NÚMERO 454

ALEJANDRO VILLAGÓMEZ Y JAVIER ORELLANA

Monetary Policy Rules in a Small Open Economy: An Application to Mexico

ABRIL 2009

CIDE

www.cide.edu

Las colecciones de **Documentos de Trabajo** del **CIDE** representan un medio para difundir los avances de la labor de investigación, y para permitir que los autores reciban comentarios antes de su publicación definitiva. Se agradecerá que los comentarios se hagan llegar directamente al (los) autor(es).

Fax: 5727•9800 ext. 6314
Correo electrónico: publicaciones@cide.edu
www.cide.edu

Producción a cargo del (los) autor(es), por lo que tanto el contenido así como el estilo y la redacción son su responsabilidad.

Abstract

We estimate a small-scale macro model for the Mexican economy under the New Keynesian framework. We then estimate alternative interest rate rules for Mexico, and use the results from both exercises to evaluate the performance of the Bank of Mexico against a set of optimality principles derived in the New Keynesian literature. We show that the Bank of Mexico holds a preference for stabilizing not only inflation around target, but also acts to achieve an output gap close to zero. Furthermore, we show the central bank responds non-linearly to real exchange rate depreciations. We also show that, although the central bank has attempted to contain inflation, it has not conclusively satisfied the Taylor principle, so moderate inflation during the period may be partly a consequence of a favorable macroeconomic environment, rather than active policy.

Resumen

Estimamos un modelo macroeconómico de pequeña escala para la economía mexicana. Posteriormente estimamos reglas de tasa de interés alternativas para México, y utilizamos los resultados de ambos ejercicios para evaluar el desempeño del Banco de México a partir de un conjunto de principios de optimalidad derivados en la nueva literatura keynesiana. Mostramos que el Banco de México mantiene preferencia no sólo por estabilizar la inflación alrededor de un objetivo, sino también por mantener el producto fluctuando alrededor de su nivel potencial. Más aún, mostramos que el banco central responde de forma no lineal a depreciaciones del tipo de cambio real. Adicionalmente, mostramos que la política monetaria no satisfizo el principio de Taylor en los últimos años de forma concluyente, por lo que la inflación moderada durante el periodo puede ser consecuencia de una coyuntura macroeconómica favorable.

Introduction

Price stability has become an explicit objective of central bank policy in Mexico. In the past, monetary policy centered on the use of the exchange rate as the economy's nominal anchor, but, when this resulted incompatible with macroeconomic conditions, the consequence often entailed a balance of payments crisis. During the last decade, Mexico's monetary policy has evolved towards the establishment of a precise inflation target, favoring the short-term nominal interest rate as policy instrument.

Explicitly, the monetary authority aims at achieving the convergence of inflation to its target level in the medium-run; however, it is plausible that implicit additional objectives also guide policy. Hence, the comprehension of the factors to which the monetary authority responds, as well as the effect of policy decisions on the economy constitute a problem of interest. On this last point, the effective identification of the transmission mechanism of monetary policy is a fundamental pillar of policy conduction.

The purpose of the present paper is to model the behavior of the Mexican economy and the response of the central bank to economic conditions during the past decade. With this in mind, we model the economic restrictions faced by policy-makers through a small-scale macro model in the New Keynesian tradition. This class of models incorporates nominal rigidities and imperfect competition into the dynamic stochastic general equilibrium framework developed in the Real Business Cycle literature. The assumption of nominal rigidities generates a structure where monetary policy is effectively non-neutral in the short-run, while maintaining its long run-neutrality. As such, money becomes a non-trivial element of the economy. We use this modeling strategy as a reference to determine which factors account in greater part for inflation dynamics in Mexico, as well as to determine important aspects of the transmission mechanism.

Furthermore, we model the conduction of monetary policy as endogenous —with the short-run nominal interest rate as instrument— through the use of the monetary policy rule methodology. In our formulation, we contrast two alternative policy rules, and show that monetary policy in Mexico implicitly targets variables besides inflation, therefore operating under a “flexible” inflation targeting framework. Among the variables targeted are the output gap and some measure of the exchange rate. Importantly, we show that the central bank's response to exchange rate fluctuations is not linear, as previously attempted in the literature for Mexico. In fact, the analysis of a non-linear response to exchange rate fluctuations is imperative in order to square the interest rate rule with the facts.

We then use our estimated results to evaluate policy against a set of optimality principles derived in the interest rate rule and New Keynesian literature. We show that the Bank of Mexico has not conclusively established monetary policy as an effective nominal anchor, as it does not decisively satisfy the Taylor principle.

The remainder of this paper is organized as follows. In section 1 we review the literature on monetary policy rules and its application to the Inflation Targeting framework, in particular we focus on interest-rate rules. Section 2 introduces the macroeconomic model to be estimated. Section 3 presents a brief description of the data used in the exercise. Section 4 carries out the estimation and presents key results. Section 5 evaluates the behavior of the model under alternative rules. Last section concludes.

1. Monetary policy and the rules methodology

Much of the recent literature on monetary policy has centered on the analysis of the Inflation Targeting (IT) framework. This plan of action, which has gained in popularity since its adoption by New Zealand in 1988, and which Mexico has employed since 2002, is characterized by the adoption of a series of measures aimed at the convergence of inflation in the medium run to a publicly announced target. The IT framework presents some important and in principle desirable characteristics, as follows.

Firstly, the IT regime commits the monetary authority to maintaining price stability. Under the framework, the central bank establishes an explicit quantitative target, which may consist of a point value or a predetermined band.

Secondly, by not committing to a specific action plan to achieve convergence of inflation to its target value, this framework allows for certain flexibility in the conduction of policy, permitting the central bank to use all and any tools at its disposal in order to respond to economic shocks.

Finally, under the IT framework the conduction of policy is subject to a high degree of transparency and accountability. Clear and timely communication of central bank targets and actions is a fundamental pillar of policy, as it allows for the effective management of expectations under a credible regime.

These characteristics turn the IT regime into a desirable operating framework. The literature establishes, on the one hand, that a policy framework under commitment reduces the inflation bias which would be incurred by the central bank if it could operate under absolute discretion. In particular, the monetary authority would have incentives to stimulate aggregate demand in the short run in order to obtain political rents, therefore generating sub-optimal inflation levels in the medium run. A more subtle, but highly relevant, point is made by Clarida *et al.* (1999) who show that, if the price-setting process is driven by expectations of future economic conditions, a central bank credibly committed to fight inflation faces a more favorable output–inflation tradeoff, as agents understand the central bank will not loosen policy in the future if price pressures persist. Furthermore, the transparency of the regime allows for the evaluation of policy results. As argued by Svensson (2000), greater transparency makes the reputation of the central bank more sensitive to policy actions, implying higher costs to the monetary authority of deviations from announced targets. Because of this, a highly transparent regime increases the incentives for the central bank to achieve convergence of inflation to its targeted value. As the central bank achieves this convergence, the institution gains credibility, which in turn empowers policy, in principle generating a virtuous circle in the fight against inflation.

Additionally, the literature based on the New-Keynesian paradigm has succeeded in establishing some principles on which sound monetary policy should rest in order to control inflation in the medium run. Clarida *et al.* (1999) survey the literature and point to the main results derived, of which key consensus points are worthy of note.

i. Under optimal policy, when facing a rise in expected inflation, nominal interest rates should increase sufficiently to elevate real rates.
ii. An optimal policy requires modifying the interest rate in order to fully neutralize demand shocks. Given that output in the long run is determined by supply-side factors, any excess demand will lead to an excessively high price level without a corresponding increase in output in the long run. Additionally, the increase in the price level derived from excess aggregate demand may become persistent if expectations of high future inflation are established.
iii. When facing shocks to potential output, or supply-side shocks, interest rates should not be modified under optimal policy. In this case, for example, a negative supply shock will lead to a one-off increase in inflation, reflecting a change in relative prices. If inflation expectations remain unaffected, inflation will return to its former level in subsequent periods.

In practice, the IT regime may be either “strict” or “flexible”. In the first case, the monetary authority is only concerned with achieving convergence of inflation to target, and is therefore willing to pay any price in terms of output or unemployment. Under a “flexible” regime, on the other hand, the central bank is additionally concerned with the evolution of macroeconomic variables besides inflation, and may pursue various goals simultaneously. In practice, it is reasonable to assume that central banks work towards achieving macroeconomic stability in a broad sense, assigning an important relative weight to price stability but not responding exclusively to it, so the use of analytic framework which allows for the analysis of a flexible policy regime is desirable.

1.1. Monetary policy rules

In order to analyze the performance of monetary policy, the monetary policy rules approach is attractive, and has received plenty of attention in the literature. Its main strength lies in its capacity to systematically incorporate economic information in order to formulate a policy recommendation. In opposition to policy conducted under discretion, policy conducted under credible rules may minimize the time inconsistency problem. Additionally, policy rules vary considerably in their essence and complexity. They may be classified as passive or active, the latter of which may in turn be separated between simple and optimal rules, as will be further discussed below.[1]

As their name indicates, passive rules do not respond to changes in economic conditions. In this way, passive policy rules may be written mathematically as $x_t = \bar{x}$, where x refers to the policy instrument. Since passive rules ignore some of the relevant channels through which markets impact the real economy, they may lead to substantial macroeconomic imbalances due to the lack of response of relevant variables to changing economic conditions.

Active policy rules, on the other hand, make use of available information about the economic environment in order to formulate policy. In this sense, an active rule may be written as $x_t = f(A_t)$, where A_t represents a vector of variables to which the central bank responds when deciding on policy. These additional variables may reflect past, present, or expected conditions. As such, active rules constitute an analytical framework which allows policy to react to a dynamic economy.

Policy conducted through active rules may be further separated into two broad categories: simple and optimal rules. Simple rules make use of a subset of available economic information in order to generate a policy recommendation. In the case of simple interest rate rules, these tend to be characterized in the literature as linear functions of the inflation rate and the output gap. Simple policy rules are essentially *ad hoc*, although some baseline versions may be derived from standard theory as special cases[2]. However, their simplicity makes them an attractive initial step in the evaluation of monetary policy, as they are able to capture some important aspects of policy conduction.

Conversely, optimal policy rules are the solution to the explicit optimization of an objective function, the latter of which may be utility, subject to the constraints imposed by the structure of the economy as a whole. By using a larger information set and by modeling interactions between variables in a more sophisticated manner than simple rules, optimal

[1] See, *e.g.* Woodford (2003).
[2] See, *e.g.* Clarida *et al.* (1999).

rules provide a more rigorous analysis. However, their complexity may reach considerable levels, making the communication of policy objectives to the general public substantially difficult. Furthermore, the optimal solution is conditional on the specific functional form of utility chosen for analysis, so an empirical application arises issues due to functional form uncertainty.

In order to employ the policy rules methodology to evaluate monetary policy, it is necessary to first define the policy instrument. During the past years, the literature has focused on the analysis of the use of a short-term nominal interest rate as policy instrument, reflecting the practice of major central banks. Although the Bank of Mexico only started to use the nominal interest rate as its policy instrument in 2008, the previous instrument, the *corto*, may be interpreted as a signaling mechanism through which the central bank indicated its preference for the market interest rate structure. Therefore, following Torres (2002) and Roldán (2005), the present analysis focuses exclusively on monetary policy rules for the determination of the short-run nominal interest rate.

