EXCHANGE-RATE REGIME AND SECTORIAL PROFITABILITY IN A SMALL OPEN ECONOMY: A THEORETICAL AND EMPIRICAL ANALYSIS OF ARGENTINA (2016-2023)

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Abstract

This paper studies, both theoretically and empirically, tradable (T) and non-tradable (N) sectorial profit rates dynamics in a small, price-taker peripheral economy with foreign exchange controls and parallel exchange rate (ER) markets. Using a state-space econometric representation of the Argentine economy for the period 2016-2023, we found evidence to support three main hypotheses derived from the theoretical models. First, an official exchange rate depreciation increases tradable goods profit rates, but has no effect on non-tradeable goods profitability. Second, the rise of the financial exchange rate increases sector N's profit rate but has no effect on T's. Moreover, this effect depends on the magnitude of the ER gap in a positive, but in a non-linear way. Third and finally, over sufficient time, both profit rates tend to influence each other, through the action of competition. This means that, eventually, and increase (depreciation) in the official exchange rate exerts its influence in sector N's profit rate; while, if sufficiently persistent and big enough, a rise in the financial ER ends up affecting sector T's profit rate too.

JEL Codes: E31, E11, F41.

Key Words: Argentina, Inflation, Exchange rate, Foreign exchange controls, Sectorial profit rates, Small open economy.

1. Introduction

Covid-19 pandemic and the war in Ukraine have again centered the economic debate on the causes of inflation. In particular, it has regained relevance, even among mainstream economists (Bernanke and Blanchard, 2023), those explanations that give prominence to production costs and, especially, the existence of *conflict* between capitalists and workers over income distribution -or “conflicting claims”- (Lorenzoni and Werning, 2023; Vernengo and Pérez Caldentey, 2023; Weber and Wasner, 2023).

However, most of these explanations have focused on a closed economy, without considering the main features of open economies to capital and trade flows, and where the exchange rate (ER) has a key role, not only as a cost of production, but also as variable that can affect income distribution *persistently* (Vernengo, 2001). While the former role has been extensively documented by the post-Keynesian literature (Blecker, 1989; Lavoie, 2014; Bastian y Setterfield, 2020), most of these works assume an economy where internal production conditions determine the international price of exported goods, i.e. a *price maker* economy. In this context, a rise (i.e. a depreciation) in the real ER has no unequivocal effect on the profit rate and, in general, on distribution. The reason is that domestic producers are able to “export inflation”, that is, they can pass-through unit cost increments in imported inputs to the rest of the world, and thus keep the domestic profit rate unaltered. By the same token, a price maker economy may be able to accommodate second round effects of wage increases. Thus, in a price-maker economy, the price system has an additional degree of freedom, with the implication that the effect of currency devaluation on the real wage and the real profit rate is a priori undetermined.

In an economy like Argentina, which besides being open, is also small -it is a *price taker* economy-, this degree of freedom is eliminated through the condition that the internal cost of production of its main exportable commodities must accommodate to their internationally *given* price. This, in turn, has important implications for income distribution. The seminal work of Steedman (1999) -recently developed by Dvoskin and Feldman (2018, 2022) and Dvoskin et al. (2020), among others, to explain Latin American specificities- shows that in these kinds of economies there is a *necessary* positive relationship between real ER depreciation and profit rate. As in any "large" economy, currency depreciation increases domestic costs of production in the proportion of imported inputs in unit total costs. However, in small open economies, tradable (T) commodities' domestic prices increase in the *same magnitude* as devaluation. Thus, in the absence of Ricardian rents, T-sector profit rate *must* increase as well. And then, through the action of competition, non-tradable (N) sector profit rate increases too, thus reducing real wages. A result developed by Steedman (1999) that has not been paid the attention it deserves, is that this mechanism occurs even if T sector produces non-basic commodities in the sense of Sraffa (1960). The reason is that this sector provides the necessary foreign currency for importing basic inputs, and therefore, the T commodities are *indirectly* employed in their production.

In a small-open economy, therefore, conflict over income distribution -that is, between real wage and profit rate- manifests itself as a conflict between real exchange rate and real wages[1]. To our knowledge however, this kind of small-open-economy dynamics has only been studied theoretically (Morlin, 2022; Dvoskin y Alvarez, 2022), but not empirically. It is the first goal of this paper to fill this gap. To this end, we extend the model for a small open economy developed in Dvoskin and Feldman (2018) and Dvoskin and Feldman (2022). We distinguish between a T sector and a N sector, and we study the effect of ER devaluation on the evolution of sectorial profit rates in a context of persistent inflation. We then compute these dynamics empirically, using a state-space representation for Argentina in the period 2016-2023, where profit rate variations are treated as the latent unobserved states in a structural prices-of-production model. The empirical results illustrate the propagation mechanism outlined above. That is, an official-ER devaluation (or a commodities price shock) affects primarily T-sector profit rate, and only in subsequent periods that of the N sector.

[1] Conflict will be more intense, ceteris paribus, the greater is wage resistance, an aspect that, due to its long tradition of strong union institutions, seems to distinguish Argentina from the rest of the LA region (see, e.g., Trajtemberg and Valdecantos, 2015 and García-Cicco et al. 2023). This also explains why, in this particular economy, exchange rate pass-through is considerably higher in these economies than in those observed for economies of similar characteristics (Vernengo and Perry, 2015; Montes-Rojas and Toledo, 2022).

Now, not only is Argentina a small open economy like most Latin American countries. It also has a particular feature that distinguishes it from the rest of the region. Since the last quarter of 2011 onwards -with the brief exception of the liberalization experience of 2016-mid 2019-, the economy has implemented foreign exchange controls, with the objective to preserve exchange rate stability in a context of growing FX scarcity, in an attempt to avoid the negative consequences of recurrent balance-of-payments crises (devaluation → inflation → real wage drop → recession), widely documented by Latin American structuralist literature in the postwar period (Braun and Joy, 1968; Diamand, 1973). These controls usually take the form of restrictions to access the official foreign exchange market for import payments, invisible transactions (profits and dividends to non-residents shareholders and other current account transfers like travel services), payments on amortization on external loans and residents' external asset build-up. Once this kind of restrictions are imposed, a parallel foreign exchange system emerges; that is, a scheme in which a market-determined exchange rate, typically used to settle financial transactions, coexists with one or more official, generally managed, exchange rates (see Feldman and Moldovan, 2023 for an in-depth analysis of stylized facts of foreign exchange controls, with focus on Argentina).

It should be noted however that, in principle, the relevant exchange rate to determining income distribution is the official one, because this is the reference value for commercial transactions, which in turn, determine normal costs of production. However, in a context of chronic foreign exchange scarcity, the financial exchange rate dynamics and the corresponding exchange rate gap between the parallel and official ER, exert an indirect, but not less concrete, role, by determining the expectations over the future value of the official exchange rate. If the financial ER measures the marginal cost of US dollars faced by the private sector, it is plausible to assume that a greater exchange-rate gap, ceteris paribus, increases devaluation expectations, and this raises expected imported inputs reposition costs. It is even plausible that those expectations depend positively on the *magnitude* of the ER gap.

