Wage indexation and monetary policy in an open economy

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Abstract

This paper analyzes the effects of monetary policy on the optimal decision of workers to update their wages to a measure of price variation: either past inflation, or expected future inflation. I show that monetary regimes with a loose nominal anchor induce workers to index their wages to past inflation, independently of whether the exchange rate is fixed or floating. The theory is illustrated for Mexico, which has experienced fixed and floating exchange-rate regimes with subperiods of loose and tight nominal anchors. Observed changes in wage and price dynamics in Mexico are consistent with the model’s predictions.

Keywords: Endogenous wage indexation, nominal anchor, SOE
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1 Introduction

This paper studies the relationship between wage revision practices that index wages to past or observed inflation, and the monetary-policy regime of an economy. Through a small-open-economy model calibrated for Mexico, I show that a passive monetary policy, based on a loose nominal anchor, induces workers to index their nominal wages to past inflation. Workers’ selection of an indexation scheme is optimal from their perspective, since it maximizes their expected utility. I study the influence of monetary-policy regimes on wage indexation using an open economy model because emerging markets have been more likely to experience episodes with inflation rates reaching three-digit numbers (Mexico and other Latin American countries in the 80s are classic examples).

Episodes of high inflation volatility tend to be quite persistent because workers search income-insurance by indexing their wages to the observed inflation rate. The latter implies that second-round effects on inflation, or price-wage spirals, are more likely to happen, which raises the persistence of inflation. In such scenarios, it is harder for the central bank to curb inflation down since the welfare costs of a disinflation policy tend to be high for society (e.g., in terms of higher unemployment and lower consumption). In this regard, monetary policy can help to reduce the welfare costs of a disinflation policy by adopting a tight nominal anchor, which helps to settle agents’ inflation expectations at stable levels. As future inflation becomes more predictable, workers would prefer to index their wages to expected inflation, which in turn reduces inflation persistence and the welfare costs of disinflation policies.

The model in this paper is an extension of Carrillo, Peersman and Wauters (2017) analysis with welfare-maximizing agents that face nominal wage rigidities. To cope with these rigidities, workers choose a wage indexation rule that update their salary in periods in which no labor contract is renewed. The choice of the indexation rule is therefore completely endogenous in the model. An important difference with respect to Carrillo et al. is that the model economy in this paper is open to trade and international financial markets. This property permits to analyze monetary-
policy regimes based on a fixed or a floating exchange rate. In the former, the monetary policy instrument is the speed of devaluation of the domestic currency, while in the latter the central bank determines the short-run nominal interest rate based on a feedback rule that responds to economic variables.

I use the two exchange-rate regimes to study the Mexican experience. I calibrate the model to represent the fixed exchange-rate regime that lasted until December 1994, and the floating exchange-rate regime that has prevailed since 1995. Within each of these regimes, there are two subperiods in which monetary policy features loose and tight nominal anchors (see Figure 1).

Figure 1: Quarterly core inflation and monetary-policy regimes in Mexico (% in annual terms)

Note: Data from INEGI. Seasonally adjusted by the author using X-13 ARIMA-SEATS.

From 1982 to 1987, during the fixed exchange-rate regime period, the Mexican economic authorities implemented large and frequent devaluations of the peso. Such policy decisions brought substantial volatility to inflation, as it is shown in Figure 1. Then, as a consequence of a nationwide agreement in December 1987, the so called Pacto de Solidaridad Económica (or PSE), the devaluation policies moderated, and wage indexation practices to past inflation were explicitly discouraged by the government. As a result, the new policies tightened the nominal anchor and decreased the correlation between contractual wage revisions and observed inflation. The latter contributed to reduce the inflation rate towards a one-digit number in 1993.
A renewed period of inflation volatility hit the Mexican economy in the second half of the 90s, after the implosion of the Tequila crisis in 1995, which forced authorities to abandon the fixed parity regime. The transition period featured a loose nominal anchor, which could have motivated workers to index their wages to past inflation. The second subperiod with a tight nominal anchor came with the adoption of the inflation-targeting framework by Banco de México in 2001. The tight anchor was formally introduced in 2003, with the establishment of an invariant annual inflation target of 3%.

The theoretical analysis in this paper predicts that the subperiods featuring a loose nominal anchor in Mexico might have contributed to an increase in the degree of wage indexation to past inflation in the economy. In this regard, empirical evidence obtained through a time-varying parameter Bayesian VAR model seems to provide support to the theoretical model. Accordingly, the dynamics of prices and wages in Mexico are consistent with a high degree of wage indexation to past inflation in the early 80s, and a low degree in the 2000s.¹

The theoretical model in this paper provides microfoundations to Benati (2008)’s seminal finding about inflation dynamics, namely that under monetary regimes with a clearly defined nominal anchor, inflation seems to be purely forward-looking. This finding is robust across different papers. For instance, Schryder, Peersman and Wauters (2014) find that the degree of inertia in wage inflation is significantly lower in economies with an explicit quantitative anchor (e.g., inflation targeting). In an earlier study, Holland (1995) finds that increases in inflation precede increases in wage indexation. And more recently, Attey (2016) find evidence supporting the hypothesis that variations in trend inflation, i.e. the long-term level at which inflation is expected to converge, explain variations in the degree of wage indexation in several economies. In this context, on the theoretical side, Danziger (1984) shows that an increase in inflation uncertainty raises workers’ perceived gains from indexing their wages. Danziger also focus on utility-maximizing workers but, in contrast to the present paper, he does not model the role of monetary policy at reducing or maintaining inflation volatility. The present paper fills this gap, and links microfounded motives with empirical findings.

¹In particular, the empirical analysis finds that wage revisions were highly correlated to past inflation in the early 80s, and that this correlation has weakened over the years, reaching low values in the 2000s. It is worth noting that the dynamic properties of prices and wages displayed an important change after the stabilization programs introduced by the government in 1987.
This paper also relates to a long strand of the literature analyzing optimal wage indexation, which includes the classic studies of Gray (1976) and Fischer (1977), and several other extensions reviewed in Cover and van Hoose (2002) and Calmfors and Johansson (2006). The aim of these papers is to find a level of wage indexation that minimizes output fluctuations. In turn, more recent papers with micro-founded DSGE models, such as Minford, Nowell and Webb (2003) and Amano, Ambler and Ireland (2007), focus on the optimal level of wage indexation that maximizes the welfare of a representative agent. In contrast, Carrillo et al. (2017) focus on the difference between the level of wage indexation that is obtained in the decentralized equilibrium of the economy, and the level preferred by a social planner. These authors show that the decentralized level and the social planner’s one may differ substantially. As mentioned earlier, the model in the present paper is an extension of Carrillo et al.’s framework. The difference is that the present analysis centers on the importance of a monetary-policy regime to shape the level of wage indexation in the economy.