1.2. The Taylor rule

The canonical example of a simple monetary policy rule is the Taylor rule, proposed by economist John Taylor in 1993.[3] In its original form, the rule describes the level of the federal funds rate in the United States as:

$$i^{ff} = 0.04 + 1.5(\pi_t - 0.02) + 0.5(y_t) \quad (1)$$

where i^{ff} is the federal funds rate, π_t is the inflation rate (measured as the GDP deflator), and y_t is the output gap. The rule establishes that the interest rate should be set aimed at an assumed level for the equilibrium long-run nominal interest rate (related to Knut Wicksell's natural interest rate)[4], contingent to deviations of inflation from target and deviations of output from its potential level, approximated by a smooth trend.[5]

Clarida *et al*. (1999) show that a rule in the spirit of the Taylor rule may be derived from an optimization process in which the central bank minimizes a quadratic loss function (with deviations of inflation from target and the output gap as its arguments), subject to a standard New Keynesian macroeconomic model. In this sense, a simple rule may, under certain assumptions, constitute an adequate approximation to optimal policy.[6] The rule obtained from said process is, however, forward-looking. As such, it

[3] See Taylor (1993).

[4] See Wicksell (1907) for further details.

[5] The Hodrick-Prescott filter is commonly used in the literature to extract the trend of the series.

[6] In particular, it is necessary to assume that the output gap and real marginal costs are proportional. Additionally, a rule that implies a gradual adjustment of the policy instrument in response to real shocks is consistent with the minimization of loss derived from deviations of inflation from target as well as deviations of output from its potential level. These issues are further discussed in Clarida *et al*. (1999) and Woodford (2001).

states that expected future deviations of inflation from target and future expected output gaps are what should determine the path of the interest rate.

(2) $$i_t = \bar{\imath} + \varphi_\pi(E_t[\pi_{t+n} - \bar{\pi}_{t+n}]) + \varphi_y(E_t[y_{t+k}])$$

Here, $E_t[\cdot] = E[\cdot|\Omega_t]$ is the expected value operator conditional on the information set Ω, known at time *t* and $\bar{\pi}_t$ denotes the central bank's inflation target, which may not be constant and presents a time subscript. Thus, monetary policy analysis through the rules methodology concentrates on examining the coefficients φ_π and φ_y, which imply the preferences of the central bank. Worthy of note is the fact that, although simple, the Taylor rule incorporates some of the key results derived in the New Keynesian literature. Following a demand shock, both the inflation and the output gaps move in the same direction, which induces the corresponding move in the interest rate, thus neutralizing the demand shock. A supply shock, on the other hand, causes opposite movements in the inflation and output gaps. For example, a temporary negative productivity shock or a cost-push shock will lead to a rise in inflation, while the output gap will decrease. Therefore, the rise in the interest rate suggested by the rise in inflation will be roughly compensated by the decrease suggested by the contraction of output. In this sense, the interest rate will display only a muted response to the shock, consistent with New Keynesian optimality principles.

As Torres (2002) points out, this rule may be written in terms of the real interest rate, yielding

(3) $$r_t = \bar{r} + (\varphi_\pi - 1)(E_t[\pi_{t+n} - \bar{\pi}_{t+n}]) + \varphi_y(E_t[y_{t+k}])$$

This form of writing the rule shows that $\varphi_\pi > 1$ is required in order to guarantee that the real interest rate rises when inflation is above target, thus allowing monetary policy to contract aggregate demand. Otherwise, that is $\varphi_\pi < 1$, monetary policy cannot constitute the nominal anchor of the economy since it does not respond vigorously enough to nominal shocks, which may be persistent. Torres (2002) presents estimations of this parameter for Mexico between 1997 and 2001, finding that monetary policy constituted an effective nominal anchor.

The Taylor rule has been subject to great scrutiny, both as a description of monetary policy in the United States and other countries, as well as a prescription of desirable policy. Taylor (1999) argues in favor of the normative relevance of the rule based on the fact that it generates a good description of actual U.S. policy in a period in which it was particularly successful in the battle against inflation.

However, the Taylor rule, as well as the methodology of interest rate rules in general, has faced sharp criticism in the literature. Woodford (2001) presents two of the main arguments employed against the use of rules in the conduction of monetary policy. First, it has been pointed out that the use of interest rate rules may be insufficient to determine the equilibrium *level* of prices in the economy. In response, Woodford shows that a monetary policy rule, which for a rise in inflation above target of *k* percent implies a rise in the nominal interest rate of more than *k* percent, is sufficient to determine the equilibrium level of prices; again $\varphi_\pi > 1$. In second place, it has also been suggested that interest rate rules may lead to an unstable inflationary spiral when expectations about future inflation extrapolate recent inflationary experience. As Woodford points out, this criticism has its roots in the inflationary "cumulative process" described by Wicksell (1907), in which a rise in expected inflation, due to any arbitrary reason, lowers the real interest rate perceived by agents,[7] which in turn stimulates aggregate demand, thus leading to ever greater inflationary pressures and greater expected inflation, *ad infinitum*. Nevertheless, Woodford points out that this criticism assumes an exogenous path for the nominal interest rate, that is, a path which does not explicitly responds to realized and expected inflation and output. The endogenous process of the nominal interest rate suggested by the Taylor rule, if adequately communicated to the public, should be enough to impede an inflationary spiral of the aforementioned sort. As pointed out by Galí and Monacelli (2005), the feedback mechanism implied in the rule is sufficient to pin down uniquely the price level given a set of initial conditions. Informed agents should be conscious that, due to the rise in inflation expectations, the monetary authority will aggressively respond to contract aggregate demand and hence diminish the realization of subsequent inflationary pressures.

Even though simple monetary policy rules incorporate some desirable elements, these in general make use of a limited information set, ignoring additional factors which may be useful in describing the inflationary process and its response to changes in policy. This highlights the convenience of using augmented rules. By employing a larger information set, augmented rules provide a more accurate description of policy.

2. A small open economy

The evaluation of alternative policy rules requires an analytic framework which is, as far as possible, concise and rich in the economic dynamics it is able to capture. Much of the recent literature on monetary policy employ models that bring imperfect competition and nominal rigidities into the dynamic stochastic general equilibrium structure developed in the Real Business Cycle literature, yielding the New Keynesian literature. Because of

[7] It is helpful to remember that, according to the Fisher equation, $r = \frac{1+i}{1+\pi^e} - 1$.

the presence of nominal rigidities, monetary policy is non-neutral. Furthermore, the structure developed yields intuitive equilibrium conditions which are similar in structure to the IS-LM model.[8] Because of this, the New Keynesian framework is widely used in the rules literature.[9]

The structure of this class of macroeconomic models, in its baseline case, is described by a system of equations composed by a demand curve and a supply curve, the latter characterized as a New Keynesian Phillips Curve. The baseline model is expanded by Svensson (2000) and Galí and Monacelli (2005) to the analysis of the small open economy, explicitly formulating additional transmission mechanisms relevant to the small open economy. In particular, they highlight the role played by the real exchange rate.

In the present paper, the model is closed with the inclusion of an interest rate rule to model the behavior of the central bank. The baseline model may be employed both in the evaluation of optimal rules as well as simple rules, the latter being the purpose of this paper.

Each of the four relevant equations of the model, namely aggregate demand, aggregate supply, exchange rate dynamics, and the interest rate rule, is further discussed below.

In the first place, the aggregate demand curve links financing conditions faced by agents with their consumption and investment decisions through time. This curve traditionally establishes a negative relationship between aggregate expenditure in the economy and the real interest rate, reflecting in part the endearment of debt as well as the decrease in the value of assets owned by agents. McCallum and Nelson (1997) show how a relation of this sort may be derived from the intertemporal maximization of utility by a representative rational agent who chooses consumption and leisure subject to a budget constraint. The aggregate demand curve is therefore given by the consumption Euler equation. Hence, the forward-looking consumption curve takes the form:

(4) $$c_t = a_1 r_t + a_2 E_t[c_{t+1}]$$

where c_t is consumption and $a_1 < 0$. It is important to note that this form for the demand curve differs from its traditional version in the sense that future consumption is *not* determined by its present value. Rather, the expectation of future consumption determines consumption today.

Given that in the baseline model consumption represents the only source of demand in the economy, consumption demand equals aggregate demand. Furthermore, assuming that marginal cost is lower than the price set, producers supply *any* quantity demanded, so that aggregate demand equals

[8] See, *e.g.* McCallum and Nelson (1997) for a complete discussion.

[9] See, *e.g.* Clarida, Galí and Gertler (1999), Svensson (2000), Woodford (2001), Galí and Monacelli (2005), Roldán (2005) and Moons *et al.* (2007).

output (Blanchard, 2008). From these considerations, an aggregate demand equation is obtained as:

$$(4') \qquad y_t = a_1 r_t + a_2 E_t[y_{t+1}]$$

where y_t is the output gap.

Following Roldán (2005) and Moons *et al.* (2007), it is important to note that a specification like the one shown in (4') may be augmented to take into account additional determinants of aggregate expenditure. Firstly, it is important to note the explicit role played by the real exchange rate in a small open economy. Movements in the exchange rate reflect movements in relative prices between two economies, which in turn have an impact on domestic demand and foreign demand for domestic goods. Because of this, it is desirable to explicitly include this variable in an aggregate demand relation for a small open economy like Mexico's. Secondly, it is desirable to include a term which captures the fiscal stance of the State, since this may be in principle an important component of total demand in the economy. Finally, it is important to note that aggregate expenditure is not necessarily entirely forward-looking. In fact, it is reasonable to assume that consumption decisions are made in part in an adaptive manner, that is, they are backward-looking. This assumption may be theoretically justified on the grounds of a utility function which includes habit formation within its arguments. Alternatively, the backward-looking component can be justified on the grounds of asymmetric information among agents, so that, for some agents, their best guess about the future may be an extrapolation of the past. These considerations lead to a hybrid and augmented aggregate demand curve of the form:

$$(5) \qquad y_t = a_1 r_t + a_2 y_{t-1} + a_3 E_t[y_{t+1}] + a_4 q_t + a_5 g_t + a_6 y_t^* + \varepsilon_t^D$$

where q_t is a measure of the real exchange rate (an increase denotes a depreciation) which captures the effect of net exports on aggregate demand, g_t is a measure of the government's fiscal stance (a positive values denotes a fiscal deficit), y_t^* is a measure of the foreign output gap. The term ε_t^D is a stochastic error term which captures shocks to demand.

At this point, it is important to note that, although an aggregate demand curve as presented in (5) may provide a better fit when faced against the data by capturing economically relevant empirical correlations, the inclusion of *ad hoc* variables presents an important cost, as they turn the specification susceptible to the Lucas critique.[10] As the author points out, it may be dangerous to attempt to predict the effect of a change in policy based on correlations observed in historical data, as those correlations are subject to

[10] See Lucas (1976).

the policy regime itself. In other words, once the policy regime changes, a rational agent will face a new set of restrictions, altering her behavior at the optimum. Therefore, correlations observed in historical data may not hold under the new policy. The Lucas critique suggests that, in order to analyze a change in policy, one must estimate the "deep parameters" of the model, those that characterize agents' preferences and their possibilities of consumption and production. This path, however, entails substantial costs of its own, mainly in terms of explicative power in lack of a structural model for the economy.