The fact is that, differently from a depreciation of the official ER, when the financial ER rises, N sectors, not directly exposed to international competition, are the firsts that can pass-through the expected rise in production costs to the selling price of their commodities. But if the official exchange rate does not follow the dynamics of the financial one, the result will be an increase in N-profitability vis-à-vis the T sector. Moreover, if the exchange rate gap is sufficiently persistent (in other words, if it does not trigger a devaluation of the official ER), differences in actual profit rates may persist over time. However, this divergence cannot, and will not, last indefinitely. Eventually, T profit rate should rise as well. However, since T selling price is constrained by international competition, this rise will occur, ceteris paribus international prices, only when the official exchange rate depreciates. All T sectors can do to accelerate this outcome is to reduce their supply of foreign currency in the official market, therefore contributing to FX scarcity and reserve losses.

Thus, the second goal of this paper is to study these particular dynamics of small open economies under foreign exchange controls and parallel exchange rates. To do this, we use the state-space econometric model and incorporate both official and financial ERs and different profit rates' dynamics. In this case, we find that financial ER devaluation positively affects N actual profit rates and has no significant effect on T sector's profit rate (while it may even indirectly decrease it in the short run). We also find that this effect shows a non-linear trend, thus increasing with increases in the ER gap. This may point to a relevant inflation mechanism in small countries with foreign exchange controls, not sufficiently studied yet.

The paper is organized as follows. Section 2 presents a long period –static- model for a small open economy. Section 3 develops a set-up to evaluate inflation and exchange rate dynamics. Section 4 describes the econometric model for the state-space representation. Section 5 shows the data sources and presents the empirical results. Section 6 concludes.

2. Long period (static) model

We consider a small –price-taker- open economy under a given pattern of specialization, to avoid any discussion about technical choices. To simplify the exposition, we assume that only two commodities are produced: one tradable agricultural commodity (T) and one non-tradable commodity (N). There is a third commodity that represents imported inputs (i.e. machines), M, unable to be produced by the domestic economy[2]. These commodities satisfy the following conditions:

$$p^T = ep^{T*} \tag{1}$$

$$p^M = ep^{M*} \tag{2}$$

where p^T and p^M are the internal prices of T and M, p^{T*} and p^{M*} are their corresponding internationally given prices and e is the official exchange rate[3] (units of Argentinian Pesos per unit of US Dollars). Competition in the international markets determines that commodity T will be domestically produced only if its normal cost of production is lower or equal than the international price. The latter is assumed to be the case (that is why we restrict to the case when $p_T = ep^{T*}$).

Labour is homogeneous, thereby equalizing the wage rate in the two sectors. Let (ℓ^T, ℓ^N) be the labour unit inputs in both sectors. Capitalist competition implies that the profit rates (r^T for T, r^N for N) are uniform across sectors in a long-period position, although we would later consider short- and medium-term dynamics where they are not necessarily equal. We assume production takes one period.

2.1. *T* and *N* as basic commodities

Production requires both the T and N commodities, together with imported inputs. Prices of production are:

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[2] This highlights the old structuralist idea of "technological dependency" (Vernengo, 2006; Dvoskin and Feldman, 2022). That is, economies which, like Argentina, have incomplete input-output matrices and must necessarily import capital goods to produce.

[3] In this paper we assume that e is the domestic price of foreign currency. This means that e increases with a depreciation of the currency.

$$p^T = (1+r)\left(a_{TT}p^T + a_{NT}p^N + a_{MT}p^M\right) + w\ell^T \tag{3}$$

$$p^N = (1+r)\left(a_{TN}p^T + a_{NN}p^N + a_{MN}p^M\right) + w\ell^N \tag{4}$$

Here a_{ij} correspond to the fixed unit input requirements of commodity i in the production of commodity j and (ℓ^T, ℓ^N) to the labor inputs.

From eq. (4) we get

$$p^N = \frac{(1+r)\left(a_{TN}p^T + a_{MN}p^M\right) + w\ell^N}{1-(1+r)a_{NN}} \tag{5}$$

and then replacing into (3)

$$p^T = a_{NT}\frac{(1+r)^2\left(a_{TN}p^T + a_{MN}p^M\right) + (1+r)w\ell^N}{1-(1+r)a_{NN}} + (1+r)\left(a_{TT}p^T + a_{MT}p^M\right) + w\ell^T \tag{6}$$

Then, using the international prices and exchange rate we obtain:

$$1 = \phi(r, w, e, p^{T*}, p^{M*}) \tag{7}$$

with $\phi(r, w, e, p^{T*}, p^{M*}) \equiv a_{NT}\frac{(1+r)^2\left(a_{TN} + a_{MN}\frac{p^{M*}}{p^{T*}}\right) + (1+r)\frac{1}{p^{T*}}\frac{w}{e}\ell^N}{1-(1+r)a_{NN}} + (1+r)\left(a_{TT} + a_{MT}\frac{p^{M*}}{p^{T*}}\right) + \frac{1}{p^{T*}}\frac{w}{e}\ell^T$.

Using the implicit function theorem, it can be shown that the equation implies that, for given money wages and import prices, a higher (more depreciated) exchange rate increases real profitability. That is $dr/de = -\frac{\partial\phi/\partial e}{\partial\phi/\partial r} > 0$. Note that this is the case even if a_{MN}, a_{MT}, a_{TN} and/or a_{TT} are zero[4]. This is because an increase in e first raises profitability in sector T and then, through the action of competition, raises profitability in sector N. Since both money prices increase with devaluation, the final effect is a decrease in the real wage in terms of any commodity $j = N, T$. That is $\frac{\frac{dw}{dp_j}}{de} < 0$.

2.2. Unequal profit rates

Consider now the case where both sectors may have long-period unequal profit rates. Then, using the results above we get[5]

$$1 = \phi(r^T, r^N, w, e, p^{T*}, p^{M*}) \tag{8}$$

As long as $a_{NT} \neq 0$, then N commodities enter the T equation, and thus profit rates are inversely related, that is, $dr^T/dr^N = -\frac{\partial\phi/\partial r^N}{\partial\phi/\partial r^T} < 0$. The reason is that profit rates in the N sector affect input prices in the T sector, whose international price is given and hence cannot change, unless the (official) exchange rate depreciates. It is also interesting to evaluate the effect of a change in e on sectorial profit rates.

$$-\frac{\partial\phi}{\partial e} = \frac{\partial\phi}{\partial r^T}\frac{dr^T}{de} + \frac{\partial\phi}{\partial r^N}\frac{dr^N}{de} \tag{9}$$

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[4] As advanced in the introduction, Steedman (1999) note that when either a_{TN} or a_{TT} is zero, a rise in e rises r even if T is a non-basic commodity.

[5] Here we obtain $\phi(r, w, e, p^{T*}, p^{M*}) = a_{NT}\frac{(1+r^N)(1+r^T)\left(a_{TN}+a_{MN}\frac{p^{M*}}{p^{T*}}\right)+(1+r^T)\frac{1}{p^{T*}}\frac{w}{e}\ell^N}{1-(1+r^N)a_{NN}} + (1 + r^T)\left(a_{TT} + a_{MT}\frac{p^{M*}}{p^{T*}}\right) + \frac{1}{p^{T*}}\frac{w}{e}\ell^T$ by solving the price equations and allowing for different profit rates.