The plan of the paper is organized as follows. Section 2 presents a simple open-economy model to gain intuition on the endogenous wage indexation mechanism. Section 3 analyzes the decentralized equilibrium for the degree of wage indexation in the economy. Section 4 present the empirical analysis for Mexico. Section 5 concludes.

2 A simple open-economy model with nominal wage rigidities

The model consists of 5 types of agents: the final-good producer, the nontradable-good producer, households, an employment agency, and the fiscal and monetary authorities.

2.1 Households and wage setting

Each household, indexed by $i \in [0, 1]$, is composed by a consumer and a worker. The former decides an optimal plan for consumption and savings, while the latter, who possess a unique labor type $\ell_{i,t}$, uses its monopolistic power to set its nominal wage $W_{i,t}$ and an indexation rule $\delta_{i,t}$ that governs how the worker’s nominal wage evolves in periods of no labor-contract negotiations. The household preferences are described by the utility function

$$V_{i,t} = E_t \left\{ \sum_{s=t}^{\infty} \beta^{s-t} \left[ e^{u_{i,t}} \frac{c_{1-s}^{1-\sigma}}{1-\sigma} - \psi_{i,s} \frac{(1+\omega)^{1+\omega}}{1+\omega} \right] \right\},$$

(1)
where \( E_t \) denotes the mathematical expectation operator conditional on information available in period \( t \), \( \beta \in (0, 1) \) denotes the subjective discount factor, \( \psi \) and \( \omega \) are positive parameters, \( \sigma > 1 \) is the inverse of the intertemporal elasticity of consumption, and \( u_t \) is a zero-mean disturbance that affects the marginal utility of consumption. In turn, \( c_t \) is a composite of tradable consumption \( c^T_t \) and nontradable consumption \( c^N_t \), such that

\[
c_{i,t} = \left[ \eta \left( c^T_{i,t} \right)^{1-\frac{1}{\sigma}} + (1 - \eta) \left( c^N_{i,t} \right)^{1-\frac{1}{\sigma}} \right]^{\frac{1}{1-\sigma}} \tag{2}
\]

To ease the exposition of the model, I assume that the intra- and intertemporal elasticities of consumption substitution are equal to each other, such that \( \nu = 1/\sigma \). As a result, foreign debt and tradable consumption are determined independently from domestic activity in the nontradable sector. Uribe and Schmitt-Grohé (2017) argue that this assumption is empirically plausible.

In order to maximize the household’s utility function, the consumer chooses tradable and nontradable consumption, domestic bond holdings \( b_{i,t} \), and foreign debt \( b^*_{i,t} \), while the worker sets \( W_{i,t} \) and \( \delta_{i,t} \) when allowed to do so. For simplicity, I assume that financial assets have a maturity of one period. Further, and without loss of generality, I add a labor income subsidy \( \tau \) to eliminate dead-weighted losses in production generated by workers’ monopolistic power. In time \( t \), the household budget constraint in nominal terms is

\[
P^T_t c^T_{i,t} + P^N_t c^N_{i,t} + \frac{P_t b_{i,t}}{(1 + R_t) e^d_t} + \mathcal{E}_t P^*_{t-1} b^*_{t-1} \leq p^T_t y^T_t + (1 + \tau) W_{i,t} \ell_{i,t} + P_{t-1} b_{i,t-1} + \frac{\mathcal{E}_t P^*_{t} b^*_{i,t}}{1 + R^*_{t}} - \Upsilon_t + \varphi_{i,t} \tag{3}
\]

where \( R_t \) is the short-run nominal interest rate of domestic bonds, \( R^*_{t} \) is the foreign short-run nominal interest rate associated to foreign debt, \( y^T_t \) is the endowment of domestic tradable goods in the economy, which is exogenously given and divided evenly across households, \( P_t \) (\( P^*_{t} \)) is the price of the domestic (foreign) final good, \( \mathcal{E}_t \) is the nominal exchange rate defined as the price of foreign currency in terms of domestic currency, \( \Upsilon_t \) are lump-sum taxes, \( \varphi_{i,t} \) are Arrow-Debreu state-contingent securities that ensure that households start each period with equal wealth, and finally \( d_t \) is a zero-mean temporary aggregate demand shock that creates a wedge between the return on bonds and the risk free rate.

In real terms, the problem of the household is therefore:

\[
\max_{c^T_{i,s}, c^N_{i,s}, b_{i,s}, b^*_{i,s}, W_{i,T}, \delta_{i,T}} \mathbb{E}_t \left\{ \sum_{s=t}^{\infty} \beta^{s-t} \left[ e^{u_t} \eta \left( c^T_{i,s} \right)^{1-\sigma} + e^{u_t} (1 - \eta) \left( c^N_{i,s} \right)^{1-\sigma} - \psi \frac{\ell_{i,s}^{1+\omega}}{1+\omega} \right] \right\},
\]
subject to
\[
p_t^T c_{i,t}^T + p_t^N c_{i,t}^N + \frac{b_{i,t}}{(1 + R_t) e^{d_t}} + \frac{Q_t b_{i,t-1}^*}{1 + \pi_t^*} \leq p_t^T y_t + (1 + \tau) w_{i,t} e_{i,t} + \frac{b_{i,t-1}}{1 + \pi_t} + \frac{Q_t b_{i,t}^*}{1 + R_t^*} - \frac{\gamma_t}{P_t} + \frac{\varphi_{i,t}}{P_t},
\]
no Ponzi schemes, and the worker’s labor-specific demand (which is defined below). Variable
\[
p_t^T \equiv P_t^T / P_t \quad \text{and} \quad p_t^N \equiv P_t^N / P_t
\]
are the relative prices of tradable and nontradable consumption goods with respect to the general price index, \( w_{i,t} \equiv W_{i,t} / P_t \) is the household real wage level, \( \pi_t \equiv P_t / P_t - 1 - 1 \) is the domestic inflation rate, \( \pi_t^* \) is the foreign inflation rate, and \( Q_t \equiv E_t^* P_t^* / P_t \) is the real exchange rate.