Due to the discussion above, estimation results pertaining to variables not explicitly derived from a micro-founded model should be interpreted with care, as it is possible that, facing a change in policy, the relations they describe may change too. Nonetheless, one may place greater confidence in the results pertaining to variables appearing in the fully specified theoretical model, such as the interest-rate elasticity of the output gap. Furthermore, it is important to note that the model presented will provide stronger results for short-run analysis.

Once the structure of aggregate demand in the economy has been identified, aggregate supply is modeled through a New Keynesian Phillips Curve. The NKPC captures inflation dynamics in the economy, relating the change in prices with demand shifts, as reflected by the output gap, as well as pressure on prices stemming from agents' expectations. This relation can be derived in an environment of monopolistically-competing firms who set out to maximize profits, combined with the assumption of staggered price setting, as in Calvo (1983). The New Keynesian synthesis therefore allows the upholding of a theoretic framework of optimizing firms while at the same time deriving a positive relationship between inflation and real economic activity. In opposition to the traditional Phillips Curve, which is backward-looking in nature, the NKPC establishes that one of the main determinants of inflation is the expectation of future inflation, not its past realizations. Therefore, the NKPC takes the general form:[11]

$$\pi_t^s = b_1 E_t[\pi_{t+1}^s] + b_2 y_t \qquad (6)$$

In this case, it is important to note that the inflation model describes underlying inflation.[12] This is due to the fact that underlying inflation better characterizes price responses to aggregate demand shocks. Non-underlying inflation, on the other hand, tends to respond to seasonal variations or to shocks specific to a particular industry, rather than to aggregate shocks. Because of this, it is convenient to separately model both components of

[11] A complete derivation is available in Galí and Monacelli (2005).
[12] This definition of inflation is based on a price index which excludes goods with particularly volatile prices.

inflation. General inflation can then be recovered as the weighted average of both inflation measures.[13]

As in the case of the aggregate demand curve, for an empirical application it is convenient to augment the specification in order to explicitly take into account additional variables which may have a direct impact on inflation. In the first place, it is important to once more note the role played by the exchange rate. Movements in the exchange rate imply changes in the price of imported inputs for production. Hence, exchange rate depreciations have a direct impact on production costs, affecting domestic inflation. Foreign inflation, on the other hand, may be passed-through if there is not a one-for-one appreciation of the nominal exchange rate. Finally, the literature shows, as in Ramos Francia and Torres (2006), that inflation dynamics are better captured by a hybrid version of the NKPC, so the inclusion of a backward-looking component is desirable. This result recognizes that there may be learning effects, staggered contracts, or other institutional arrangements in the economy which might lead to a significant effect of past conditions on current ones. This leads to an augmented specification of the form:

$$\pi_t^s = b_1\pi_{t-1}^s + b_2E_t[\pi_{t+1}^s] + b_3y_t + b_4(\Delta e_t + \pi_t^*) + \varepsilon_t^S \quad (7)$$

Here, e_t is the nominal exchange rate (again, an increase corresponds to a depreciation) and π_t^* is foreign inflation. The two variables have a significant effect on domestic inflation for a small open economy depending on how they affect the cost of imported intermediate goods used in the production process. They also impact the price of imported final goods, which affect CPI inflation. The term ε_t^S is a mean-zero stochastic term which captures aggregate supply shocks. As in the case of the aggregate demand curve, the augmented specification includes *ad hoc* terms which compliment the theoretically-derived structure. In particular, this components correspond to the “pass-though” term and the change in nominal wages. In the empirical literature, Roldán (2005) and Moons *et al*. (2007) employ similar specifications which compliment the theoretical model presented in Svensson (2000) and Galí and Monacelli (2005).

Given the role played by the exchange rate in both aggregate demand and supply in a small open economy, it is important to note some of the consequences of including this variable in the model.

Firstly, as noted by Svensson (2000), in an open economy the exchange rate is an important aspect of the transmission mechanism. For a closed economy, monetary policy has an impact on the economy via the aggregate demand channel and the expectations channel. In the first case, monetary policy impacts demand with a lag due to its effect on the nominal interest

[13] The appropriate weighting coefficient is published by the Bank of Mexico.

rate, which modifies credit conditions. This channel is captured in the aggregate demand curve. Demand will then have an effect on inflation, with an additional lag, via its interaction with aggregate supply, described in the NKPC. The expectations channel, alternatively, allows monetary policy to affect agents' expectations, which will impact the price formation process, such as wage negotiations. This alters domestic inflation by changing production costs. Additionally, for an open economy, the exchange rate has an effect on aggregate demand, and eventually prices, through its impact on the trade balance. There is also, as mentioned before, a direct effect, as exchange rate movements affect the price of imported final goods, thus impacting CPI inflation directly. This channel, as pointed out by Svensson (2000), has a quicker effect on prices than the aggregate demand channel. Therefore, monetary policy may be faster to act on inflation in an open economy than in a closed one, as it acts through a greater variety of channels.

Secondly, the exchange rate is essentially the price of an asset, so it is determined in a forward-looking manner. Because of this, the inclusion of the exchange rate contributes to the importance of forward-looking variables in the performance of the economy (Svensson, 2000).

Finally, the exchange rate captures variations in foreign economic conditions such as inflation, interest rate movements, and country-risk premia. All these variables impact foreign demand for domestic goods, which will in turn affect inflation in the home country.

For these reasons, the class of macro models used in the monetary policy rules literature is enhanced by the inclusion of a specification that describes the behavior of the exchange rate. For this purpose, purchasing-power-parity (PPP) is invoked in order to express the (log) real exchange rate:

(8) $$q_t = e_t + (p_t^* - p_t)$$

where p_t and p_t^* denote the level of domestic and foreign prices, respectively. It is assumed that uncovered interest rate parity (IRP) holds, so the real exchange rate can be expressed as:

(9) $$q_t - E_t[q_{t+1}] + (r_t^* - r_t)$$

where the real interest rate comes from an approximation to the Fisher equation of the form:

(10) $$r_t = i_t - E_t[\pi_{t+1}]$$

However, empirical studies for industrial economies show that interest-rate-parity does not hold in practice.[14] In particular, due to the fact that IRP is a condition of equilibrium, not behavior, the exchange rate shows systematic

[14] See, for example, Eichenbaum and Evans (1995).

deviations from the level suggested by IRP. In fact, the exchange rate may "overshoot" after changes in the interest rate structure. This result is presented by Eichenbaum and Evans (1995), among others. In order to better characterize the behavior of the real exchange rate, therefore, it is convenient to use a more flexible specification, which allows a more gradual adjustment of the variable towards its long-run equilibrium level, identified by IRP.

$$q_t = c_{1j}\sum_{j=1}^{J} q_{t-j} + c_2\{E_t[q_{t+1}] + (r_t^* - r_t)\} + \varepsilon_t^q \qquad (11)$$

Roldán (2005) uses a specification of this type for the Mexican economy.

Once the dynamics of aggregate demand, the NKPC, and exchange rate dynamics have been identified, the macro model is closed with an interest rate rule that translates macroeconomic conditions into a policy stance. Our analysis of simple rules is then centered on the performance of this rule within the specified macro model. With this purpose in mind, and based on principles previously discussed, a rule in the spirit of the Taylor Rule is proposed as:

$$i_t = (1 - d_1)\{(d_2 + d_3\overline{\pi}_t) + d_4(E_t[\pi_{t+1} - \overline{\pi}_{t+1}]) + d_5(E_t[y_t])\} + d_1 i_{t-1} + \varepsilon_t^i \qquad (12)$$

Torres (2002) proposes a rule of this kind, as this specification allows for a nominal interest rate target which varies in time according to changes in the inflation target, as captured by the term $(d_2 + d_3\overline{\pi}_t)$. This fact is important given that the study encompasses a period of disinflation overseen by the Mexican central bank during the second half of the 1990s.

The simple interest rate rule is then evaluated against and augmented rule which considers real exchange rate depreciation within the central bank's reaction function. Even though Torres (2002) establishes that the inclusion of some measure of exchange rate depreciation does not improve the rule's fit, it is important to note that his work only considers a linear response from the monetary authority to movements in the exchange rate. The literature for industrial economies shows, as in Taylor, Peel and Sarno (2001) and Chinn (2008), that there may exist a non-linear response. In other words, it is plausible that the central bank maintains an implicit concern for avoiding *excessive* fluctuations in the real exchange rate. Thus, the central bank may operate under an implicit scheme to maintain the variable fluctuating around a long-run objective or a conditional mean. Consequently, and differing from Torres (2002), we specify the augmented interest rate rule as:

(13)

$$i_t = (1 - d_1)[(d_2 + d_3\bar{\pi}_t) + d_4(E_t[\pi_{t+1} - \bar{\pi}_{t+1}]) + d_5(E_t[y_t]) + d_6(E_t[q_{t+1}]) + d_7(E_t[q_{t+1}]^3)] + d_1 i_{t-1} + \varepsilon_t^i$$

where the cubic term in the real exchange rate captures the non-linearity in the central bank's reaction function.[15]

The macroeconomic model describing the economy is therefore given by the system of equations composed by (5), (7) and (11), while (12) offers a benchmark interest rate rule, to be compared with the augmented case described in (13).

3. Data

This section briefly describes the data used for the estimation of the macroeconomic model. Table 1 summarizes the variables employed.

TABLE 1	
Endogenous Variables	
i	Short-run nominal interest rate
y	Output gap
q	Real exchange rate
π^s	Underlying monthly inflation
Exogenous Variables	
i^*	Short-run nominal interest rate (U.S.)
y^*	Output gap (U.S.)
e	Nominal exchange rate
π^{ns}	Non-underlying monthly inflation
π^*	General monthly inflation (U.S.)
w	Nominal wage
g	Government's fiscal stance
Residual Variables	
π	General monthly inflation
r	Short-run real interest rate
r^*	Short-run real interest rate (U.S.)

The short-run nominal interest rate under consideration is the 28-day CETES secondary market rate. Even though this is not the rate explicitly targeted by the central bank, it is assumed that the central bank holds sway over this key market rate through its interest rate target scheme. The foreign

[15] In this specification, a cubic term is chosen to capture the non-linearity as to distinguish between movements in the exchange rate which generate a positive deviation from trend (a steep depreciation) and those which generate a negative deviation from trend (a steep appreciation).

short-run nominal exchange rate is defined as the 4-week T-BILL secondary market rate.[16]

The output gap is calculated from the log General Index of Economic Activity (IGAE), which is a monthly proxy for GDP. The gap is defined as the deviation of the index from its Hodrick-Prescott filtered trend. Similarly, the foreign output gap is calculated from the log U.S. Industrial Production Index (IPI).

The bilateral real exchange rate between Mexico and the United States[17] is calculated from the log nominal exchange rate as shown in (8).[18] The variable is expressed in terms of a deviation with respect to a quadratic trend.