Given that $\frac{\partial \phi}{\partial e} < 0, \frac{\partial \phi}{\partial r^T} > 0, \frac{\partial \phi}{\partial r^N} > 0$, the more one sector benefits from an exchange rate devaluation, the less the other does. This may play a relevant role in inflation dynamics as long as one sector can anticipate and pass-through expected exchange rate corrections. Moreover, this may be a process of inflation spiralling in a standard inflation conflict model. If one sector obtains a temporary higher profit rate (say the T sector benefits from the commercial exchange rate devaluation), then this would reduce the other sector profit rate as longs as costs of production increases. Then, re-composition of profit rates may happen not through the actual mobility of capital, but through price increments, which in turns affect the initial sector profit rate.

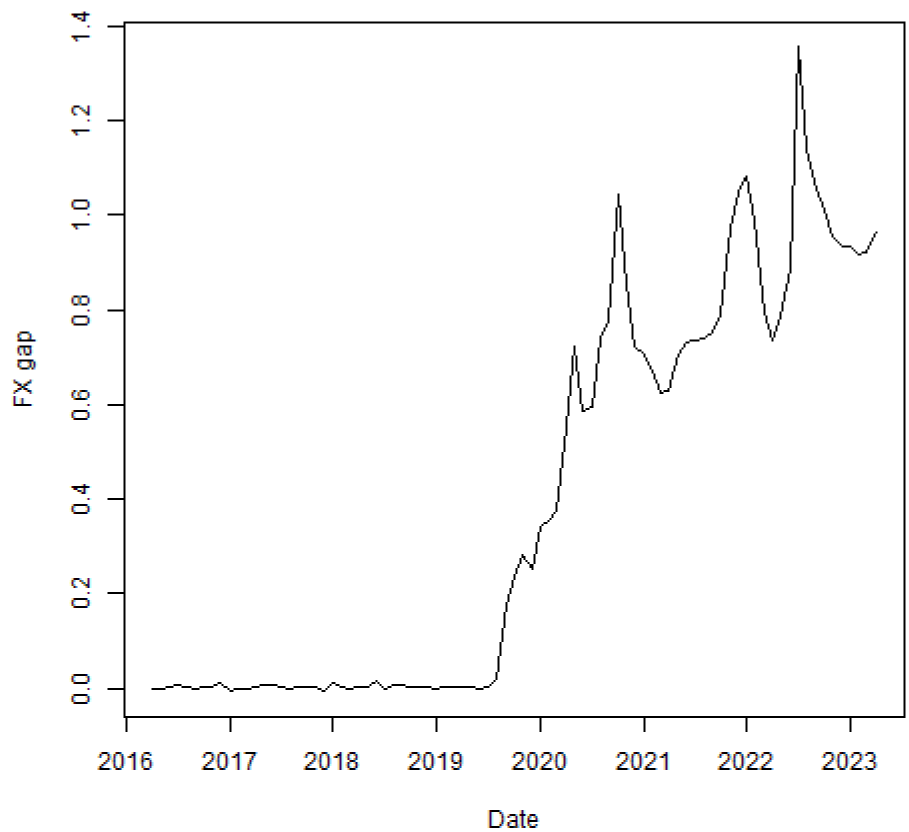
3. A SIMPLIFIED DYNAMIC MODEL FOR ARGENTINA

As mentioned in the introduction, we are mainly interested in analysing two distinctive features of a small open economy with foreign exchange controls, that are relevant to understanding relative profit-rates and inflation dynamics under different kinds of ER shocks. The first one involves the *official* exchange-rate, e. In particular, suppose the official ER rises. Does an increase in T-profit rate eventually affect N-profitability, *even* when T commodities are not directly nor indirectly employed in N production? This channel may be particularly relevant in Argentina, since oilseeds and grains, their main exported commodities, are not generally employed as an input by N sectors.

The second feature involves "*financial*" or parallel ER. Recall that the period under analysis includes foreign exchange controls, which have led to the emergence of a parallel ER, f. The price of f is higher than e, used in commercial transactions and relevant to determine income distribution (there is a so called "FX gap" defined as $\frac{f-e}{e}$). To the extent that a rise in the gap creates expectations of devaluation of the official ER, producers may be willing to pass-through the expected increase in production costs of imported inputs to their selling price, not to lose profitability. But only N producers may be able to behave in this way, at least in the short run, since they are not constrained directly by international competition[6]. If devaluation does not actually happen, but devaluations expectations persist, N profitability should rise. In the short run, this could affect profitability of sector T directly (as long as N goods are used as inputs of T) and even indirectly (if wages react to the rise in N thus causing a further reduction in T). However, profitability in both sectors cannot be persistently different. In the longer run, then, one should expect both profit rates to move in the same direction. Since T sector cannot affect the selling price of commodity T directly, the equalization of profits rates may occur -borrowing an expression from Sraffa (1960, p. 10)-, through "devious ways". For instance, the tradable sector may delay or refuse to surrender the FX from its exports, in order to force a devaluation of the official exchange rate. This need not happen when the FX gap is small, but it gains plausibility in moments when the magnitude of FX gap widens, as it has been for instance the case during the second half of 2022. To contextualize this, consider Figure 1, which plots the FX gap through the period under analysis, using the implicit parity of the most representative securities transacted in the domestic capital market (known as "CCL" ER) as a measure of the financial or parallel exchange rate. It clearly shows an increasing trend from September 2019, together with moments of high volatility and a gap that reached a maximum of 140% in the first quarter of 2022.

[6] Although in the long run they are *indirectly* constrained, as we have seen in Section 2 above when there is a tendency to profit rates to equalize.

Figure 1. FX gap in Argentina (2019-2023)



Source: Authors' calculations using data from sources specified in Table 1.

To focus on these specific kinds of ER dynamics and their influence on profitability, we consider a simplified version of the static equations of section 2. We assume that T is not used as an input ($a_{TT} = a_{MT} = 0$). This allows us to study the effect of devaluation, first on sector T, and then on the economy as a whole, even when T is *not* a basic good. We also assume that imported goods enter as inputs of N commodities, only ($a_{TN} = a_{NN} = 0$, $a_{MN} > 0$). This allows us to examine the effect of devaluation - or expected devaluation, see equation (18) and (19) below- on N production costs and profitability. Finally, we assume that N is used by sector T, only ($a_{NT} > 0$). This is to examine the effect of an increase in the selling price of N -caused by an increase in production costs or by a rise in its selling price- on sector's T profitability.

The relevant dynamic equations are:

$$p_t^T = (1 + \mu_t^T)\left(a_{NT} p_{t-1}^N\right) + w_t \ell^T \quad (10)$$

$$p_t^N = (1 + \mu_t^N)\left(a_{MN} p_{t-1}^M\right) + w_t \ell^N \quad (11)$$

$$p_t^T = e_t p_t^{T*} \quad (12)$$

$$p_t^M = e_t p_t^{M*} \quad (13)$$

$$p_t = \delta^N p_t^N + \delta^T p_t^T \quad (14)$$

Equation (14) characterizes the consumption bundle, where δ^T and δ^N denote the number of units of T and N, respectively, that are contained in the corresponding bundle, out of which inflation will be calculated at time t as $\pi_t = log(p_t) - log(p_{t-1})$. In an inflationary context, it is necessary to distinguish between the *nominal* profit rate at time t, which is calculated as a mark-up over *historical* costs, and the *real* profit rate computed over *reposition* costs. In (10) and (11), μ_t^j is the nominal profit rate of sector $j = T, N$ at time t. Then, the real profit rate can be calculated as:

$$1 + r_t^j = \frac{1 + \mu_t^j}{1 + \pi_t} \quad (15)$$

Note that real profitability is also measured in terms of p_t.