Similar to Schmitt-Grohé and Uribe (2016), I assume that the law of one price holds for tradable goods, so \( P_t^T = P_t^T,^* E_t \), where \( P_t^T,^* \) is the price of foreign tradable goods. To simplify the analysis further, I assume foreign prices are constant and normalized to one, i.e. \( P_t^* = P_t^T,^* = 1 \). This assumption implies that the nominal price of tradables is equal to the nominal exchange rate, while the relative price of tradable goods equals the real exchange rate, i.e.
\[
P_t^T = E_t \quad \text{and} \quad p_t^T = Q_t.
\]
This assumption is also used by Schmitt-Grohé and Uribe (2016) and permits to focus on domestic price fluctuations. The first-order conditions for consumption, savings, and indebtedness are the following:

\[
e^{ut} (c_{i,s}^T)^{-\sigma} = \lambda_t p_t^T, \tag{4}
\]

\[
e^{ut} (1 - \eta) (c_{i,s}^N)^{-\sigma} = \lambda_t p_t^N, \tag{5}
\]

\[
\beta E_t \left\{ \lambda_{t+1} \frac{1 + R_t}{1 + \pi_{t+1}} e^{d_t} \right\} = \lambda_t, \tag{6}
\]

\[
\beta E_t \left\{ \lambda_{t+1} \frac{1 + R_t^*}{1 + \pi_{t+1}^*} \frac{p_{t+1}^T}{p_t^T} \right\} = \lambda_t, \tag{7}
\]

where \( \lambda_t \) is the Lagrange multiplier associated to the budget constraint. Notice that \( \lambda_t \) also denotes the marginal utility of wealth of each household. In this regard, since there is no cross-sectional inequality in households’ wealth at the end of each period (due to the existence of state-contingent securities), \( \lambda_t \) is common to all households. Further, \( \lambda_t \) serves as an income effect signal which rises as income decreases. This feature is particularly important for the worker’s labor-contract setting described below.
From equations (6) and (7), we can recover the interest rate parity condition in real terms:

\[ 1 + r_t = (1 + r_t^*) (1 + \Delta p_{t+1}^{T,e}) e^{-d_t}, \]

where \( r_t \equiv (1 + R_t)/E_t \{1 + \pi_{t+1}\} - 1 \) is the real interest rate of domestic bonds, \( r_t^* \) is the real interest rate of foreign debt, and \( \Delta p_{t+1}^{T,e} \equiv E_t \{P_{t+1}^T/p_t^T\} - 1 \) is the expected percent change in the real exchange rate. I assume that the interest rate associated to foreign debt is sensitive to the cross-sectional total level of debt \( b_t^* = \int_i b_{i,t}^* \, di \), such that

\[ 1 + r_t^* = (1 + \bar{r}^*) \left( b_t^* / \bar{b}^* \right)^{\xi \hat{r}_t^*}, \]

where \( \bar{r}^* \) is the steady-state foreign real interest rate, \( \bar{b}^* \) is the natural debt level of the domestic economy, and \( \hat{r}_t^* \) is a zero-mean exogenous variable that simulates changes in the foreign real interest rate (for different alternatives on how to close small open economy models, see Schmitt-Grohé and Uribe, 2003). The parameter \( \xi \) is usually set as positive but small number to induce stationarity in consumption, foreign debt obligations, and the trade balance.

Finally, the general price index equals

\[ P_t = \left[ \eta^{\frac{\sigma}{\sigma - 1}} \left( P_t^T \right)^{\frac{\sigma - 1}{\sigma}} + (1 - \eta)^{\frac{\sigma}{\sigma - 1}} \left( P_t^N \right)^{\frac{\sigma - 1}{\sigma}} \right]^{\frac{\sigma - 1}{\sigma - 1}}. \]

The latter results from the optimal combination of tradable and nontradable consumption that minimizes a household’s expenses.\(^2\)

**Labor contracts.** Similar to Erceg, Henderson and Levin (2000), a competitive employment agency combines households’ labor hours into an aggregate labor input \( \ell_t \), which is then supplied to the nontradable-good producer.\(^3\) The agency uses a CES technology to produce aggregate hours using the production function

\[ \ell_t^{(\theta - 1)/\theta} = \int_i \ell_{i,t}^{(\theta - 1)/\theta} \, di, \]

where \( \theta > 1 \) is the elasticity of substitution between any two labor types. The agency’s demand for type-\( i \) labor is thus given by

\[ \ell_{i,t} = \left( W_{i,t} / W_{i,t} \right)^{\theta} \ell_t, \quad (8) \]

where \( W_t = [\int_i W_{i,t}^{-\theta} \, di]^{1/\theta} \) denotes the aggregate nominal wage index. The latter is consistent with a zero-profit condition for the employment agency, such that

\[ w_t \ell_t - \int_i w_{i,t} \ell_{i,t} \, di = 0. \]

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\(^2\)In particular, each household solves the problem \( \min_{(c_T, c_N)} P^T c_T + P^N c_N - P_c \), subject to equation (2). Notice that minimum expenses imply that \( P_c = P^T c_T + P^N c_N \).

\(^3\)Notice that Erceg et al. (2000) feature a closed-economy model, so there is no tradable sector in their setup.
The labor contract negotiations follow closely the description in Carrillo et al. (2017). The negotiations feature Calvo (1983)'s price-setting mechanism, i.e. there is a probability to reset a labor contract in each period equal to $1 - \alpha$. If allowed to renegotiate in time $t$, the worker optimally sets $W_{i,t}$ and chooses from a pre-established menu a wage-indexation rule $\delta_{i,t}$ that updates his or her nominal wage in periods of no negotiation. In this simple model, all bargaining power is given to the worker. The reason behind this simplifying assumption is that both employment agency and the nontradable-good producer make zero profits in the model, so they are indifferent about the indexation rule selected by workers.

For tractability, the indexation-rule menu contains only two items: a $\delta^e$ rule based on expected future inflation, and a $\delta^p$ rule based on past or observed inflation. Therefore, if the contract negotiation of worker $i$ happens in period $t$ with an optimal nominal wage $W_{i,t}^{k,*}$ for contract $k \in \{e, p\}$, in period $T \geq t$, worker $i$'s wage is updated to either $W_{i,T}^e = \delta_{i,T}^e W_{i,t}^{e,*}$ or $W_{i,T}^p = \delta_{i,T}^p W_{i,t}^{p,*}$, where

$$\delta_{i,T}^e = E_t \{ 1 + \pi_{T+4} \} \delta_{i,T-1}^e \quad \text{and} \quad \delta_{i,T}^p = (1 + \pi_{T-1}) \delta_{i,T-1}^p, \quad \text{with} \quad \delta_{i,t}^k = 1.$$

Rule $\delta_{i,T}^e$ indexes wages to what workers expect inflation to be 4 periods ahead from time $t$. If a period is a quarter, that means a lapse of one year. In contrast, rule $\delta^p$ indexes wages to the inflation rate that a worker has observed in the most recent period.