Underlying inflation is defined as the monthly change in the seasonally-adjusted underlying component of the log National Consumer Price Index (CPI). Non-underlying inflation corresponds to the monthly change in the non-underlying component of Mexico's log CPI. This component of inflation is modeled as exogenous due to the fact that underlying inflation better reflects pressure on prices stemming from shifts in aggregate demand. Non-underlying inflation captures price-changes in highly volatile goods and services whose prices respond to idiosyncratic shocks, which may not necessarily reflect pressure upon other prices in the economy. General domestic inflation is recovered as the weighted average of both components. Foreign general monthly inflation is measured as the monthly change in the log CPI for the U.S.

Nominal wages are defined as the seasonally-adjusted change in the log nominal hourly wage in the manufacturing industry in Mexico, as reported by the National Institute of Statistics and Geography.

The government's fiscal stance is defined as the change in a measure of government structural deficit, which measures variations in discretionary fiscal policy. This series is calculated from the government's deficit as in Cermeño, Roth and Villagómez (2008).

Data are used in monthly frequencies, and correspond to the period following the Tequila crisis and its subsequent period of volatility. Thus, the sample encompasses 1998:01 to 2008:07. This period provides a sample suitable for the study of inflation dynamics under that IT regime, as well as a period for the analysis of exchange rate dynamics under a float.

16 Due to the fact that there are no available data for this instrument for the first years of the sample studied, these are calculated as the implicit 4-week rate in implicit in 3-moth Treasury bill rates. This calculation necessarily assumes that the expected monthly rate is the same through the three months to the bond's maturity. This assumption is reasonable for an economy with low levels of expected inflation and low inflation volatility, as is the case for the U.S. economy during the sample period.

17 This measure of the exchange rate is used for the Mexican economy given that trade with the United States heavily dominates Mexico's Current Account.

18 With this purpose, price-level indexes for Mexico and the United States are transformed so as to represent an equal base year.

4. Estimation of the macro model and interest rate rules

Estimation results are presented in two sections. Firstly, the aggregate demand curve, the aggregate supply curve, and the exchange rate relation are reported. In the second section, results for the alternative interest rate rules are shown. Due to the forward-looking nature of the estimation, however, a brief explanation of the method employed is pertinent at this time.

Given that the equations describing the dynamics of the economy include forward-looking variables, it is necessary to employ a method which allows the incorporation of this characteristic. It is important to note that, in principle, it should be possible to obtain data on the expectations of agents about these variables (this is particularly true in the case of inflation expectations, on which periodic surveys are conducted). However, as pointed out by Torres (2002), the use of these measures may bring about problems in its own right, particularly if the expectations of agents are systematically different from those held by the central bank, the latter being the relevant set in the formulation of policy. In the case of inflation expectations reported by professional forecasters, for example, it is essential to note that forecasters face asymmetric costs for under-forecasting and over-forecasting inflation, which may lead to a systematic forecast bias. Additionally, it is necessary to recognize that there are no available explicit measures for agent's expectations of variables such as the output gap or the real exchange rate. Because of these considerations, and following the literature, the relations are estimated using the Generalized Method of Moments (GMM). This estimation method uses ex-post values of non-predetermined variables as instruments for their ex-ante values. As such, the error term in the regression becomes a linear combination of an exogenous shock and the forecast errors of forward-looking variables. Consequently, it is possible to obtain unbiased estimators of the regression coefficients if the forecast errors have zero mean. To this end, GMM uses a set of instrumental variables, known at time *t* and meaningful for the formation of expectations about non-predetermined variables, in order to obtain a set of orthogonal restrictions which are then used to find a set of regression coefficients which guarantee mean-zero forecast errors.

With these considerations in mind, the equations describing the dynamics of the economy are then estimated. Table 2 presents results for the estimation of the aggregate demand equation.

TABLE 2: AGGREGATE DEMAND CURVE				
y_t	1	2	3	4
y_{t-1}	0.462572*** (0.055419)	0.491314*** (0.055775)	0.435284*** (0.058655)	0.312326*** (0.071871)
$E_t[y_{t+1}]$	0.511361*** (0.059008)	0.502658*** (0.060256)	0.445782*** (0.099438)	0.261744* (0.165932)
r_{t-1}		-0.007190 (0.006646)		
r_t	-0.008220 (0.009123)		-0.015341 (0.010679)	-0.049826** (0.021035)
q_{t-1}		0.000233 (0.000179)		
q_t	0.000281 (0.000224)		0.000406 (0.000266)	0.001608*** (0.000558)
g_t				0.000092 (0.000066)
y^*_{t-1}				0.373520** (0.156189)
y^*_t			0.094034 (0.084262)	
Adjusted R^2	0.6234	0.6230	0.6286	0.5760
Standard Error of Regression	0.0084	0.0084	0.0084	0.0090
J	0.1091	0.1099	0.1100	0.0940

Instruments used in the regression:
Δy(-1 a -6, -9, -12); r(-1 a -6); Δy(-1 a -6)*
Standard errors robust to arbitrary forms of autocorrelation and heteroskedasticity are reported.
*, **, *** H_0: $\beta = 0$ is rejected at the 10%, 5% and 1% significance level respectively.

The estimation of the aggregate demand curve presents some interesting results. In the first place, under all specifications both the one-period lag and one-period lead of the output gap are statistically significant and present the expected sign. This outcome is consistent with the literature which estimates hybrid aggregate demand equations, both for developed and developing economies. Additionally, the magnitude of the estimated coefficients is worthy of note, as they suggest that that both the lead and the lag of the output gap have similar weights in the determination of the output gap. Secondly, under all specifications the coefficient corresponding to the elasticity of the output gap to the real interest rate is negative, as predicted by theory. However, only under specification 4 is it statistically significant at the 95% confidence level. Under this specification, the magnitude of the coefficient lies within the range estimated for other small open economies.[19]

[19] See, for example, Moons *et al.* (2007).

The real exchange rate, on the other hand, reports the expected positive sign, as real exchange rate depreciations, reflected by a rise in q_t, should stimulate foreign demand for domestically-produced goods. The positive and statistically significant sign suggests that the Marshall-Lerner condition is satisfied, so that demand for export goods is sufficiently elastic so that the depreciation has a positive net effect on the trade balance. Once the variable representing the government's fiscal stance is included, it does not prove to be statistically significant, although it presents the expected positive sign. Finally, foreign demand seems to play an important role in the determination of Mexico's output, as seen by the correlations between Mexico's output gap and its U.S. counterpart, Mexico's chief international trade partner. Specification 4 generates adequate fit, and, most importantly, provides statistically significant coefficients with the sign suggested by theory. Thus, this specification is later employed in the model.

Results for the aggregate supply curve are presented in Table 3.

TABLE 3: AGGREGATE SUPPLY CURVE

π_t^s	1	2	3
π_{t-1}^s	0.740707*** (0.076135)	0.823806*** (0.102552)	0.771280*** (0.099001)
$E_t[\pi_{t+1}^s]$	0.258618*** (0.071953)	0.208212** (0.092541)	0.222883** (0.99122)
y_{t-1}	0.013720*** (0.004689)		
y_t		0.018371** (0.007221)	0.017289** (0.007639)
$\Delta e_{t-2} + \pi_{t-2}^*$			0.002057** (0.000860)
$\Delta e_{t-1} + \pi_{t-1}^*$	0.001764*** (0.000567)	0.001792** (0.000715)	
Δw_{t-1}	-0.000304 (0.001319)		
Δw_t		-0.001235 (0.001544)	0.000186 (0.001712)
Adjusted R^2	0.9207	0.9096	0.9153
Standard Error of Regression	0.0011	0.0012	0.0011
J	0.1178	0.1524	0.1395

Instruments used in the regression:
π^s(-1 a -6); Δy(-1 a -6); Δe(-1 a -6); Δw(-1 a -6)
Standard errors robust to arbitrary forms of autocorrelation and heteroskedasticity are reported.
*, **, *** $H_0: \beta = 0$ is rejected at the 10%, 5% and 1% significance level respectively.

In the case of the aggregate supply curve, the outcome suggests that underlying inflation in Mexico is still backward-looking to a large degree. Under all specifications considered, the coefficient corresponding to the lagged variable is between three to four times larger than the one corresponding to its expectation. This robust result points to strong inertial behavior for underlying inflation. However, there are other variables which significantly correlate with inflation. Concretely, the output gap coefficient is robust throughout all specifications, and shows the expected positive sign. An increase in the output gap reflects excess aggregate demand, which puts upward pressure on prices in the economy. On the other hand, it is interesting to note that, even though there is a statistically significant and positive pass-through effect of foreign inflation on underlying CPI inflation in Mexico, it is remarkably small. This result is in line with studies which suggest that this factor has lost relative importance as a driver of inflation in Mexico. Changes in nominal wages, conversely, do not appear to explain inflation during this period. Under no specification is a statistically significant coefficient recorded. Specification 3 shows good fit with the data and provides coefficients with the signs suggested by theory, therefore it selected as the best specification.

Subsequently, Table 4 shows results for the estimation of exchange rate dynamics.

TABLE 4: REAL EXCHANGE RATE

q_t	1	2	3	4
q_{t-1}	0.320427*** (0.025324)	0.486102*** (0.055724)	0.511228*** (0.056899)	0.496325*** (0.054408)
q_{t-2}		-0.209175*** (0.042718)	-0.265636*** (0.063646)	-0.233060*** (0.065585)
q_{t-3}			0.045583 (0.039432)	0.005015 (0.057884)
q_{t-4}				0.039854 (0.041299)
$E_t[q_{t+1}] + r_t^* - r_t$	0.696802*** (0.027036)	0.739855*** (0.031858)	0.728748*** (0.031120)	0.712755***
Adjusted R^2	0.9591	0.9544	0.9548	0.9581
Standard Error of Regression	0.0139	0.0147	0.0147	0.0144
J	0.1376	0.1221	0.1244	0.1276

Instruments used in the regression:
q(-1 a -6, -9, -12); Δy(-1 a -6, -9, -12); {E[q]+r-r}(-1 a -6)*
Standard errors robust to arbitrary forms of autocorrelation and heteroskedasticity are reported.
*, **, *** $H_0: \beta = 0$ is rejected at the 10%, 5% and 1% significance level respectively.

In this case, it is interesting to note that the coefficient for the interest rate parity condition is positive and statistically significant under all specifications. Additionally, the estimated coefficient is robust. The data suggests that the exchange rate channel (assuming that there is a movement in the real exchange rate) is relevant in a small open economy like Mexico's. Furthermore, lagged values of the real exchange rate also contain useful information about its current value. The results obtained suggest that, in agreement with the empirical literature, the real exchange rate shows persistence, although it contains an important forward-looking element. Thus, the interest rate parity condition should be interpreted as a long-run equilibrium condition, but there may be temporary deviations from this equilibrium level in the short and medium run.

Next, the estimation outcome for the specified interest rate rules is presented. Table 5 shows the estimated coefficients for the simple interest rate rule as defined in (12).