Of course, different dynamic structures determine different processes of adjustments to long period equilibrium and suggest different dynamic equations to study a change in exchange rates. Equations (10) and (11) assume that prices in period t are determined as a mark-up over historical costs settled in $t-1$, plus wage costs paid at the end of the current period. While equations (12) and (13) assume that currency depreciations are immediately passed through tradable selling prices.

We consider the case where both nominal profit rates depend on a reference interest rate (i_t) and they have also autonomous components that represent the specific elements of "risk and trouble" (Pivetti, 1991), ρ^T and ρ^N, such that,

$$\mu_t^T = i_t + \rho_t^T \tag{16}$$

$$\mu_t^N = i_t + \rho_t^N \tag{17}$$

It is not the aim of the paper to model the determinants of the exchange rate gap explicitly. To capture the effect of the financial exchange rate, f, on devaluation expectations and relative profitability, it is enough to assume that the nominal profit rate of sector N, ρ_t^N, is a positive function of the FX gap in period t:

$$\rho_t^N = h(f_t - e_t),\ h'(.) > 0 \qquad (18)[7]$$

3.1. Income distribution

Let define $\omega_t \equiv \frac{w_t}{p_t}$ as the real wage in period t -the quantity of wage bundles whose price is given by (14)- afforded by the representative worker. If we replace (11) and (12) into (14)[8], we can derive the following expression for the real wage:

[7] The influence of price expectations on the nominal profit rate, and hence on inflation dynamics has been introduced by Frenkel (1979). In Frenkel's contribution however, expectations are purely subjective, not anchored in any objective variable, therefore price increases on this basis remain largely arbitrary, thus neglecting the persistent influence of competition. While in our framework they are influenced by objective data -the magnitude of the FX gap.

[8] Notice that the relevant price for workers is the selling price of commodities. This is why in the case of the tradable good, we use condition (12) instead of (10).

$$\omega_t = \left\{\epsilon_t \left\{\delta^T p_t^{T*} + \delta^N a_{MN} p_t^{M*} \frac{(1+\mu_t^N)}{(1+\pi_t^T)}\right\} + \delta^N l_N \right\}^{-1} \tag{19}$$

where $\epsilon_t \equiv \frac{e_t}{w}$ is the inverse of the money wage in foreign currency and π_t^T is the rate of inflation in the tradable-goods sectors, which for simplicity is assumed to be same for goods T and M[9]. Everything else equal, an increase in ϵ_t and μ_t^N, decreases the real wage in period t, while an increase in π_t^T increases it[10].

The nominal profit rate in sector N is determined by (17), while the expression for the nominal profit rate in the tradable sector in terms of the other distributive variables can be obtained by equalizing condition (10) and (12):

$$1 + \mu_t^T = \frac{[p_t^T \epsilon_t - l_T][1 + \pi_t^N]}{a_{MN} l_N + \frac{1 + i_t + \rho_t^N}{(1+\pi_t^e)(1+\pi_t^I)} a_{MN} \epsilon_t p_t^{M^*}} \tag{20}$$

Ceteris paribus, an increase in ϵ_t increases μ_t^T, while an increase in i_t or ρ_t^N, tends to decrease it, at least in the short run. (the reason being that commodity N is part of T production costs).

3.2. Inflation

Let us define variables $\theta_t \equiv \frac{\delta^N p_t^N}{p_t}$ and $1 - \theta_t = \frac{\delta^T p_t^T}{p_t}$ which stand, respectively, for the weights of N and T goods in the wage bundle. Then, the rate of inflation (π_t) can be expressed as a weighted average of both N (π_t^N) and T (π_t^T) rates of inflation:

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[9] In a price taker economy, the rate of price increase of a generic tradable good T is $(1+\pi^T) = (1+\pi^e)(1+\pi^I)$, that is, it is equal to the rate of the crawling peg, i.e. $(1+\pi_t^e) = \frac{e_t}{e_{t-1}}$, plus the rate of international inflation (π_t^I). The simplifying assumption of the model is that the last term is the same for all tradable goods considered in the analysis, i.e. $(1+\pi_t^I) = \frac{p_t^T}{p_{t-1}^T} = \frac{p_t^{M^*}}{p_{t-1}^{M^*}}$

[10] The reason for this is the following: for the generic commodity j, $p_t^j = p_{t-1}^j(1+\pi_j)$. Then, given p_t^j, a rise in π_j is equivalent to a decrease in p_{t-1}^j, which is part of historical costs.

$$\pi_t = \theta_t \pi_t^N + (1-\theta_t)\pi_t^T \tag{21}$$

Since sector T is price taker, inflation in tradable goods in period t (π_t^T) follows the peace of international inflation (π_t^I) plus the pace of depreciation of the official exchange rate (π_t^E):

$$\pi_t^T = \pi_t^I + \pi_t^E \tag{22}$$

The derivation of inflation in N sector is more cumbersome and will be postponed to the appendix .

$$\pi_t^N = \left(1 - a_{MN} x_{t-1} p_{t-1}^*\right)\pi^w + a_{MN} x_{t-1} p_{t-1}^* (\pi_t^I + \pi_t^E + \Delta\mu_t^N) \tag{23}$$

where $x_t \equiv \frac{p_t^T}{p_t^N}$ is the relative price of commodities T and N. Therefore, in the short run, inflation in N commodities is a weighted average of wage inflation, international inflation, the rate of depreciation of the official exchange rate, and changes in N-nominal profit rate, which in turn depends on the exchange-rate gap (see (18)). And the weights are given by relative weights of capital ($a_{MN} x_{t-1} p_{t-1}^*$) and labour $\left(1 - a_{MN} x_{t-1} p_{t-1}^*\right)$ in sector N.

As is usual in "conflicting claim" models, we assume that wage dynamics depends on past inflation (π_{t-1}) and on autonomous increments (c_w) in real money wages (determined, for instance, by the institutional setting, the stance of the labour market, and so on), such that:

$$\pi_t^W = d_W \pi_{t-1} + c_W \tag{24}$$

where $d_W < 1$ is the wage adjustment coefficient to past inflation.[11]

[11] We could assume this is derived from a wage bargaining setting where workers set a target real wage, ω^* such that $\frac{w_t}{\bar{p}_t} = \alpha\left(\frac{w_{t-1}}{\bar{p}_{t-1}} - \omega^*\right) + \frac{w_{t-1}}{\bar{p}_{t-1}}$, where $\alpha < 0$.