If the labor-contract negotiation takes place in time $t$, worker $i$ faces the following problem:

$$\max_{W_{i,t}, \delta_{i,t}} \quad \mathbb{E}_t \left\{ \sum_{T=t}^{\infty} (\beta \alpha)^{T-t} \left[ \lambda_T (1 + \tau) \frac{\delta_{i,T} W_{i,t}}{P_T} \ell_{i,T} - \frac{\psi}{1+\omega} \ell_{1+\omega}^{1+\omega} \right] \right\}, \quad (9)$$

subject to the labor-specific demand $\ell_{i,T} = \left( \frac{W_T}{\delta_{i,t} W_{i,t}} \right)^\theta \ell_{T}^T$, and the indexation-rule menu, $\delta_{i,T} \in \{\delta_{i,T}^e, \delta_{i,T}^p\}$. The term $\beta \alpha$ discounts the future according to both the household preferences and the stochastic duration of the contract. Worker $i$ thus chooses $W_{i,t}$ and $\delta_{i,t}$ to maximize the difference between the expected utility derived from labor income vs. the cost imposed by lower leisure.\(^4\)

Notice that if $\lambda_t$ increases, worker $i$ would like to increase his or her labor supply since the utility value of labor income rises. In other words, as the household becomes poorer, it would like to smooth consumption by increasing the worker’s labor supply.

\(^4\)The first term in equation (9) denotes the utility value of labor income, expressed in consumption units, while the second term describes the disutility generated by labor hours.
Optimal nominal wage selection. Conditional on indexation rule $\delta_{k,t,T}$, the worker’s optimal nominal wage is given by

$$\frac{W_{k,\star}^t}{W_t} = \psi \frac{\theta}{(\theta - 1)(1 + \tau)} \frac{E_t \left\{ \sum_{T=t}^{\infty} (\beta \alpha)^{T-t} \left( \ell_{t,T}^k \right)^{1+\omega} \right\}}{E_t \left\{ \sum_{T=t}^{\infty} (\beta \alpha)^{T-t} \lambda_T \left( \delta_{t,T}^k W_t / P_T \right) \ell_{t,T}^k \right\}}. \quad (10)$$

The subindex $i$ is redundant because workers with indexation rule $\delta_{k,t,T}$ who can re-optimize in period $t$ will choose the same wage; in turn, $\ell_{t,T}^k$ denotes the time $T$ labor-specific demand for workers in group $k$ who last re-optimized in period $t \leq T$. The steady-state distortion generated by a worker’s monopolistic power is given by the wage markup $\frac{\theta}{\theta - 1}$. To remove this distortion, the labor subsidy must be set such that $1 + \tau = \frac{\theta}{\theta - 1}$. Taking into account these two observations, the optimal wage level can be rewritten as

$$\left( \frac{W_{k,\star}^t}{W_t} \right)^{1+\omega} = \psi \frac{\text{num}_{k,t}}{\text{den}_{k,t}}, \quad (11)$$

where

$$\text{num}_{k,t} \equiv (\ell_t)^{1+\omega} + \beta \alpha E_t \left\{ \left( \frac{1 + \pi_{t+1}^w}{\delta_{t+1}^{k+1}} \right)^{(1+\omega)\theta} \right\} \text{num}_{k,t+1},$$

$$\text{den}_{k,t} \equiv \lambda_t w_t \ell_t + \beta \alpha E_t \left\{ \left( \frac{1 + \pi_{t+1}^w}{\delta_{t+1}^{k+1}} \right)^{\theta-1} \right\} \text{den}_{k,t+1},$$

and $\pi_{t+1}^w \equiv \frac{W_{t+1}}{W_{t+1} - 1}$ is the inflation rate of nominal wages. Notice that in the case of fully flexible wages ($\alpha = 0$), wage dispersion vanishes along with the differences in individual labor supplies. Accordingly, equation (11) collapses to the familiar welfare-maximizing condition in which the marginal rate of substitution between consumption and labor, $MRS_{i,t} \equiv \psi \ell_{i,t} / \lambda_t$, equals worker $i$’s real wage $w_{i,t}$. Therefore, worker $i$’s supply of labor hours in a flexible-wage economy is given by

$$\ell_{i,t}^f = \frac{1}{\psi} \lambda_t^f w_{i,t}^f, \quad (12)$$

where the superscript $f$ denotes quantities of the flexible-wage economy, and the individual real wage $w_{i,t}^f$ equals the aggregate real wage $w_t^f$ for all $i$ and $t$. 
Optimal indexation rule selection. Staggered wages imply that a worker’s wage will not be re-optimized during some periods, but instead it will follow the chosen indexation rule. In these periods, the worker’s effective labor hours might deviate from the desired labor supply schedule, \( \ell^*_i,t \), which has the same functional form than the labor supply under flexible wages, i.e.

\[
\ell^*_i,t = \frac{1}{\psi_i} \lambda_t w_{i,t},
\]

This condition is optimal for the worker, since if he or she supplies \( \ell_{i,t} = \ell^*_i,t \) hours, given the real wage \( w_{i,t} \) and the income effect \( \lambda_t \), the household’s welfare would reach its maximum level given constraints. Therefore, a worker’s most-preferred indexation rule is the one that minimizes the welfare costs derived from wage rigidities or, equivalently, the one that minimizes the distance between the desired and actual labor supply of a worker.

Let system \( \mathbb{P}_t \) summarize all equilibrium conditions that characterize the equilibrium dynamics. Thus, worker \( i \) faces the following problem when he or she is drawn to renegotiate a new labor contract:

\[
\max_{\delta_{i,t} \in \{\delta^e, \delta^p\}} V_{i,t} \quad \text{subject to } \mathbb{P}_t,
\]

Notice that \( V_{i,t} \) is constrained by the expected duration of the labor contract, so the effective discount factor is \( \beta \alpha \). Furthermore, because of the state-contingent securities, individual consumption equals the aggregate level and does not depend on the individual indexation choice \( \delta_{i,t} \). In contrast, expected labor disutility does depend on the chosen indexation rule.\(^5\)

The aggregate degree of nominal wage indexation to past inflation is given by the proportion of workers who select the rule \( \delta^p \). This proportion is given by \( \chi \in [0, 1] \). Therefore, a proportion \( 1 - \chi \) of workers update their wages according to \( \delta^e \).