TABLE 5: SIMPLE INTEREST RATE RULE

	d_1	d_2	d_3	d_4	d_5
Coefficient	0.697474***	0.024008***	1.106180***	1.104926***	1.310284***
Standard Error	(0.034720)	(0.004688)	(0.055063)	(0.222829)	(0.279295)
Adjusted R^2	0.9138	Standard Error of Regression	0.0211	J	0.0953

Instruments used in the regression:
1; $\pi - \bar{\pi}$*(-1 a -6, -9, -12); y(-1 a -6, -9, -12); i(-1 a -6, -9, -12)*
Standard errors robust to arbitrary forms of autocorrelation and heteroskedasticity are reported.
*, **, *** $H_0: \beta = 0$ is rejected at the 10%, 5% and 1% significance level respectively.

Results obtained for the simple interest rate rule indicate that there is effectively an important inertial component in the determination of the interest rate, as reflected in the high relative value of d_1. This obeys the fact that the most frequent policy decision is to maintain the interest rate target unchanged. On the other hand, it is important to note that the coefficient d_4, corresponding to the weight assigned by the central bank to deviations of inflation from target, is positive and statistically significant. However, even though the estimated coefficient is greater than unity, it is not statistically so.[20] This suggests that during the period under study monetary policy has not been sufficiently aggressive to maintain prices anchored. In light of this, and as suggested by Melick and Galati (2006), it is not convenient to ignore the possibility that the relatively low levels of inflation seen during the past few

[20] A Wald test rejects the null hypothesis $d_4 > 1$ at the 95% confidence level.

years in Mexico may be caused in part by a favorable macroeconomic environment, beyond monetary policy. This result is further discussed later in this paper.

Additionally, it is interesting to note that the coefficient pertaining to the output gap, d_5, is likewise positive and statistically significant. Furthermore, the estimated coefficient is close in value to that pertaining to deviations of inflation from target. This suggests that, effectively, the central bank assigns a positive weight to the behavior of real economic activity when formulating policy. This initial results seems to corroborate the hypothesis that the Mexican central bank operates under a flexible inflation targeting framework, where both nominal and real variables are target variables for the institution.

Taking the simple rule as a benchmark, an augmented interest rate rule is also estimated, as described by (13). Estimation results are presented in Table 6.

TABLE 6: AUGMENTED INTEREST RATE RULE

d_1	d_2	d_3	d_4	d_5	d_6	d_7
0.77628***	0.06259***	0.57886***	1.24513***	1.40747***	-0.66185***	30.1617***
(0.01588)	(0.00585)	(0.07711)	(0.30830)	(0.531622)	(0.11708)	(9.94365)
Adjusted R^2	0.9074	Standard Error of Regression	0.0219	J	0.1584	

Instruments used in the regression:
1; $\pi-\bar{\pi}$*(-1 a -6, -9, -12); y(-1 a -6, -9, -12); i(-1 a -6, -9, -12); e(-1 a -6, -9, -2)*
Standard errors robust to arbitrary forms of autocorrelation and heteroskedasticity are reported.
*, **, *** $H_0: \beta = 0$ is rejected at the 10%, 5% and 1% significance level respectively.

The exercise for the augmented interest rate rule suggest that the estimated effect is robust for the coefficients corresponding to the central bank's response to deviations of inflation from target, as well as deviations of output from its potential level. The estimated degree of interest rate inertia in the rule is also robust. Again, worthy of note is the fact that the estimated coefficient for d_4 is greater than unity, but not statistically so.[21] Therefore, the estimation of the augmented rule confirms the key result obtained from the estimation of the simple rule. Concretely, both estimations question the aggressiveness with which monetary policy in Mexico has been conducted throughout the period under study, as it cannot be conclusively determined that it constituted the key factor behind moderate inflation rates in the last years. The literature for Mexico presents opposing results with which to compare this outcome. While Torres (2002) finds a coefficient for deviations

[21] Again, a Wald test rejects the null hypothesis $d_4 > 1$ at the 95% confidence level.

of inflation from target statistically greater than unity by estimating a Taylor Rule, Galindo and Guerrero (2003) do not find a coefficient statistically greater than one.

A second result of note corresponds to the estimated response of the central bank to movements in the real exchange rate. Upon first examination, the coefficient pertaining to exchange rate depreciation, d_6, is negative, albeit small. Given that the real exchange rate is measured as a deviation from trend, the negative coefficient seems to suggest that the central bank *lowers* the nominal interest rate when the currency weakens. This result, taken alone, is counter-intuitive, and contradicts conventional theory. In part, and as pointed out by the empirical literature,[22] this result may be due to the fact that the exchange rate is an extremely difficult variable to forecast at short time horizons. Consequently, this negative correlation may be a product of the high volatility present in the variable.

More importantly, however, the result may be rationalized by the presence of a non-linear response from the monetary authority to movements in the exchange rate. Thus, it is important to note that the coefficient for the cubic term on the exchange rate gap, d_7, is statistically significant and shows the correct sign. Moreover, the estimated effect is relatively large. This result strongly suggests that the central bank aggressively responds to large deviations of the exchange rate with respect to a target, which in practice may be a long-run equilibrium level.

Taken a as whole, results for the augmented interest rate rule strongly suggest that the monetary authority is in fact concerned with maintaining exchange rate stability, although it may be responding actively only to excessive movements in the variable, preferring to ignore small variations. This is reasonable considering the high volatility of exchange rates. Furthermore, the estimation corroborates that, even though the central bank is concerned with maintaining inflation fluctuating around target, monetary policy is not particularly aggressive, and so the possibility remains that moderate inflation in Mexico may be due, at least in part, to favorable economic conditions which may prove transitory.

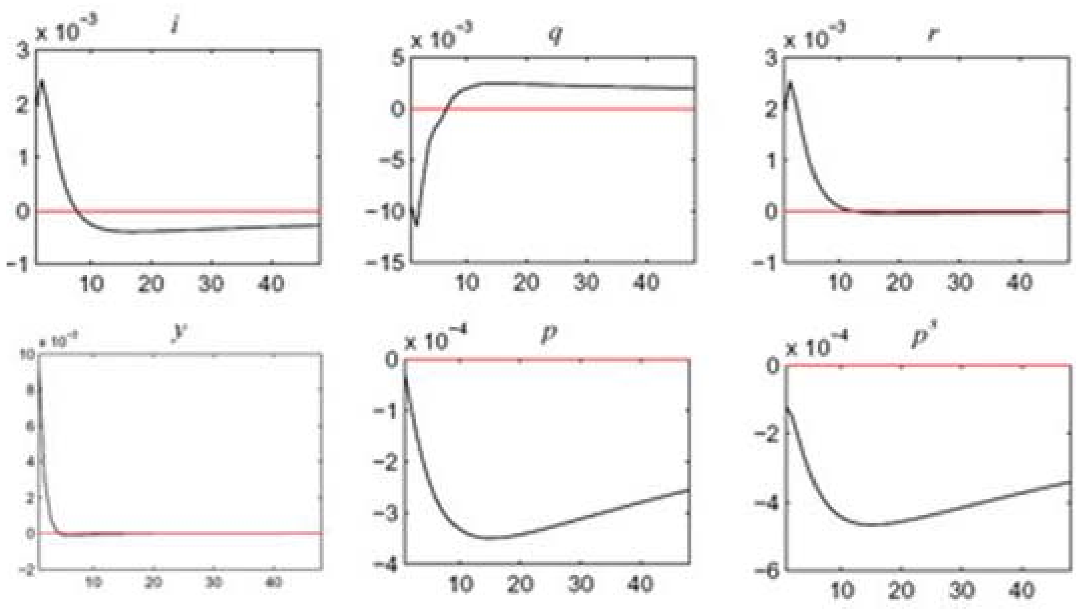
[22] See, for example, Chinn (2008).

5. Model dynamics under alternative interest rate rules

In order to elaborate on this last finding, the dynamics of the model estimated above are evaluated through an impulse-response analysis. In particular, we focus on the short-run response of the model's variables to aggregate demand and aggregate supply shocks.

Figure 1 shows the response of the macroeconomic model to an orthogonal demand shock under the policy dictated by the simple interest rate rule. The shock causes the output gap to increase temporarily, prompting a rise in the nominal interest rate. This increase is sufficiently large to raise the real interest rate, therefore contracting demand and neutralizing the shock. Additionally, the increase in the real interest rate leads to an exchange rate appreciation, which further reinforces the restrictive policy. Inflation is therefore prevented from rising after the shock to aggregate demand. Therefore, central bank policy is consistent with consensus points of sound monetary policy when facing shocks to aggregate demand.

FIGURE 1: SIMPLE INTEREST RATE RULE
RESPONSE TO AN ORTHOGONAL SHOCK TO ε^D



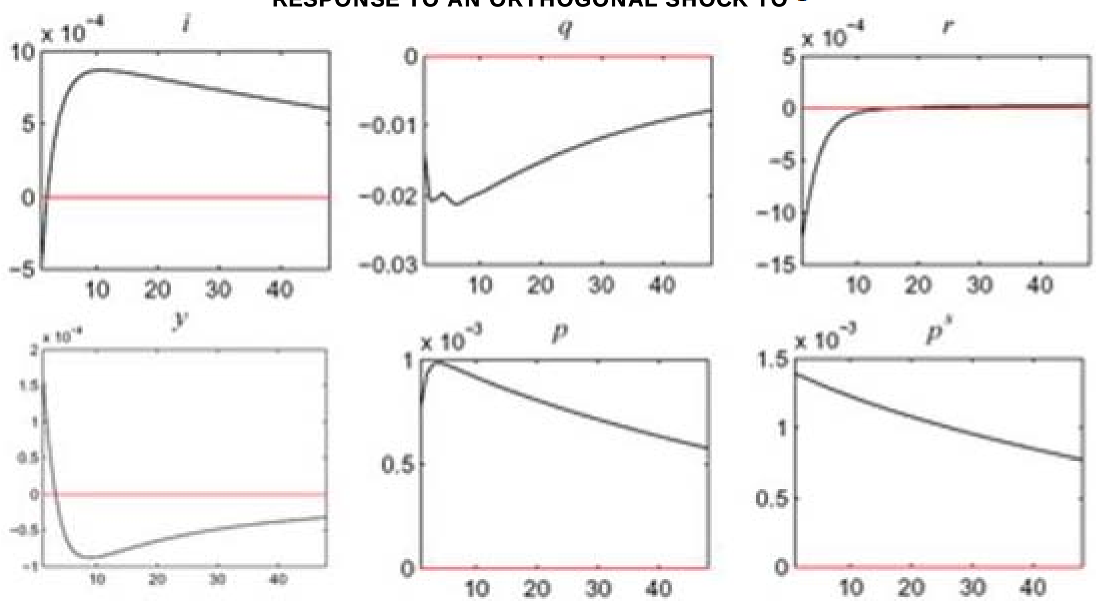
Source: Author's calculations.

Figure 2 follows in showing the model's dynamics to a negative supply shock under the simple interest rate rule. The shock leads to a surge in inflation, to which the monetary authority responds by raising the nominal interest rate. However, the increase in the nominal rate is not sufficiently large to elevate the real rate, therefore failing to implement an effective restrictive policy immediately. This is reflected in an inability to contract aggregate demand following the shock, as seen by the initial increase in the output gap, further reinforcing inflationary pressures. This may be an expression of the failure of monetary policy to satisfy the Taylor principle categorically. By not succeeding in controlling the inflationary impulse from its very start, inflation expectations may become entrenched, as inflation still has a significant backward-looking component.