Finally, inserting (22), (23) and (24) into (21), we obtain an expression for π_t in terms of imported inflation ($\pi^{\mathrm{I}}_{\mathrm{t}}$), the pace of currency depreciation ($\pi^{\mathrm{E}}_{\mathrm{t}}$), the determinants of wage inflation (d_W, c_W) and the rate of change of the nominal mark-up of the N goods ($\Delta\mu_{\mathrm{t}}$).

$$\pi_t = \theta_t\{a_{MN}x_{t-1}(\pi^{\mathrm{I}}_{\mathrm{t}} + \pi^e_t + \Delta\mu^N_t) + (1 - a_{MN}x_{t-1})(d_W\pi_{t-1} + c_W)\} + (1 - \theta_t)(\pi^E + \pi^I) \tag{25}$$

3.3. Steady State (SS) solution

We define the SS solution as a situation in which all nominal variables grow at the same rate, such that income distribution and relative prices do not change. This implies that tradable-goods inflation (π^T), non-tradable inflation goods inflation (π^N) and wage inflation (π^W) must all evolve at the same rate π^*:

$$\pi^* = \pi^N = \pi^T = \pi^W \tag{26}$$

We also assume that in the long run, the interest rate (i) and the exchange rate gap are constant -such that $\Delta\mu^N_t = 0$. Then, on the one hand, since, given the technique, tradable goods prices grow at the same rate as the exchange rate depreciation (π^E) plus international inflation π^I, in a SS, the following condition must hold:

$$\pi^* = \pi^E + \pi^I \tag{27}$$

On the other hand, it follows from (24) that wage inflation in SS is:

$$\pi^w = \frac{c_w}{1 - d_w} \tag{28}$$

Finally, since (29) must hold in SS, the rate of grow of money wages must be equal to the rate of grow of tradable goods prices:

$$\frac{c_w}{1-d_w} = \pi^E + \pi^I \tag{30}$$

Which means that the rate of money wage growth must be equal to the rate of depreciation plus international inflation. Then, considering that imported inflation is exogenously given, either the rate of devaluation or the variables that define wage inflation must endogenously adjust for inflation to run at a uniform rate.

3.3.1. Income distribution

The real rate of profits in the non-tradable sector is given by:

$$1 + r^{N^*} = \frac{1+\mu_N}{1+\pi^*} \tag{31}$$

From (19) and we can obtain the real wage in SS:

$$\omega^* = \left\{\epsilon^*\left\{\delta^T p^{T^*} + \delta^N a_{MN}[1+r^N]\right\} + \delta^N l_N\right\}^{-1} \tag{32}$$

with $\epsilon^* = \frac{e_t}{w_t} = \frac{e_{t+1}}{w_{t+1}} \dots$

As in the static long-period framework, the real wage raises with ϵ^* and decreases with the rate of profits in the non-tradable sector, r^N. Finally, from (20), the SS rate of profits in sector T is:

$$1 + r^{T^*} = \frac{1+\mu_T}{1+\pi^*} = \frac{\epsilon^* p^{T^*} - l_T}{a_{NT} l_N + [1 + r_N^*] a_{MN} \epsilon^* p^{M^*}} \tag{33}$$

which positively depends on ϵ^* and negatively on r_N^* (as in the long period framework when there is no equalization of profits rates). This means that rise in money wages relative to e, or in r^{N^*} will have a negative impact on T profit rate.

If there is equalization of sectorial profit rates, $r^* = r^{T^*} = r^{N^*}$, then from (33) we obtain an expression analogous to the static long-period condition (7):

$$1 = \phi(r, \epsilon, p^{T*}, p^{M*}) \tag{34}$$

with $\phi(r, \epsilon, p^{T*}, p^{M*}) = \frac{1}{\epsilon^*}(\frac{l_T + a_{MN}(1+r^*)}{p^{T^*} - a_{MN}a_{NT}(1+r)})$. Notice then that, an increase in the official-exchange-rate-to-wage ratio, increases the profit rate: $dr^*/d\epsilon^* = -\frac{\frac{\partial\phi}{\partial\epsilon^*}}{\partial\phi/\partial r^*} > 0$.

4. Econometric model

We now proceed to evaluate the theoretical results. As discussed above, we are mainly interested in studying how depreciations of the official and financial exchange rates, e and f, respectively, affect relative sectorial profitability in the short and in the longer runs, when due time is given for competition to exert its influence. In particular, we want to test the following hypotheses (H):

1. H1. Sectorial profits rate cannot be persistently different. Over sufficient time, actually observed sectorial profit rates, r_t^N and r_t^T, move in the same direction, through the action of competition.
2. H2. A depreciation of the official ER (e) increases r_t^T, but not r_t^N.
3. H3. A rise of the FX gap (a depreciation of the financial ER (f)) affects r_t^N, but not r_t^T. Moreover, this influence depends on the magnitude of the ER gap.

Notice that, together, H1 and H2 imply that, eventually, a rise in e affects sector r_t^N too; while H1 and H3 imply that, over sufficient time, a rise in f affects r_t^T too.[12]

To this aim, let us denote the first differences in logarithms operator, $\pi_t^x = \Delta \log x_t$. An approximate log-linearization dynamic equation model of the price of production is:

[12] Here we will use r and μ indistinctively. The econometric model below identifies the nominal profit rate for each sector as the unobserved component of sector nominal inflation variables. However, given that the CPI deflator applies equally to both T and N, and that we are mostly interested in the relative dynamics in profit rates, we will write the parameters in terms of r.

$$\pi_t^T = \beta_r^T \dot{r}_t^T + \beta_M^T \pi_t^M + \beta_\ell^T \pi_t^W + u_t^T \tag{35}$$

$$\pi_t^N = \beta_r^N \dot{r}_t^N + \beta_M^N \pi_t^M + \beta_\ell^N \pi_t^W + u_t^N \tag{36}$$

where $\pi_t = (\pi_t^T, \pi_t^N)'$ is a vector of two-sector inflation, $\dot{r}_t = (\dot{r}_t^T, \dot{r}_t^N)'$ are the specific dynamics (first differences of the logarithm) in profit rates, which are themselves dependent on exchange rates and international prices dynamics and other factors.[13]

We consider a dynamic representation of the vector of tradable and non-tradable inflation dynamics (10) and (11) using a linear Gaussian state-space model. The state-space model is characterized by two principles. First, there is a hidden or *latent process* $\dot{r}_t$, called the state process. For our purposes, this captures the *unobserved dynamics* in profit rates for the two sectors, $(\dot{r}_t^T, \dot{r}_t^N)$. The second condition is that the observations, inflation dynamics in both sectors, $(\pi_t^T, \pi_t^N)'$ are independent, given the states $\dot{r}_t$ and other observable exogenous covariates. This means that the dependence among the observations is given by states and covariates[14].

Then, the state-space representation with Gaussian innovations of the above model is

$$\pi_t = A + \dot{r}_t + \Psi z_{1t} + u_t \tag{37}$$

$$\dot{r}_t = B\dot{r}_{t-1} + \Phi z_{2t} + \varepsilon_t \tag{38}$$

where $u_t \sim N(0, R)$, $\varepsilon_t \sim N(0, Q)$, $\dot{r}_{t=0} \sim N(\dot{r}_0, V_0)$ (initial conditions), and where R, Q y V_0 are 2×2 symmetric matrices. Moreover, A is a 2×1 vector, Ψ is a $2 \times k$ matrix of k observable control variables z_1, B is a 2×2 matrix with the state autoregressive coefficients, and Φ is a $2 \times h$ matrix of h observable control variables z_2. Due to the secular spiraling of inflation in the period of analysis, we consider a constant term in

[13] For the empirical model we consider contemporaneous changes in imported inputs and wages rather than lagged changes, as it would follow from the theoretical model in Section 3.