2.2 Nontradable-good producer

A perfectly competitive firm produces the nontradable good \( y^N_t \) using a linear technology on aggregate labor hours, so that:

\[
y^N_t = A e^{\alpha t} \ell_t,
\]

where \( \alpha \) is a productivity disturbance with mean zero.

\(^5\)Notice that, given worker \( i \)'s atomistic size relative to the aggregate, the individual choice of an indexation rule has a negligible effect on aggregate indexation.
The nontradable-good producer maximizes its real-term profits, such that
\[
\max_{\ell_t} ~ p_t^N A e^{\alpha t} \ell_t - w_t \ell_t,
\]
which leads to
\[
w_t = p_t^N A e^{\alpha t}.
\]
The perfectly competitive nontradable-good producer holds a zero-profit condition at all times.

### 2.3 Economic policy

The government collects lump-sum taxes and issues one-period bonds to subsidize workers’ labor supply, and pay its obligations. The public budget constraint in real terms is:
\[
\Upsilon_t + \int_i \frac{b_{i,t}}{(1 + R_t)e^t} \, di = \tau \int_i w_{i,t} \ell_{i,t} \, di + \int_i \frac{b_{i,t-1}}{1 + \pi_t} \, di.
\]
In an open economy, the government may decide to fix the nominal exchange rate or to leave it floating, determined by market forces. In case of a fixed exchange rate regime, the central bank sets a target for the depreciation of the nominal exchange rate, such that
\[
1 + \Delta_t = \frac{\mathcal{E}_t}{\mathcal{E}_{t-1}}.
\]
In this regime, the variable \( \Delta_t \) is a policy choice, exogenously given, while the nominal short-run nominal interest rate \( R_t \) must adjust endogenously to achieve the exchange-rate target.

In contrast, in a floating exchange rate regime the central bank fixes \( R_t \) according to a feedback rule that depends on inflation and/or domestic real activity. In this case, let the monetary-policy reaction function be given by a Taylor-type rule of the form
\[
1 + R_t = \frac{1 + \pi_t^*}{\beta} \left( \frac{1 + \pi_t}{1 + \pi_t} \right)^{a_\pi} \left( \frac{y_t}{\bar{y}} \right)^{a_y},
\]
where \( y_t \) and \( \bar{y} \) denote total real GDP in time \( t \) and the non-stochastic steady state, and \( \pi_t^* \) is the inflation target that follows the process \( \pi_t^* = (1 - \rho_\pi)\bar{\pi} + \rho_\pi (\pi_{t-1}^* + \varepsilon_{\pi_t}) \). If \( \rho_\pi = 0 \), the central bank features an inflation-targeting regime, while if \( \rho_\pi = 1 \) the central bank implements a drifting-inflation regime.
2.4 Equilibrium and model solution

Aggregate consumption in tradable and nontradable goods is given by $c_T^t = \int_i c_{T,i,t}^i di$ and $c_N^t = \int_i c_{N,i,t}^i di$, respectively. Total foreign debt is $b^*_t = \int_i b_{i,t}^i di$. In turn, the sum of all state-contingent securities equal zero, i.e. $\int_i \varphi_{i,t} di = 0$. Equilibrium in the nontradable sector implies that $y_N^t = c_N^t$. This condition, along with the zero-profit condition of the employment agency and the nontradable-good producer, plus the budget constraint of households and the government, determine the trade balance:

$$c_T^t + \frac{b^*_{t-1}}{1 + \pi^*_t} = y_T^t + \frac{b^*_t}{1 + R^*_t}.$$ (15)

The economy’s GDP in nominal terms is defined as $P_t y_t = P_T^t y_T^t + P_N^t y_N^t$, which in real terms becomes

$$y_t = p_T^t y_T^t + p_N^t y_N^t.$$

In equilibrium, there exists a set of prices $\{\lambda_t, p_T^t, p_N^t, w_t, w_{i,t}, r_t\}_i$ and a set of quantities $\{y_t, c_T^t, c_N^t, b^*_t, \ell_t, \ell_{i,t}, \chi\}_i$ for all $i$ such that all markets clear at all times, and agents maximize their utility and profits.

To determine the equilibrium level of wage indexation to past inflation $\chi^{eq}$, I compare households expected welfare costs generated by each indexation rule $\delta$ within a fine grid of indexation values $\chi \in [0, 1]$. The most preferred rule $\delta$ of households is the one with the lowest welfare cost. The corner solution $\chi^{eq} = 0$ is achieved if, for any $\chi \in [0, 1]$, the expected-inflation indexation rule $\delta^e$ yields the lowest welfare cost for all households. Similarly, $\chi^{eq} = 1$ if for any $\chi$, the past-inflation indexation rule $\delta^p$ yields the lowest welfare cost for all household. An interior solution exists if there is at least one $0 < \chi < 1$ such that the welfare costs associated to each indexation rule are equal. In such a case, households are indifferent between the two indexation rules.

I solve the model up to a second-order approximation in order to compute the stochastic steady state of the model, and rank the indexation rules according to their related welfare. The model is solved using Dynare, version 4, and the pruning algorithm of Andreasen, Fernández-Villaverde and Rubio-Ramírez (2018).

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The stochastic steady state is also referred to as the “ergodic mean in the absence of shocks”, or EMAS (see Born and Pfeifer, 2014) or the “risky steady state” (see Juillard, 2011).
2.5 Calibration

I calibrate the model for Mexico in two exchange-rate regimes: fixed and floating. The calibration strategy is mixed. Some parameters are set to match moments of the data, such as the long-run equilibrium of the real interest rate, or the ratio between tradable output over non-tradable output. Some other parameters take standard values of the literature, like those governing the households preferences. Finally, the parameters related to the volatility and persistence of shocks are retrieved from a Bayesian estimation of the model with Mexican data for two time periods, each comprehending a different exchange-rate regime. The first sample period corresponds to the fixed exchange-rate regime and a nonindependent central bank, and spans from 1982Q1 to 1994Q4. The second sample period, characterized by a floating exchange rate regime and an independent central bank with a price-stability goal, covers 1996Q1 to 2018Q3. The year 1995 does not enter into the estimation to avoid the extreme volatility observed in aggregate Mexican data during the Tequila crisis. The data used in the estimation include 8 variables: core CPI inflation, the percent change in contractual nominal wages, tradable and nontradable GDP, the percent change of the peso-dollar nominal exchange rate, an index of the real exchange rate between Mexico and the US (built using core CPI indexes for Mexico and the US, and the peso-dollar parity), the nominal interest rate of 3-month Mexican government bonds, and the one-year real interest rate of US government bonds as computed by the Cleveland Fed from asset prices in US fixed-income markets. All data is collected from Banco de México, INEGI, and the Cleveland Fed.