This last point is of special interest, as it suggests that Mexico's monetary policy did not fully comply with the second and third optimality criteria presented in the literature. In particular, optimal monetary policy generally requires a null response to temporary supply shocks, except when inflation expectations are affected. In the latter case, a temporary inflationary shock may become permanent if agents revise their expectations of future inflation. Under such circumstances, optimality criteria call for policy to become restrictive, as to neutralize expectations of rising future inflation. If the formation of inflation expectations still contains a significant backward-looking component, as estimated for Mexico, then a temporary rise in inflation may lead agents to expect ever higher inflation in the future.

FIGURE 2: SIMPLE INTEREST RATE RULE

RESPONSE TO AN ORTHOGONAL SHOCK TO ε^S



Source: Author's calculations.

The results presented above hold under the augmented interest rate rule, as shown in Figure 1a and Figure 2a, presented in Appendix I.

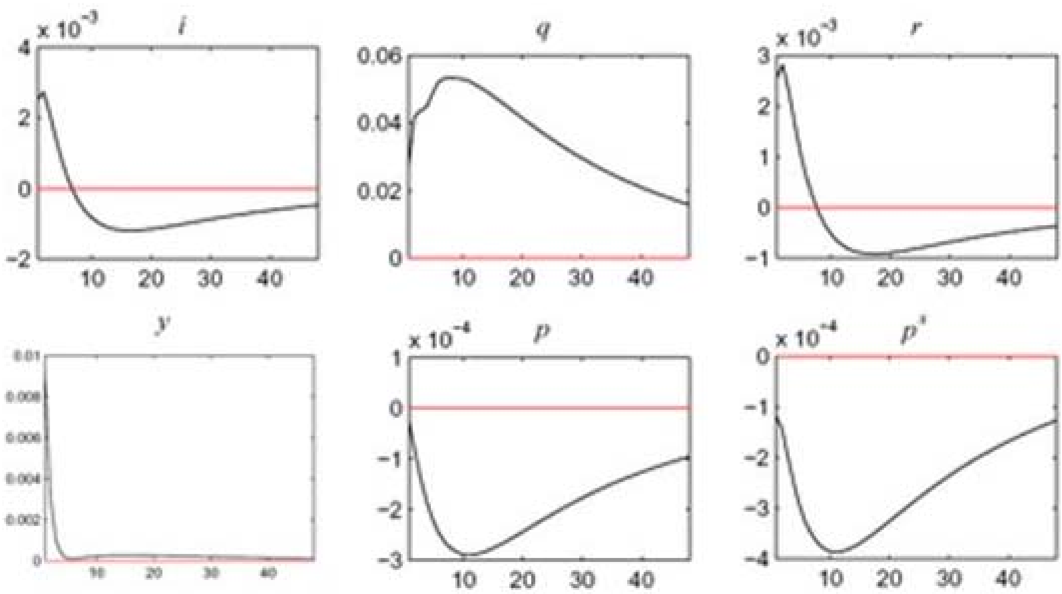
5.1. The Taylor principle

In light of the finding that monetary policy may not be responding vigorously enough against inflationary shocks, it is interesting to contrast the interest rate rules above with an alternative fully satisfying the Taylor principle. To this end, we show the response of the model to aggregate demand and aggregate supply shocks, respectively, under a version of the augmented rule espousing the Taylor principle.[23]

Figure 3 shows the response of the model to a demand shock under the new specification. The behavior of the output gap, inflation, and both the nominal and real interest rates, matches that under the estimated rule, as is to be expected. When hit by a shock to aggregate demand, monetary policy tightens sufficiently in order to close the output gap and halt any inflationary pressures. This is reflected in the raise exhibited by the real interest rate.

FIGURE 3: AUGMENTED RULE AND THE TAYLOR PRINCIPLE

RESPONSE TO AN ORTHOGONAL SHOCK TO ε^D



Source: Author's calculations.

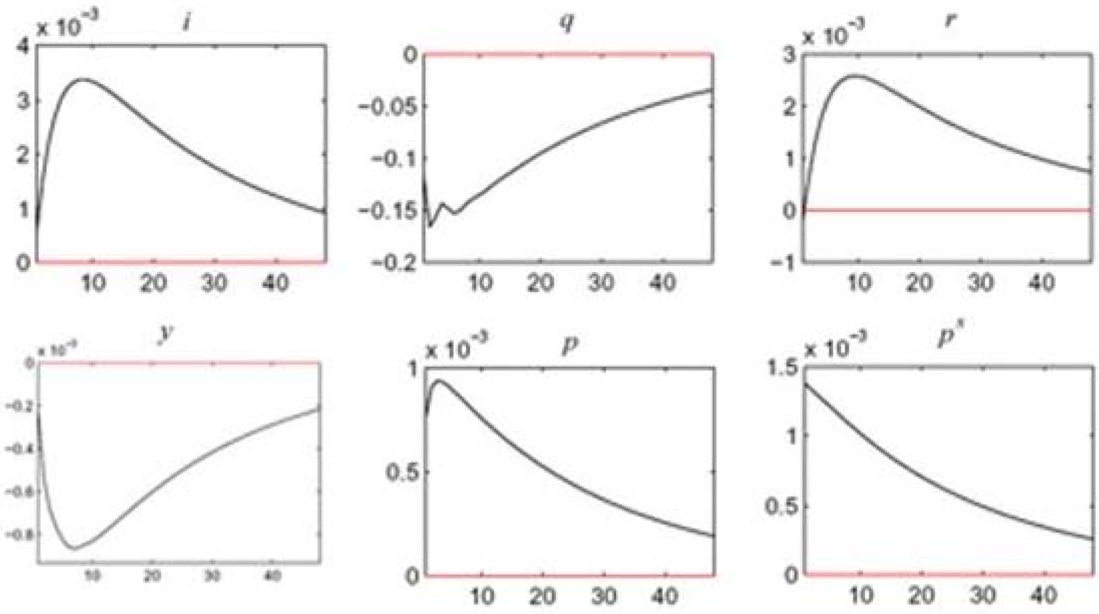
Of greater interest, however, is the response of the model to a negative supply shock under the interest rate rule satisfying the Taylor principle, presented in Figure 4. In this case, after an inflationary shock the nominal interest rate rises sufficiently to elevate the real rate. Hence, monetary policy is effectively restrictive, and it manages to curtail to a much greater extent the inflationary pressure. This represents a stark contrast with respect to the baseline estimated formulation. However, it is important to note that

[23] We set $d_4 = 6$. This implies a highly restrictive policy, for illustrative purposes.

this implies costs in terms of real economic activity, as seen by the negative output gap generated by the policy. Nevertheless, a disposition to incur in short-run costs in terms of output when facing surges in inflation is paramount in the establishment of monetary policy as an effective nominal anchor.

FIGURE 4: AUGMENTED RULE AND THE TAYLOR PRINCIPLE

RESPONSE TO AN ORTHOGONAL SHOCK TO ε^S



Source: Author's calculations.

Conclusions

Monetary policy constitutes a powerful tool which may be used to influence the behavior of aggregate demand. In practice, its conduction is complex and may respond to broad considerations, beyond explicitly stated objectives announced by the central bank. The monetary policy rules methodology is useful as a framework to systematically analyze policy decisions. Hence, the inflation targeting regime under which the Mexican central bank operates may be characterized through interest rate rules, which identify some of the key economic factors to which the monetary authority actively responds.

The exercise presented in this paper suggests some important points. In the first place, our results establish that, even though monetary policy in Mexico is aimed at controlling inflation, it does not exclusively respond to the behavior of that variable. On the contrary, the central bank assigns a positive weight to the behavior of real economic activity when making policy decisions. In particular, it seeks to maintain output fluctuating around its potential level. Additionally we establish that, although the central bank does not intervene to prevent small fluctuations of the exchange rate, when these become excessive it adjusts the nominal interest rate in order to stimulate the return of the exchange rate to sustainable levels. This result is, to the best of our knowledge, new in the literature for Mexico.

Secondly, the estimation of the simple and augmented rules suggest that the central bank, between 1998 and mid-2008, did not decisively establish the conduction of monetary policy as the economy's nominal anchor, as it does not conclusively satisfy the Taylor principle. In other words, it is not clear that movements in the interest rate target have been sufficiently aggressive to elevate real rates when facing surges in inflation. In this sense, it is not convenient to ignore the possibility that, as Melick and Galati (2006) and Cecchetti *et al*. (2007) point out for developed economies, a benign macroeconomic environment may be in part responsible for the conditions of moderate inflation experienced in Mexico during the last decade. Changing economic conditions could create a hostile environment that truly challenges the central bank's reputation as a reliable inflation fighter. The effectiveness of the central bank in this task is of central importance in a context of persistent inflation, as is estimated for Mexico.

Additionally, it is seen that for a small open economy like Mexico's, the exchange rate does in fact provide an additional transmission mechanism for monetary policy. The exchange rate responds strongly to changes in monetary policy, inducing both first-round and second-round effects on output and inflation.

Finally, using the criteria described in the literature under which optimal monetary policy should operate, results indicate that, in Mexico, monetary policy does in fact respond aggressively to aggregate demand shocks. Thus, the interest rate has been effectively used during the past decade to neutralize states of excess demand. Overall, monetary policy has constituted an effective demand management tool, satisfying this optimality criterion. However, results suggest that in the case of supply shocks, the nominal interest rate does not present a sufficiently vigorous response to elevate the real rate. While this response may be optimal in the case of transitory supply shocks, it may not be so when inflation is highly persistent, as is the case in Mexico. This is due to the fact that high inflation caused by the transitory shock may lead to an upward revision of future inflation expectations. Therefore, the response of the monetary authority to supply shocks could be more aggressive in order to prevent the consolidation of higher inflation expectations. This last point merits additional attention in future research on the subject, particularly in the current context of adverse shocks to the economy.

As a tentative answer to this point, this paper contrasts the behavior of the model under a hypothetical rule where the Taylor principle is clearly satisfied. Here, monetary policy effectively neutralizes pressure on inflation by incorporating a clearly restrictive policy in light of adverse supply shocks, mitigating their persistence. However, the exercise suggests that this policy implies a sacrifice in terms of output in the short run. This highlights the importance of maintaining an institutional framework for the central bank which favors price stability above secondary objectives, possibly linked to the real economy. As this is achieved, monetary policy may constitute a more effective nominal anchor for the economy. Furthermore, the formulation of effective policies becomes more important, especially as the benign economic environment to which Mexico is exposed disappears in the near future.

A second relevant extension of this paper consists of verifying the robustness of the estimated parameters to alternative estimation methods. In particular, the recent development of methods which allow for the simultaneous estimation of the system, through the use of Bayesian methods or conditional maximum likelihood, for example, could be useful in the verification of results here obtained. Finally, future research should be aimed at identifying the model's structural parameters, allowing for the evaluation, in terms of welfare, of different policy regimes.