[14] See Shumway and Stoffer (2017) ch.6, for a general discussion about state-space models.

the inflation equation. Moreover, since the period of analysis is one of considerable relative price variation, we will impose no constraints on these constants, then $A = (a^T, a^N)'$. Nevertheless, we restrict the state transition equation to have no intercept as changes in profit rates cannot be permanent.

z_{1t} is a vector of $h = 2$ exogenous variables the directly determine p_t. It corresponds to inflation arising from inputs. In this case, $z_{1t} = (\pi_t^M, \pi_t^W)'$ where:

- π_t^M is the log variation in imported goods, which may itself be dependent on various local factors such as tariffs, exchange rate restrictions and quotas;
- π_t^W is the log variation in nominal wages;

z_{2t} is a vector of $k = 3$ (we will also consider $k = 4,5$) exogenous variables for the state transition equations, which are themselves interpreted as variation in sectorial profit rates. For the baseline model we consider $z_{2t} = (\pi_t^E, \pi_t^{T*}, \pi_t^F)$':

- π_t^E is the log variation in the official nominal exchange rate. Several econometric exercises show that exchange rates and inflation are highly correlated;
- π_t^{T*} is the log variation in exported commodities prices;
- π_t^F is the log variation in the nominal unofficial financial exchange rate, a specific variable for countries under foreign exchange restrictions, as it is the case of Argentina.

The identification of profit rates dynamics in terms of the latent state variables relies on some assumptions. First, the model assumes that technological change does not happen at a significant level during the period of analysis, nor that there was a change in trade specialization patterns. Argentina maintained its productive structure without major changes for those years. Second, we also assume that the rent structure did not change, thus producing spurious dynamics in profit rates. Agricultural exported goods (that we use as T) are also subject to export taxes (known as "retenciones"), which were maintained at comparable levels during the period of analysis. Moreover, during the period of analysis, specifically since the second half of 2022, large FX gaps coincide with temporary export incentives through differential ER; in particular, an ER specific to soybean exporters (known as "dólar soja"), that then benefited other primary exportable commodities[15]. As such, the econometric of ER effects may be driven by these subsector specific benefits as latent state variables absorb these. Third, price dynamics may also be due to changes in tariffs, taxes and government intervention. This is an important issue in Argentina. As an example, tradable manufactured goods (such as textiles and electronics) have a large tariff protection and varied across governments, resulting in considerable relative price variations. We use data from T and N sectors, where this is not the case. That is, we use tradable agricultural commodities for T and services for N.

5. EMPIRICAL RESULTS

5.1. Data description

We consider data on a monthly basis for the period April 2016 to April 2023, comprising a total of 84 months. Tradable goods' prices come from wholesale price index (WPI) for the agricultural component. Non-tradable prices are computed from consumer price index (CPI) using a weighted average of different components. For the latter we use cultural services, restaurants & hotels and other goods and services (including personal services). We also consider the official exchange rate, main reference for commercial transactions, and a financial ER ("CCL" or "contado con liquidación") that affects inflation expectations as outlined above.

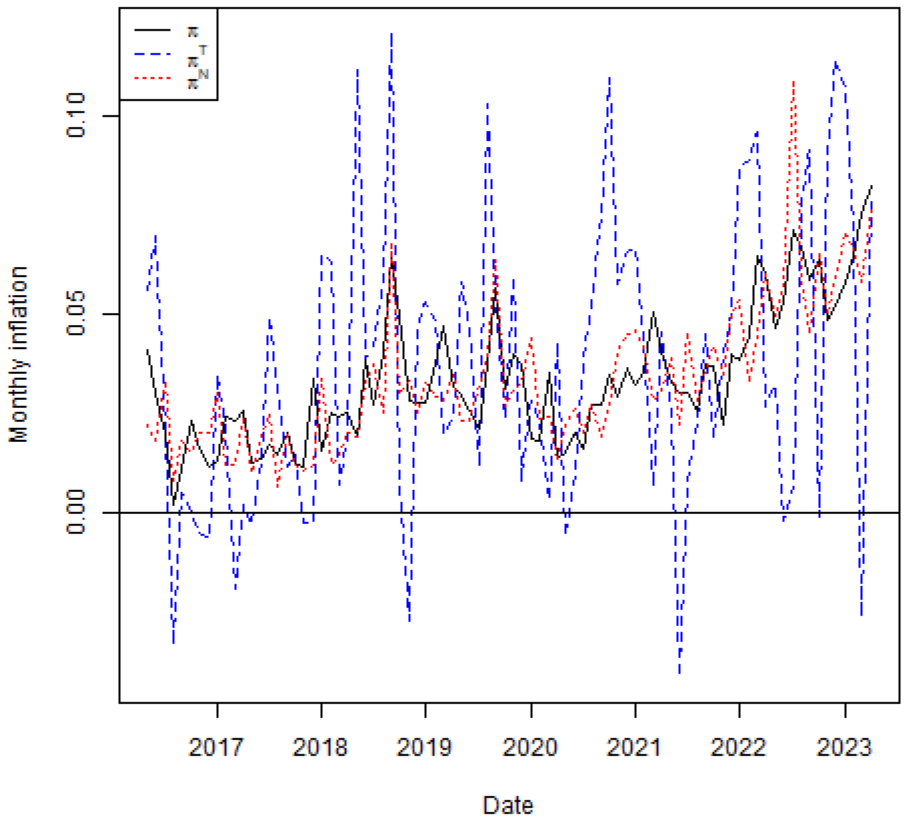
International prices for agricultural goods are collected from commodity price index for Argentine exported agricultural goods. Imported input goods are collected from a WPI item. Wages are constructed from governmental sources and correspond to the formal wage. This is an important issue as informality in the labour market is generally large with great variation across sectors. We assume that the aggregate formal wage serves as a reference for the monthly variation.

[15] This is one of the many "devious ways" mentioned in the main text, in which the tendency towards equalization of profits rates expresses itself. In fact, the government used these temporary incentives to induce commercialization of harvest by soybean producers and liquidation of foreign exchange, with the aim of increasing foreign reserves and reducing the expectation of a devaluation in the official ER.

The period of analysis covers two different government administrations, Mauricio Macri (2016-2019) and Alberto Fernández (2020-2023). The former corresponds to a period of initial unification of the FX market and rapid deregulation of the external financial account that resulted in a major external public debt crisis in May 2018, which included a large loan from the IMF and ended up with the reimposition of foreign exchange controls that continued in place under the current government of Fernández. The period also coincided with the COVID-19 pandemic that severely affected production, especially between March 2020 and early 2021.

