Additional instruments used are the stacked levels and first differences of dependent variable and prices, GDP and NER.

Notes:

i) Asymptotic standard errors robust to general cross-section and time series heteroskedasticity are reported in parentheses.
ii) Time dummies are included in all equations.
iii) We report the p-value and in brackets are the degrees of freedom.
iv) In Anderson-Hsiao-type equations are estimated using the third lag of the CPI as instrument.
v) The GMM estimates reported are all two step.

Appendix

Table A1. Long term elasticities of the CPI to money, GDP, NER and food prices

Independent variables	(a) OLS	(b) Within-groups
M2	0.1190	0.7116
	(0.0000)	(0.0000)
GDP	0.0081	0.5553
	(0.0000)	(0.0000)
NER	0.0590	0.7377
	(0.0000)	(0.0000)
Corn	0.1335	1.0338
	(0.0000)	(0.0000)
Wheat	0.0328	0.9837
	(0.0000)	(0.0000)
Sorghum	0.0435	0.1327
	(0.0000)	(0.0000)
Milk	0.0057	0.6407
	(0.0000)	(0.0000)
Poultry	0.0433	0.4607
	(0.0000)	(0.0000)
Red meat	0.0219	-
	(0.0000)	
Rice	0.0289	1.7810
	(0.0000)	(0.0000)
Constant	0.0066	-
	(0.0000)	
Wald joint	0.000 [23]	0.000 [18]
Wald dummy	0.000 [14]	0.000 [6]
Wald time	0.000 [4]	0.000 [6]
m2	0.003	0.964
m1	0.003	0.095
No. of observations	46	65

Notes:

i) Asymptotic standard errors robust to general cross-section and time series heteroskedasticity are reported in parentheses.
ii) Time dummies are included in all equations.
iii) We report the p-value and in brackets are the degrees of freedom.
iv) Column (a) reports OLS estimates of the equation in levels.
v) Column (b) reports within-groups estimates. These are OLS estimates of the equation in deviations from time means.