Appendix I

Impulse response functions: Augmented interest rate rule

FIGURE 1A: RESPONSE TO AN ORTHOGONAL SHOCK TO ε^D

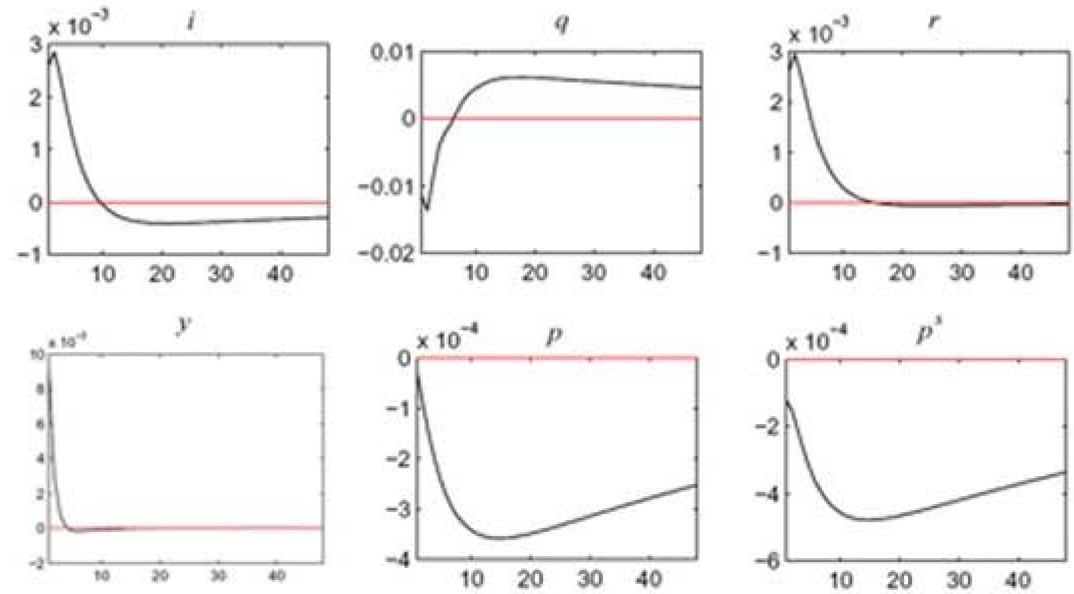
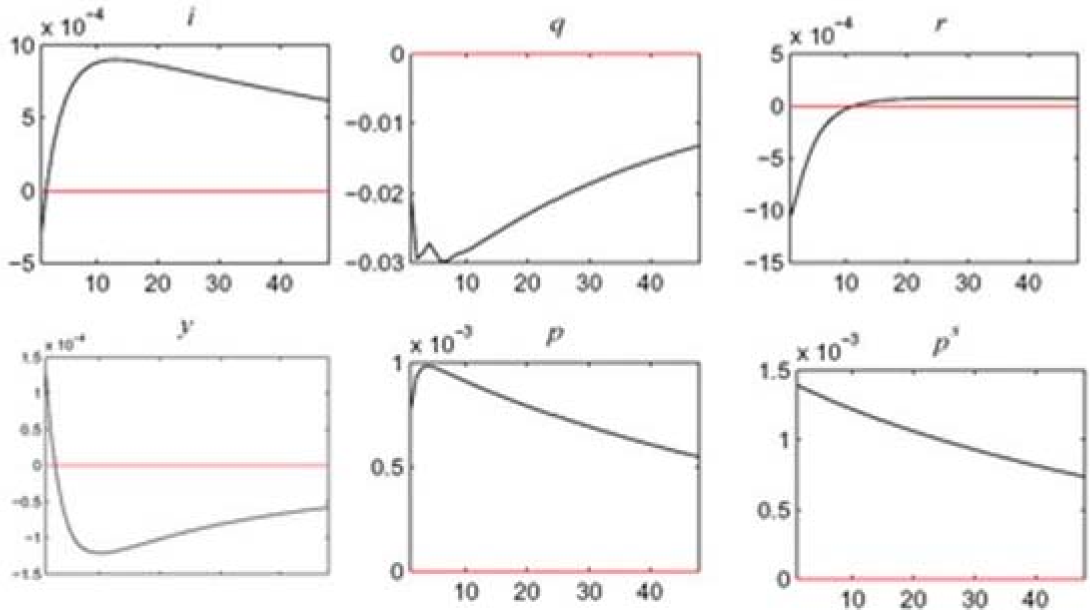


FIGURE 2A: RESPONSE TO AN ORTHOGONAL SHOCK TO ε^S



Appendix II

Stochastic processes for exogenous variables

TABLE 8: NON-UNDERLYING INFLATION	
π_t^{ns}	
c	0.003852***
	(0.000778)
π_{t-1}^{ns}	0.342566***
	(0.084076)
Adjusted R^2	0.1102
Standard Error of Regression	0.0068
Durbin-Watson	1.9406
*, **, *** H_0: $\beta = 0$ is rejected at the 10%, 5% y 1% significance level.	

TABLE 9: FISCAL DEFICIT	
g_t	
c	-1.639213
	(2.687828)
g_{t-1}	-0.020145
	(0.091648)
Adjusted R^2	0.0004
Standard Error of Regression	30.1617
Durbin-Watson	2.0013
*, **, *** H_0: $\beta = 0$ is rejected at the 10%, 5% y 1% significance level.	

TABLE 10: NOMINAL WAGE	
Δw_t	
c	0.050556
	(0.055678)
Δw_{t-1}	0.362337***
	(0.087878)
Δw_{t-2}	0.185921**
	(0.091105)
Δw_{t-3}	0.218741**
	(0.091745)
Δw_{t-4}	0.188935**
	(0.087306)
Adjusted R^2	0.8636
Standard Error of Regression	0.0204
Durbin-Watson	2.0281
*, **, *** H_0: $\beta = 0$ is rejected at the 10%, 5% y 1% significance level.	

TABLE 11: NOMINAL EXCHANGE RATE	
	Δe_t
c	0.001817 (0.002003)
Δe_{t-1}	0.176711** (0.087808)
Adjusted R^2	0.0236
Standard Error of Regression	0.0186
Durbin-Watson	1.9620

*, **, *** $H_0: \beta = 0$ is rejected at the 10%, 5% y 1% significance level.

TABLE 12: FOREIGN VARIABLES (VAR)			
	π_t^*	y_t^*	i_t^*
π_{t-1}^*	0.295129*** (0.08935)	0.016181 (0.16870)	0.042981 (0.08953)
π_{t-2}^*	-0.330407*** (0.09007)	0.148311 (0.17006)	0.046413 (0.09025)
y_{t-1}^*	0.011618 (0.04789)	0.788317*** (0.09042)	0.061541* (0.04798)
y_{t-2}^*	0.031219 (0.04842)	0.075015 (0.09143)	-0.029875 (0.04852)
i_{t-1}^*	0.117078 (0.09002)	0.514505*** (0.16996)	1.232959*** (0.09019)
i_{t-2}^*	-0.135196* (0.08834)	-0.486977*** (0.16679)	-0.260938*** (0.08851)
c	0.003016*** (0.00067)	-0.001258 (0.00126)	0.000522 (0.00067)
Adjusted R^2	0.1368	0.8275	0.9780
Standard Error of Regression	0.0025	0.0047	0.0025

*, **, *** $H_0: \beta = 0$ is rejected at the 10%, 5% y 1% significance level.

References

Blanchard, O. J., (2008), "The State of Macro", Working Paper 14259, National Bureau of Economic Research.

Capistrán, C. and M. Ramos Francia, (2006), "Inflation Dynamics in Latin America", *Serie Documentos de Investigación* 2006-11, Banco de México.

Calvo, G., (1983), "Staggered Prices in a Utility Maximizing Framework", *Journal of Monetary Economics,* vol. 12, no. 13, pp. 983-998.

Cecchetti, S. G., P. Hooper, B. Kasman, K. Schoenholtz and M. Watson, (2007), "Understanding the Evolving Inflation Process", *U.S. Monetary Policy Forum*, February 2007.

Cermeño, R., B. Roth and A. Villagómez, (2008), "Fiscal Policy and National Savings in Mexico, 1980-2006", *Estudios Económicos*, vol. 23, no. 2, pp. 281-312.

Chinn, M. D., (2008), "Nonlinearities, Business Cycles and Exchange Rates", *University of Wisconsin*, Mimeo, Available: http://www.ssc.wisc.edu/~mchinn/taylorrule_xr.pdf

Clarida, R., J. Galí and M. Gertler, (1999), "The Science of Monetary Policy", *Journal of Economic Literature*, vol. 37, no. 4, pp. 1661-1707.

Eichenbaum, M. and C. L. Evans, (1995), "Some Empirical Evidence on the Effects of Shocks to Monetary Policy on Exchange Rates", *Quarterly Journal of Economics*, vol. 110, no. 4, pp. 975-1009.

Fuhrer, J. and G. Moore, (1995), "Inflation Persistence", *The Quarterly Journal of Economics*, vol. 110, no. 1, pp. 127-159.

Galí, J. and T. Monacelli, (2005), "Monetary Policy and Exchange Rate Volatility in a Small Open Economy", *Review of Economic Studies*, vol. 72, no. 3, pp. 707-734.

Galindo, L. M. and C. Guerrero, (2003), "La regla de Taylor para México: un análisis econométrico", *Investigación Económica*, vol. 42, no. 246, pp. 149-167.

Lucas Jr., R. E., (1972), "Expectations and the Neutrality of Money", *Journal of Economic Theory*, vol. 4, no. 2, pp. 103-124.

__________ (1976), "Econometric Policy Evaluation: A Critique", *Carnegie Rochester Conference Series on Public Policy*, vol. 1, pp. 19-46.

Mankiw, N. G. and D. Romer, ed., (1991), *New Keynesian Economics*, MIT Press Readings in Economics.

McCallum, B. T. and E. Nelson, (1997), "An Optimizing IS-LM Specification for Monetary Policy and Business Cycle Analysis", Working Paper 5875, National Bureau of Economic Research.

Melick, W. and G. Galati, (2006), "The evolving inflation process: an overview", *Working Papers* 196. Bank for International Settlements.

Moons, C., H. Garrestsen, B. van Aarle and J. Fornero, (2007), "Monetary Policy in the New-Keynesian Model: An Application to the Euro Area", *Journal of Policy Modeling*, vol. 29, pp. 879-902.

Olivera, J., (1970), "On Passive Money", *The Journal of Political Economy*, vol. 78, no. 4, part 2, pp. 805-814.

Ramos Francia, M. and A. Torres, (2006), "Inflation Dynamics in Mexico, A Characterization Using the New Phillips Curve", *Serie Documentos de Investigación* 2006-15, Banco de México.

Roldán Peña, J., (2005), "Un análisis de la política monetaria en México bajo el esquema de objetivos de inflación", *Gaceta de Economía*, vol. 11, no. 21.

Sargent, T. and N. Wallace, (1975), "'Rational Expectations', the Optimal Monetary Instrument, and the Optimal Money Supply Rule", *The Journal of Political Economy*, vol. 83, no. 2, pp. 241-254.

Svensson, L. E. O., (2000), "Open Economy Inflation Targeting", *Journal of International Economics*, vol. 50, pp. 155-183.

Söderström, U. *et al*., (2002), "Can a Calibrated New-Keynesian Model of Monetary Policy Fit the Facts?", *Working Paper Series* 140, Sveriges Riksbank.