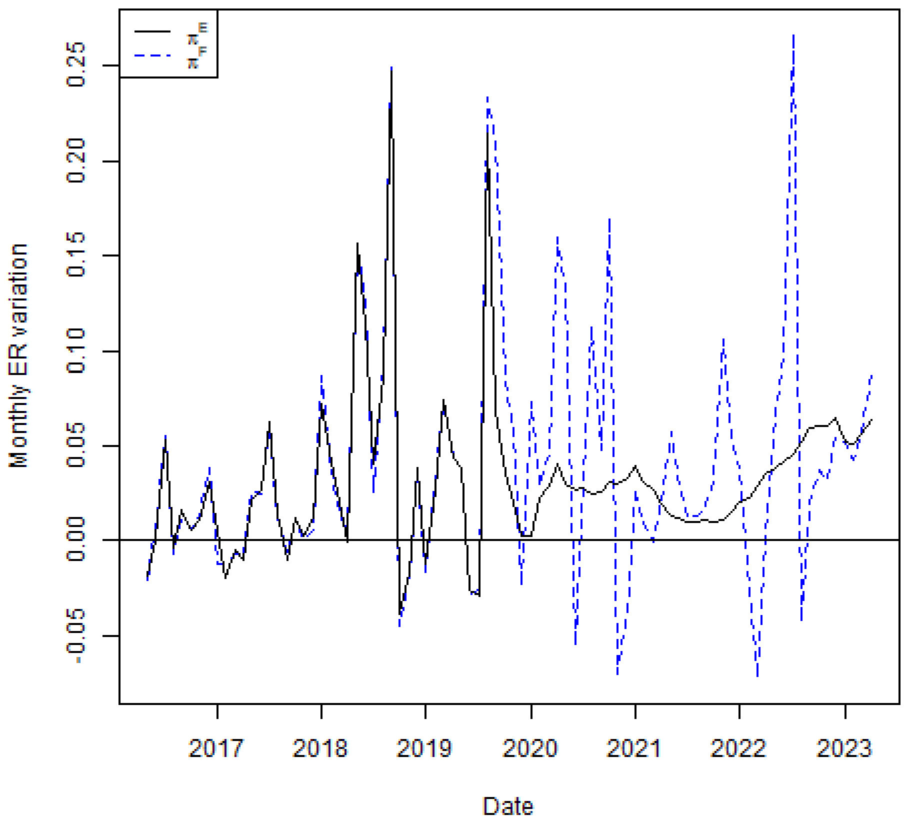
Specific data description and data sources appear in Table 1. Inflation dynamics for the period of analysis is summarized in Figure 2. These series show an increasing trend in inflation and highlight differences in CPI, T and N inflation dynamics. Figure 3 plots the monthly variation in the official and financial ER (see also Figure 1).

Figure 2. Consumer price index, tradable and non-tradable inflation



Source: Authors' calculations using data from sources specified in Table 1.

Figure 3. Exchange rates, official and financial



Source: Authors' calculations using data from sources specified in Table 1.

Table 1: Variables description and sources

Variable	Description	Source
p_t^T	Tradable, WPI: Agricultural prices	INDEC (a)
p_t^N	Non tradable. Services: Cultural services (35%); Restaurants and hotels (49%); Other goods and services (16%)	INDEC (b)
p_t^{Na}	Equipment and house maintaining	INDEC (b)
p_t^{T*}	Index of exported agricultural commodities	BCRA (c)
p_t^M	IPM: imported capital goods	INDEC (a)
e_t	exchange rate	BCRA (d)
f_t	Financial exchange rate CCL ("contado con liquidación")	Ámbito Financiero
w_t	RIPTE seasonally-adjusted	Ministry of Labour (f)

Notes:

(a) https://www.indec.gob.ar/indec/web/Nivel4-Tema-3-5-32

(b) https://www.indec.gob.ar/indec/web/Nivel4-Tema-3-5-31

(c) https://www.bcra.gob.ar/PublicacionesEstadisticas/Precios_materias_primas.asp

(d) https://www.bcra.gob.ar/PublicacionesEstadisticas/Tipos_de_cambios.asp

(e) https://www.ambito.com/contenidos/dolar-cl-historico.html

(f) https://www.trabajo.gob.ar/estadisticas/oede/estadisticasnacionales.asp

5.2. Results

We estimate the state-space model using the MARSS package in R with the Broyden–Fletcher–Goldfarb–Shanno (BFGS) algorithm. The parameter estimates are reported together with standard errors calculated using the Hessian function estimates from the maximum likelihood model. All covariates are standardized to have a standard deviation of 1 in order to interpret effects as a shock in 1 standard deviation magnitude. Parameter estimates for this model appear in Table 2. We consider first a baseline model where $z_{1t} = (\pi_t^W, \pi_t^M)$ and $z_{2t} = (\pi_t^E, \pi_t^{T*}, \pi_t^F)$. This corresponds to the simplest representation in the static equation models and it is defined as Model 1. Then we consider Model 2 where $z_{2t} = (\pi_t^E, \pi_t^{T*}, \pi_t^F, \pi_t^F \times FXgap_{t-1})$, where $FXgap_{t-1} = \frac{f_{t-1} - e_{t-1}}{e_{t-1}}$, that is, the effect of the financial ER is interacted with the value of the FX gap lagged one month. Finally we also add a threshold value on the size of the FX gap, i.e. $z_{2t} = \left(\pi_t^E, \pi_t^{T*}, \pi_t^F, \pi_t^F \times \frac{f_{t-1} - e_{t-1}}{e_{t-1}}, \pi_t^F \times FXgap_{t-1} \times 1[FXgap_{t-1} > 0.75]\right)$. For the latter we consider a FX gap of 0.75, that comprise exactly 25% of the sample (i.e. the upper quartile of the FX gap distribution). The results are qualitatively similar if alternative threshold values are used but the statistical significance and convergence of the MARSS model varies. The residuals from all state equations satisfy both absence of autocorrelation and normality assumptions thus suggesting that the model is correctly specified.

Of particular interest for the empirical results below are the computation of the effects of price and ER shocks. For these we compute accumulated impulse response functions based on parametric bootstrap with 2000 replications. In particular, we use independent Gaussian draws of the model coefficients using the asymptotic distribution of the maximum likelihood estimates with the Hessian method to compute the variance-covariance matrix.

Table 2. Econometric results: parameter estimates

Coefficient	Model 1		Model 2		Model 3	
$\pi_t^E \to \dot{r}_t^T$	0.0131	*	0.0145	^	0.0093	
	(0.0075)		(0.0106)		(0.0104)	
$\pi_t^E \to \dot{r}_t^N$	-0.0019		0.0014		-0.0017	
	(0.0019)		(0.0026)		(0.0025)	
$\pi_t^{T*} \to \dot{r}_t^T$	0.0161	***	0.0166	***	0.0168	***
	(0.0031)		(0.0031)		(0.0031)	
$\pi_t^{T*} \to \dot{r}_t^N$	-0.0015		-0.0013		-0.0005	
	(0.0012)		(0.0011)		(0.0011)	
$\pi_t^F \to \dot{r}_t^T$	-0.0033		-0.0037		-0.0014	
	(0.0036)		(0.0078)		(0.0079)	
$\pi_t^F \to \dot{r}_t^N$	0.0032	**	-0.0003		0.0030	^
	(0.0014)		(0.0020)		(0.0020)	
$\pi_t^F FXgap_{t-1} \to \dot{r}_t^T$			0.0026		-0.0008	
			(0.0060)		(0.0097)	
$\pi_t^F FXgap_{t-1} \to \dot{r}_t^N$			0.0046	***	-0.0029	
			(0.0017)		(0.0026)	
$\pi_t^F FXgap_{t-1} 1[FXgap_{t-1} > 0.75] \to \dot{r}_t^T$					0.0020	
					(0.0071)	
$\pi_t^F FXgap_{t-1} 1[FXgap_{t-1} > 0.75] \to \dot{r}_t^N$					0.0065	***
					(0.0021)	
$\dot{r}_t^T \to \dot{r}_{t+1}^T$	0.1797		0.1730		0.1882	
	(0.1439)		(0.1445)		(0.1478)	
$\dot{r}_t^T \to \dot{r}_{t+1}^N$	0.1441	**	0.1171	**	0.1568	**
	(0.0648)		(0.0574)		(0.0614)	
$\dot{r}_t^N \to \dot{r}_{t+1}^T$	0.7434	**	0.6202	*	0.6374	**
	(0.3269)		(0.3474)		(0.3082)	
$\dot{r}_t^N \to \dot{r}_{t+1}^N$	0.8258	***	0.6777	***	0.7597	***
	(0.0939)		(0.1067)		(0.0922)	
$\pi_t^M \to \pi_t^T$	0.0126	*	0.0110	^	0.0142	*
	(0.0071)		(0.0077)		(0.0075)	
$\pi_t^M \to \pi_t^N$	0.0042	**	0.0025		0.0032	^
	(0.0018)		(0.0020)		(0.0020)	
$\pi_t^W \to \pi_t^T$	-0.0048		-0.0048		-0.0044	
	(0.0041)		(0.0040)		(0.0042)	
$\pi_t^W \to \pi_t^N$	0.0036	**	0.0042	**	0.0029	*
	(0.0017)		(0.0017)		(0.0016)	

Notes: Standard errors in parentheses. Statistical significance: ^20%, *10%, **5%, ***1%.