The subjective discount factor $\beta$ is set to match the long-term average of the ex-post short-run real interest rate in Mexico observed in the two periods (10% in 1982-1994 and 4% in 1996-2018). The Calvo probability $\alpha$ is equal to 0.75, which implies that a wage contract is negotiated on average once every year. The parameter $\eta$ and the steady-state level of tradable output $\bar{y}^T$ are set to match the ratio between the value of tradable and nontradable GDP at the steady state, $\bar{p}^T \bar{y}^T / (\bar{p}^N \bar{y}^N)$, which is equal to 39%, according to the average for the two sample periods in Mexico. The preference parameter $\psi$ is set such that steady-state labor equals a third of the available

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7 Banco de México let the peso-dollar parity to float in December of 1994, during the unfolding of the Tequila crisis. The year 1995 is not considered in any of the samples due to the atypical volatility observed in the Mexican economy.

8 Tradable GDP is composed by agriculture, forestry, fishing, mining, and manufacturing sectors. Nontradable GDP includes sectors producing electricity, gas and water, plus construction, retail trade, transport, education, and public and private services.
Table 1: Size and persistence of shocks

<table>
<thead>
<tr>
<th>Shock</th>
<th>Persistence $\rho_x$</th>
<th>St. deviation $\sigma_x$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed exchange rate regime (82-94)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>$a_t$</td>
<td>0.97</td>
</tr>
<tr>
<td>Tradable endowment</td>
<td>$y^T_t$</td>
<td>0.97</td>
</tr>
<tr>
<td>Domestic bond returns</td>
<td>$d_t$</td>
<td>0.57</td>
</tr>
<tr>
<td>Foreign bond rate</td>
<td>$\tilde{r}^*_t$</td>
<td>0.98</td>
</tr>
<tr>
<td>Marginal utility</td>
<td>$u_t$</td>
<td>0.50</td>
</tr>
<tr>
<td>Nominal anchor (loose), 82-87</td>
<td>$\Delta_t$</td>
<td>very close to 1</td>
</tr>
<tr>
<td>Nominal anchor (tight), 88-94</td>
<td>$\Delta_t$</td>
<td>0</td>
</tr>
<tr>
<td><strong>Floating exchange rate regime (96-18)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>$a_t$</td>
<td>0.97</td>
</tr>
<tr>
<td>Tradable endowment</td>
<td>$y^T_t$</td>
<td>0.98</td>
</tr>
<tr>
<td>Domestic bond returns</td>
<td>$d_t$</td>
<td>0.69</td>
</tr>
<tr>
<td>Foreign bond rate</td>
<td>$\tilde{r}^*_t$</td>
<td>0.75</td>
</tr>
<tr>
<td>Marginal utility</td>
<td>$u_t$</td>
<td>0.93</td>
</tr>
<tr>
<td>Nominal anchor (loose), 96-02</td>
<td>$\pi^*_t$</td>
<td>very close to 1</td>
</tr>
<tr>
<td>Nominal anchor (tight), 03-onwards</td>
<td>$\pi^*_t$</td>
<td>0</td>
</tr>
</tbody>
</table>

time of workers. In turn, $\sigma = 1.25$ and $\omega = 3$. These values are within the ballpark of those used in the literature. Parameter $A$ ensures that non-tradable output $y^N$ equals to one at the non-stochastic steady state. The elasticity of substitution between any two labor types $\theta$ equals 10, while the elasticity of debt $\xi$ in the foreign-debt interest rate equation is equal to 0.005. Again, these values are standard in the literature. Total foreign debt to GDP is set to 60%, although this number is inconsequential for the aggregate dynamics of the model since there is no risk of default and access to the foreign market is secured in any period. For the floating exchange rate regime, the Taylor rule parameters are $a_\pi = 1.5$ and $a_y = 0.5$.

All shocks follow AR processes of order 1, such that $x_t = (1 - \rho_x)x + \rho_x x_{t-1} + \sigma_x \varepsilon_{x,t}$. Table 1 summarizes the calibration of shocks for the two time periods. Some remarks are worth noting. First, the fixed exchange rate regime is characterized by larger shocks than the floating exchange rate regime. Second, in each regime, the table differentiates between two subperiods of inflation-abating policies. The subperiod of 1982 to 1987 featured large devaluations of the currency, averaging 120% per year. The exchange-rate policy stabilized substantially in the subperiod of 1988 to November 1994, where the average devaluation reached 6% per year. The change in the exchange-
rate policy was part of an overall shift in price control policies and wage indexation practices in December 1987, where the Economic Solidarity Pact (Pacto de Solidaridad Económica or PSE) took effect. This pact supported a change in wage indexation practices, banishing past-inflation indexation and promoting an expected-inflation indexation.9

In a similar vein, the subperiod 1996 to 2002 featured large swings in inflation in comparison to the subsequent subperiod, where the central bank established a target of 3% annual inflation in 2003. The two panels in Figure 2 show with a dashed vertical lines the changes in the behavior of the nominal anchor in the two exchange rate regimes in Mexico.

Figure 2: Nominal anchors in the two exchange-rate regimes

![Graph showing nominal anchors in the two exchange-rate regimes]

**Note:** The figure shows clear changes in the path of the nominal anchor in each of the two regimes. These changes were the result of the introduction of the PSE in December 1987, and the formal adoption of the 3% inflation target in 2003.

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3  Equilibrium level of wage indexation

I compare the welfare costs generated by the two wage indexation rules using standard compensating consumption variations. Such compensations make agents indifferent between the lifetime utility of a non-stochastic equilibrium, and the expected lifetime utility of a long-run stochastic equilibrium a given indexation rule. In the non-stochastic environment, households have effectively the same wage and utility levels regardless of the chosen indexation rule, since in the absence of shocks wage indexation is inconsequential (as inflation and the real wage do not vary).

The welfare measures are constructed as follows: Let $V^k$ represent the unconditional expected lifetime utility attained by households with indexation rule $\delta^k$. In turn, define $V^d$ as the welfare attained in the deterministic steady state, so that:

$$V^d = \frac{1}{1 - \beta} \left[ \frac{\bar{c}^{1-\sigma}}{1 - \sigma} - \psi \bar{l}^{1+\omega} \right],$$

where $\bar{c}$ and $\bar{l}$ are the long-run equilibrium levels of consumption and labor supply in the deterministic steady state.