Taylor, M., D. Peel and L. Sarno, (2001), "Nonlinear Mean-Reversion in Real Exchange Rates: Toward a Solution to the Purchasing Power Parity Puzzles", *International Economic Review*, vol. 42, no. 4, pp. 1015-1042.

Taylor, J., (1980), "Aggregate Dynamics and Staggered Contracts", *Journal of Political Economy*, vol. 88, pp. 1-24.

__________ (1993), "Discretion versus Policy Rules in Practice", *Carnegie-Rochester Series on Public Policy*, vol. 39.

__________ (1999), "A Historical Analysis of Monetary Policy Rules", en *Monetary Policy Rules.* ed. J. Taylor. Chicago, The University of Chicago Press.

Torres, A., (2000), "Estabilidad en variables nominales y el ciclo económico: el caso de México", *Serie Documentos de Investigación* 2000-03, Banco de México.

__________ (2002), "Un análisis de las tasas de interés en México a través de la metodología de reglas monetarias", *Serie Documentos de Investigación* 2002-11, Banco de México.

Wicksell, K., (1907), "The Influence of the Rate of Interest on Prices", *The Economic Journal*, vol. 17, no. 66, pp. 213-220.

Woodford, M., (2001), "The Taylor Rule and Optimal Monetary Policy", *The American Economic Review*, vol. 91, no. 2, pp. 232-237.

__________ (2002), "Inflation Stabilization and Welfare", *Contributions to Macroeconomics*, vol. 2, no. 1, article 1.

__________ (2003), *Interest and prices: foundations of a theory of monetary policy*, Princeton, Princeton University Press.

Novedades

División de Administración Pública

Laura Sour y Jorge Ortega, *Marco institucional formal del FAIS y del FAFM en México*, DTAP-210

Luis F. Luna y José Ramón Gil, *Resultados de la "Encuesta sobre gobierno electrónico y colaboración interorganizacional"…*, DTAP-211

José Ramón Gil, *Pensamiento sistémico y dinámica de sistemas para el análisis de políticas públicas…*, DTAP-212

Laura Sour, *Correspondencia entre las políticas públicas del PND y el gasto ejercido de la CHPF en México*, DTAP-213

José Ramón Gil, Judith Mariscal y Fernando Ramírez, *Gobierno electrónico en México*, DTAP-214

Judith Mariscal, José Ramón Gil y Armando Aldama, *Políticas de acceso a tecnologías de la información: El caso de e-México*, DTAP-215

Laura Sour y Miguel Ángel Gutiérrez, *Extrinsic Incentives and Tax Compliance*, DTAP-216

Laura Sour y Fredy Girón, *The Flypaper Effect in Mexican Local Governments, 1990-2006*, DTAP-217

Judith Mariscal y Fernando Ramírez, *Retos para el desarrollo del sector de las telecomunicaciones en México*, DTAP-218

Alejandra Ríos y Juan E. Pardinas, *Hacia la reforma constitucional: Las entidades de fiscalización superior en México*, DTAP-219

Laura Sour, *Regional Differences in Infrastructure Investment at the State Level in Mexico*, 1998-2005, DTAP-220

División de Economía

John Scott, *Incidencia de las transferencias públicas en el ingreso de los trabajadores de salario mínimo en México…*, DTE-443

John Scott, *Evaluación de políticas y programas públicos…*, DTE-444

Sonia Di Giannatale, Gian Luca Clementi y Thomas Cooley, *A Theory of Firm Decline*, DTE-445

Víctor Carreón y Alfonso Zerón, *Innovación de procesos en el costo de generación de electricidad*, DTE-446

Víctor Carreón y Evangelina Dardati, *La tarifa de generación en México estimada con el mecanismo de orden de mérito*, DTE-447

Rodolfo Cermeño y Daniel Garrido, *Convergencia de las entidades federativas de México, 1940-2004: un enfoque de series de tiempo*, DTE-448

Rodolfo Cermeño y Huver Rivera, *La demanda por importaciones y exportaciones: evidencia de cointegración para México, 1991-2005*, DTE-449

Juan Manuel Torres, Octavio S. Magaña y Francisco Moreno, *Determinantes del cambio de uso/cobertura arbolada en México*, DTE-450

Juan M. Torres, David B. Bray y Octavio S. Magaña, *The Role of Scale in Mexican Community Forest Management*, DTE-451

Richard H. Adams, Jr. and Alfredo Cuecuecha, *Remittances, Consumption and Investment in Ghana*, DTE-452

División de Estudios Internacionales

Jesús Velasco , *Lou Dobbs and the Rise of Modern Nativism*, DTEI-171
Jorge Schiavon, *La diplomacia local del Distrito Federal (2000-2007)*, DTEI-172
Rafael Velázquez, *La proyección internacional de Baja California*, DTEI-173
Consuelo Dávila, Jorge Schiavon y Rafael Velázquez, *La paradiplomacia de las entidades federativas en México*, DTEI-174
Francisco Javier Aparicio y Covadonga Meseguer, *Collective Remittances and the State: The 3x1 Program in Mexican Municipalities*, DTEI-175
Alejandro Anaya, *Free Trade, "Spillover" and Human Rights Foreign Policies in North America*, DTEI-176
Alejandro Anaya, *Security and Human Rights in Mexico: Do Pressure from Above and Argumentation Have Anything to Do With It?*, DTEI-177
Jorge Chabat, *The International Role of Latin America After September 11: Tying the Giant*, DTEI-178
Jorge Chabat, *The Bush Revolution in Foreign Policy and Mexico: The Limits to Unilateralism*, DTEI-179
Jorge Chabat, *Franchises for Crime: "Maras" and North American Security*, DTEI-180

División de Estudios Jurídicos

Gustavo Fondevila e Ingram Matthew, *Detención y uso de la fuerza*, DTEJ-23
Ana Laura Magaloni y Ana María Ibarra Olguín, *La configuración jurisprudencial de los derechos fundamentales…*, DTEJ-24
Ana Laura Magaloni, *¿Por qué la Suprema Corte no ha sido un instrumento para la defensa de derechos fundamentales?*, DTEJ-25
Ana Laura Magaloni, *Arbitrariedad e ineficiencia de la procuración de justicia: dos caras de la misma moneda*, DTEJ-26
Ana María Ibarra, *Los artificios de la Dogmática Jurídica*, DTEJ-27
Ana Elena Fierro y Adriana García, *Responsabilidad patrimonial del Estado. Interpretación de la SCJN del artículo 113 constitucional*, DTEJ-28
Adriana García y Dirk Zavala, *El análisis económico del derecho como herramienta para el diseño normativo…*, DTEJ-29
Carlos Elizondo y Luis Manuel Pérez de Acha, *¿Un nuevo derecho o el debilitamiento del Estado? Garantía de audiencia previa en la expropiación*, DTEJ-30
Ana Elena Fierro y Adriana García, *Guía de las decisiones del PJF en materia de competencia económica: Cómo generar una cultura de la competencia*, DTEJ-31
Carlos Elizondo y Ana Laura Magaloni, *La depuración de las corporaciones policiacas y el juicio de amparo*, DTEJ-32
Marcelo Bergman y Hernán Flom, *Policía y comunidad: una comparación…*, DTEJ-33

División de Estudios Políticos

Joy Langston y Allyson Benton, *"A ras de suelo": Candidate Appearances and Events in Mexico's Presidential Campaign*, DTEP-199

Gabriel Negretto, *The Durability of Constitutions in Changing Environments…*, DTEP-200

Joy Langston, *Hasta en las mejores familias: Madrazo and the PRI in the 2006 Presidential Elections*, DTEP-201

Andreas Schedler, *Protest Beats Manipulation. Exploring Sources of Interparty Competition under Competitive and Hegemonic Authoritarianism*, DTEP-202

Alejandro Villagómez y Jennifer Farias, *Análisis de la evolución de la matrícula de las licenciaturas en CP, AP y RI en México, 1974-2004*, DTEP-203

Julio Ríos Figueroa, *Judicial Institutions and Corruption Control*, DTEP-204

Allyson Benton, *The Effect of Electoral Rules on Indigenous Voting Behavior in Mexico's State of Oaxaca*, DTEP-205

Andreas Schedler y Cas Mudde, *The Quantitative Skeleton of Comparative Politics*, DTEP-206

Joy Langston y Francisco Javier Aparicio, *The Past as Future: Prior Political Experience and Career Choices in Mexico, 1997-2006*, DTEP-207

Francisco Javier Aparicio y Sandra Jessica Ley, *Electoral Institutions and Democratic Consolidation in the Mexican States, 1990-2004*, DTEP-208

División de Historia

Luis Barrón, *Revolucionarios sí, pero Revolución no*, DTH-44

Ugo Pipitone, *Oaxaca: comunidad, instituciones, vanguardias*, DTH-45

Luis Barrón, *Venustiano Carranza: un político porfiriano en la Revolución*, DTH-46

Mauricio Tenorio y Laurencio Sanguino, *Orígenes de una ciudad mexicana: Chicago y la ciencia del* Mexican Problem *(1900-1930)*, DTH-47

Rafael Rojas, *José María Heredia y la tradición republicana*, DTH-48

Rafael Rojas, *Traductores de la libertad: el americanismo de los primeros republicanos*, DTH-49

Mónica Judith Sánchez, *History* vs. *the Eternal Present or Liberal Individualism and the Morality of Compassion and Trust*, DTH-50

Luis Medina, *Salida: los años de Zedillo*, DTH-51

Michael Sauter, *The Edict on Religion of 1788 and the Statistics of Public Discussion in Prussia*, DTH-52

Michael Sauter, *Conscience and the Rhetoric of Freedom: Fichte's Reaction to the Edict on Religion*, DTH-53

Ventas

El **CIDE** es una institución de educación superior especializada particularmente en las disciplinas de Economía, Administración Pública, Estudios Internacionales, Estudios Políticos, Historia y Estudios Jurídicos. El Centro publica, como producto del ejercicio intelectual de sus investigadores, **libros, documentos de trabajo,** y **cuatro revistas especializadas:** *Gestión y Política Pública*, *Política y Gobierno*, *Economía Mexicana Nueva Época* e *Istor*.

Para adquirir cualquiera de estas publicaciones, le ofrecemos las siguientes opciones:

VENTAS DIRECTAS:	VENTAS EN LÍNEA:
Tel. Directo: 5081-4003 Tel: 5727-9800 Ext. 6094 y 6091 Fax: 5727 9800 Ext. 6314 Av. Constituyentes 1046, 1er piso, Col. Lomas Altas, Del. Álvaro Obregón, 11950, México, D.F.	Librería virtual: **www.e-cide.com** Dudas y comentarios: **publicaciones@cide.edu**

¡¡Colecciones completas!!

Adquiere los **CDs de las colecciones completas** de los documentos de trabajo de todas las divisiones académicas del CIDE: **Economía**, **Administración Pública**, **Estudios Internacionales**, **Estudios Políticos**, **Historia** y **Estudios Jurídicos.**

¡Nuevo! ¡¡Arma tu CD!!

Visita nuestra Librería Virtual www.e-cide.com y selecciona entre 10 y 20 documentos de trabajo. A partir de tu lista te enviaremos un CD con los documentos que elegiste.