The welfare cost of a particular indexation rule is defined as the percent change in consumption, $ce$, relative to $\bar{c}$ such that the following condition holds:

$$V^k = \frac{1}{1 - \beta} \left[ \frac{(\bar{c}(1 - ce))^{1-\sigma}}{1 - \sigma} - \psi \bar{l}^{1+\omega} \right].$$

A positive (negative) $ce$ measures how much the reference steady state consumption would need to fall (increase) so that welfare in the non-stochastic steady state is the same as in a stochastic equilibrium. Thus, $ce > 0$ ($ce < 0$) is a welfare cost (gain) relative to the deterministic steady state. Given the utility function assumed in the model, we have that:

$$ce = 1 - \left[ 1 + \left( \frac{(1 - \sigma)(1 - \beta)(V^k - V^d)}{\bar{c}^{1-\sigma}} \right) \right]^{(1-\sigma)^{-1}}. \quad (16)$$

Figure 2 shows the long-run welfare costs associated to labor contracts with past-inflation indexation $\delta^p$ ($ce^p$ is the line with circles) and those with expected-inflation indexation $\delta^e$ ($ce^e$ is the plain line) for the two exchange rate regimes considered and loose or tight nominal anchors. A loose nominal anchor refers to a situation in which shocks to this anchor were large and permanent.
This situation seems to apply to Mexico in the subperiods 1982-1987 and 1995-2002, as explained earlier. A tight nominal anchor refers to an inflation-abating policy that aims to stabilize inflation towards low and stable levels. These policies seem to apply to Mexico during the PSE agreement from 1987 to 1994 and after the adoption of a fixed inflation target in 2003.

In each panel of Figure 2, the equilibrium degree of aggregate indexation to past inflation $\xi_{eq}$ is achieved as an interior solution. This level of aggregate indexation is an equilibrium in all cases shown, since workers have no incentives to change their $\delta$ rule at this level of aggregate indexation (recall that $\xi$ denotes the proportion of workers with the indexation rule $\delta^p$). Also, $\xi_{eq}$ is globally stable because, for any initial $\xi_0 \neq \xi_{eq}$, workers choose the contract with the lowest expected costs, and so aggregate indexation $\xi$ would converge eventually to $\xi_{eq}$ in the long run. The main result from the figure is that monetary regimes featuring a loose nominal anchor will tend to feature a higher degree of wage indexation to past inflation. In addition, and conditional on the calibration proposed, a loose nominal anchor increases households’ welfare costs in stochastic environments by a factor of 4 to 8 times in comparison to monetary regimes with a tight nominal anchor. Part of the higher welfare costs are explained by a more unstable monetary policy, but also for a feedback effect between inflation and nominal wages that prolong the perverse effects of inflationary shocks in the economy. As shown below, a higher degree of wage indexation to past inflation effectively increases the persistence of inflation.

A first-order approximation to the wage-setting equation (11) and the aggregate nominal wage index yields a wage Phillips curve of the form:

$$\hat{\pi}_t^w = \chi \hat{x}_{t-1} + \kappa \hat{x}^N + \beta E_t \{ \hat{\pi}_{t+1}^w - \chi \hat{x}_t \} - (1 - \chi) \Delta \pi_t^*, \quad (17)$$

where $\hat{\pi}_t^w = \pi_t^w - \pi_t^*$ and $\hat{\pi}_t = \pi_t - \pi_t^*$ are deviations of wage and price inflation from the inflation target, $\hat{x}^N = \hat{y}_t - \hat{y}_t^{N,f}$ is the nontradable efficient output gap, $\hat{y}_t^N$ is the percent deviation of nontradable output with respect to its steady-state level, $\hat{y}_t^{N,f}$ is its flexible-wage economy counterpart, and $\kappa \equiv \frac{(1-\beta\alpha)(1-\alpha)(\omega+\sigma)}{\alpha(\omega+\theta)}$.

Equation (17) shows that as the aggregate degree of wage indexation to past inflation increases, so does the co-movement between nominal wages and inflation. Since wages are a fundamental component of production costs of the nontradable producer, the latter implies that a feedback effect from wages to prices emerges. Using the equilibrium conditions of the economy, the above wage
Figure 3: Welfare costs in each subperiod within the two exchange rate regimes

(a) Fixed forex regime: loose anchor

(b) Fixed forex regime: tight anchor

(c) Floating forex regime: loose anchor

(d) Floating forex regime: tight anchor

Welfare cost (%)

Aggregate past-inflation indexation, $\chi$

Note: The figure shows the households welfare costs associated with each indexation rule conditional on the calibration of Table 1. The decentralized equilibrium level of aggregate indexation to past inflation is signaled in the $x$-axis by the dotted line.

Phillips curve can be rewritten as a New-Keynesian Phillips curve (NKPC) for prices as follows:

$$\hat{\pi}_t = \frac{X}{1+\beta\chi} \hat{\pi}_{t-1} + \frac{\kappa}{1+\beta\chi} \hat{\pi}_t + \frac{\beta}{1+\beta\chi} E_t \{ \hat{\pi}_{t+1} - \Delta \hat{p}_{t+1}^T \} + \frac{\varphi}{1+\beta\chi} \Delta \hat{p}_t^T + \epsilon_t^p, \quad (18)$$
where $\epsilon^p_t \equiv ((1 - \xi)\Delta \pi^* + \beta(\rho_a - 1)a_t - \Delta a_t)/(1 + \beta \chi)$, and $\varphi = \left(\frac{\eta}{1 - \eta}\right)^{1/\sigma} \left(\frac{\bar{p}^T}{\bar{p}^N}\right)^{(\sigma - 1)/\sigma}$, $\bar{p}^T$ and $\bar{p}^N$ and are the steady-state levels of the relative price of tradable and nontradable goods. In this equation, it is clear that a higher degree of wage indexation to past inflation implies, other factors held constant, a higher persistence in inflation (first term in equation 18). In the next section, we verify with the help of a time-series model whether the predictions about the dynamics of prices and wages conditional on the degree of wage indexation to past inflation hold for Mexico.

4 Inflation and wage dynamics in Mexico

Inflation in Mexico displayed high levels, high persistence and large volatility in the early 80s and second half of the 90s. Part of these price variations were passed through nominal wages, which in turn pressured back prices. As the model in the previous section suggested, the second-round effects between prices and wages tends to be larger the higher is the degree of wage indexation to past inflation.

This section presents evidence on price and wage dynamics consistent with a high degree of wage indexation to past inflation in the 80s, and a low degree of this type of indexation in the 2000s. The analysis suggests that inflation persistence has decreased over time, while the correlation between wage revisions and observed inflation is lower today of what it was in the 80s.

To measure changes in the dynamics of inflation, nominal wage revisions, and the percent change in the nominal exchange rate, I use the following vector autorregression model with time-varying parameters and stochastic volatility:

$$X_t = C_t + A_{1,t}X_{t-1} + A_{2,t}X_{t-2} + \epsilon_t,$$

where $X_t = (\Delta\%E_t, \pi^w_t, \pi_t)'$ and var($\epsilon_t$) = $R_t$. Variable $\Delta\%E_t$ is the percent change in the nominal exchange rate, $\pi^w_t$ denotes contractual nominal wage revisions, and $\pi_t$ is core inflation. The data used in the estimation is presented in Figure 4.

The model in equation (19) helps to measure changes in trend inflation, which is defined as the level to which inflation would converge in the absence of further shocks to the economy. Trend inflation may vary, as the monetary-policy regimes with loose nominal anchors suggest. In the time-series model, trend inflation is given by the third element of the column vector $(I - A_{1,t} - A_{2,t})^{-1}C_t$. The estimated path for the autoregressive coefficients $A_{p,t}$ also help to measure other
features of the data, such as the persistence of inflation, the exchange rate pass through to prices, and the correlation between wage revisions and past inflation. Finally, the stochastic volatility $R_t$ helps the model to cope with periods of high volatility. Notice that the larger inflation persistence is, the longer inflation takes to converge to its trend level.
The model is estimated through Bayesian techniques for the period 1982M2 to 2018M8, following a methodology similar to Primiceri (2005) and Del Negro and Primiceri (2015). As it is usual in the literature, I use a pre-sample period to inform the \textit{a priori} distribution of the model coefficients and variance-covariance matrix. The pre-sample spans 1982M2 to 1984M3. The model’s results are therefore available from 1984M4 onwards.

Figure 5 shows the estimate of trend inflation along with the stochastic volatility of inflation for the whole sample period. Accordingly, trend inflation stabilized after the adoption of inflation targeting at the beginnings of the 2000s. In addition, the model correctly identifies the early 80s and late 90s as periods characterized by high inflation volatility, or a loose nominal anchor.

The theoretical analysis of the previous section point out that if wage indexation to past inflation were high, inflation persistence would also be high. Panel (c) in Figure 5 presents evidence consistent with this prediction. The picture shows that the persistence of inflation was higher in the 80s and late 90s then afterwards. This result is confirmed if instead we measure the correlation between present and past inflation, as it is done in panel (a) of Figure 6.

In addition, panel (d) in Figure 5 shows that the estimated exchange-rate pass through to prices has declined over time, a result that is in line with previous findings for Mexico (see Capistrán, Ibarra and Ramos-Francia, 2011; Cortés-Espada, 2013).

The theoretical analysis also suggests that if wage indexation to past inflation were high, the correlation between wage revisions and past inflation would also be high. Panel (b) in Figure 6 shows precisely this result. It is noteworthy that the correlation between wage revisions and past inflation rises in the subperiods characterized by a loose nominal anchor. In addition, notice that after the adoption of the 3% inflation target by Banco de México, the correlation between wages and past inflation has followed a consistent but slow descending trend.

In order to measure the importance of the second-round effects from wages to prices, I compute impulse-response functions for inflation and wage revisions to shocks affecting each of these variables. The response are computed using a Cholesky decomposition of model in equation (19). To exploit the time-varying dimension of the model, I select 4 time periods to compute the impulse-responses: 1984-1987, 1988-1994, 1995-2002, and 2003-2018. These subperiods correspond to
the monetary-policy regimes featuring a loose nominal anchor (first and third superiods) and a tight nominal anchor (second and fourth subperiods). Figure 7 displays the median responses. Panels (a) and (b) present the responses to a shock on inflation, while panels (c) and (d) do so for a shock on nominal wage revision.

It is worth noting that the impulse-responses show a smooth transition in all panels, from high to low inflation persistence, with the exception of panel (c). In this panel, the responses of inflation to a wage revision shock contains a substantial amount of second-round effects. This behavior is probably capturing wage indexation practices that prevailed in the early 80s. In particular, the high degree of price and wage indexation to past inflation allowed by the government, and implemented by firms and unions, added a strong inertial component to inflation. The large second-round effects in inflation during the 80s was one of the reasons to launch the PSE agreement in December.
Figure 6: Dynamic correlation between inflation and wage revisions against past inflation

Note: Own estimations. Data is collected from Banco de México, INEGI, and the Mexican Labor Ministry. The frequency is monthly.

1987. As mentioned earlier, this pact discouraged practices that indexed wages to past inflation, promoting instead the indexation to a measure of expected inflation. As the the impulse-responses in Figure 7 suggest, the indexation policy of the PSE was quite successful at abating second-round effects of wages on prices.

5 Conclusion

This paper argues that practices that index nominal wages to past or observed inflation may be influenced by the monetary-policy regime of an economy. The theoretical model provides micro-foundations to the stylized fact that economies with a tight nominal anchor experience an inflation rate with a strong forward-looking component, while those economies with a loose nominal anchor show an inflation rate with a strong backward-looking component. In addition, the analysis suggests that a monetary-policy regime featuring a loose nominal anchor may increase substantially the welfare costs of society through two channels, a direct one and an indirect one. The former refers to the exacerbated real volatility introduced in the economy by a drifting trend inflation. The latter refers to the welfare costs derived by a more persistent inflation rate, along with the associated higher costs of disinflation policies.
For the case of Mexico, an estimated time-varying parameter BVAR model suggests that price and wage dynamics are consistent with a high degree of aggregate wage indexation in the 1980s, and a low degree in the 2000s. In particular, inflation is less persistent today than in the 1980s, while second-round effects of wages on prices are practically absent in the current regime with a tight nominal anchor. Two facts seem to have contributed to these phenomena. First, the adoption of an explicit inflation target in 2003 has helped to anchor inflation expectations in Mexico, which might have contributed to promote wage revision practices that take into account expected inflation. And second, the explicit arrangement promoted by the PSE agreement in 1987, which discouraged wage revision practices based on past inflation, seems to have printed a long lasting effect on abating the second-round effects of wages on prices.

Note: Own estimations.
References


Juillard, M. (2011) Local approximation of DSGE models around the risky steady state, wp.comunite 0087, Department of Communication, University of Teramo.


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