5.2.1. Profit rate dynamics

Consider first the latent variable structure dynamics in the state-space representation. The estimates show that r_t^T has no statistically significant autoregressive effect, but r_t^N has persistence. The results also show that there is a positive association between both profit rates. That is, the latent variable structure shows that r^T Granger-causes r^N and r_t^N also Granger-causes r_t^T. As such, any shock in one sector has dynamic persistence and affects both sectors. This is consistent with the models of sections 2 and 3, which assume a long period tendency of profits rates to move in the same direction, and gives support to H1.

Figures 4 and 5 show the evolution of the inflation series, together with the estimated latent state variables, that correspond to the profit rates' dynamics. The figures report the estimated states variables for Model 1, qualitatively similar results are observed for Models 2 and 3. Figures (a) show the dynamics of the corresponding inflation and estimated profit rate-latent variables. For the latter we include the 90% confidence interval. Figures (b) have inflation rates in the horizontal axis and profit rates in the vertical axis. The latter clearly indicate that there is a positive association between sector-specific price increments and profit rates. In particular, the largest inflation jumps are the ones that correspond to the largest increments in profit rates.

Figure 4. Tradable inflation and tradable profit rate dynamics

(a) (b)

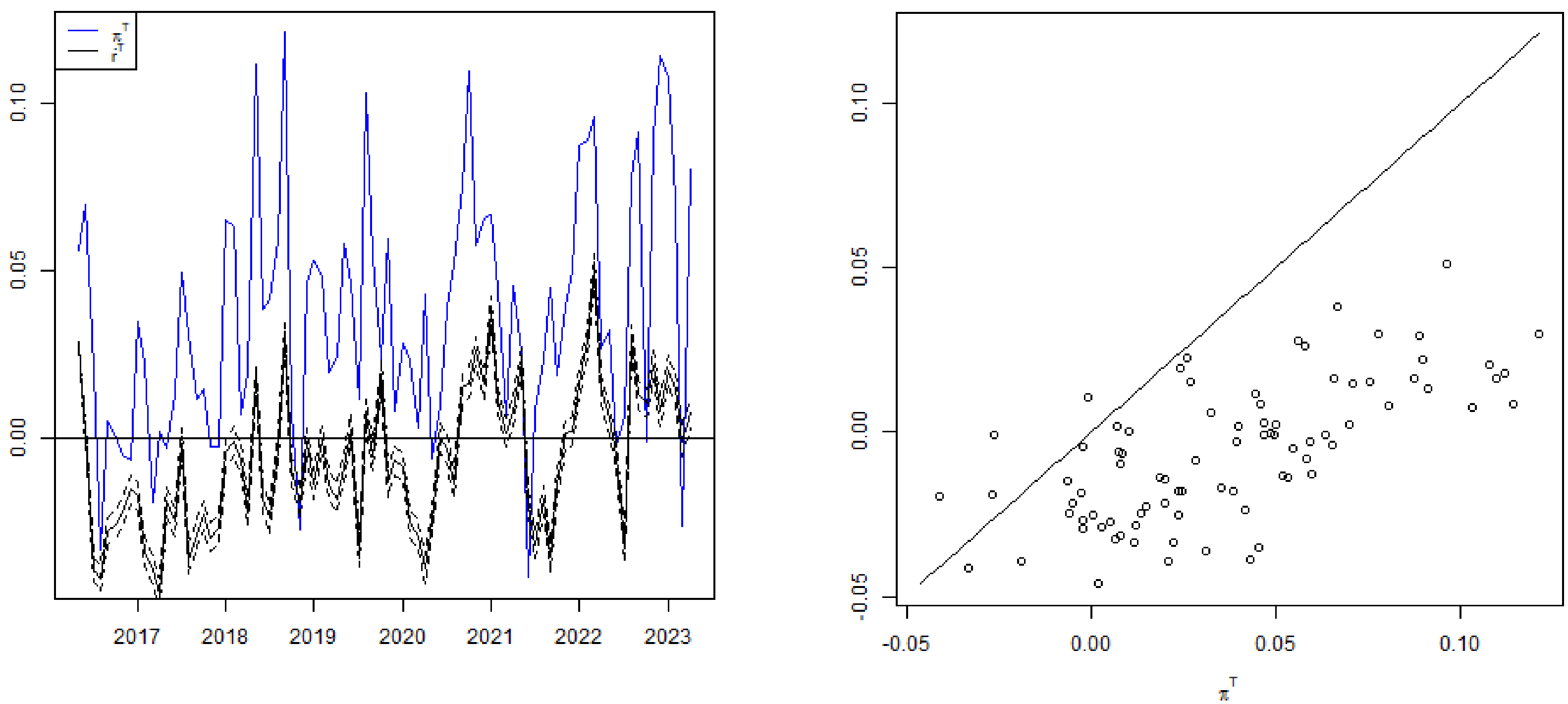
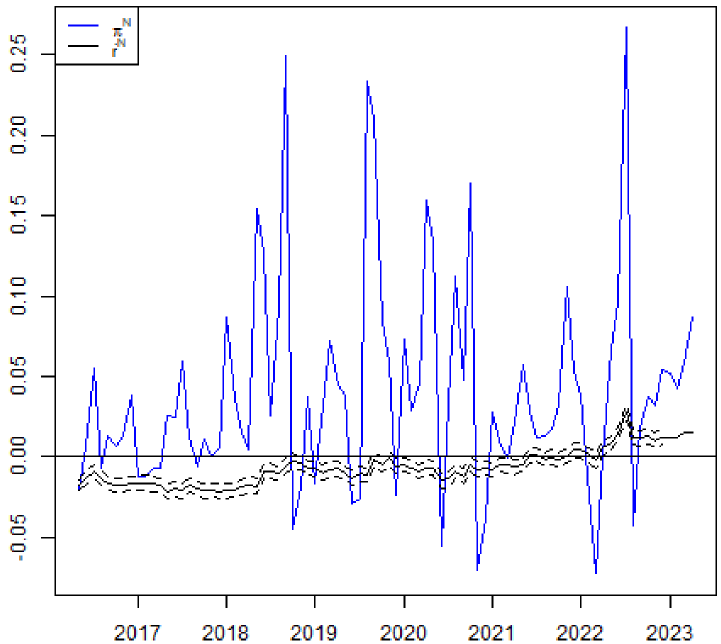
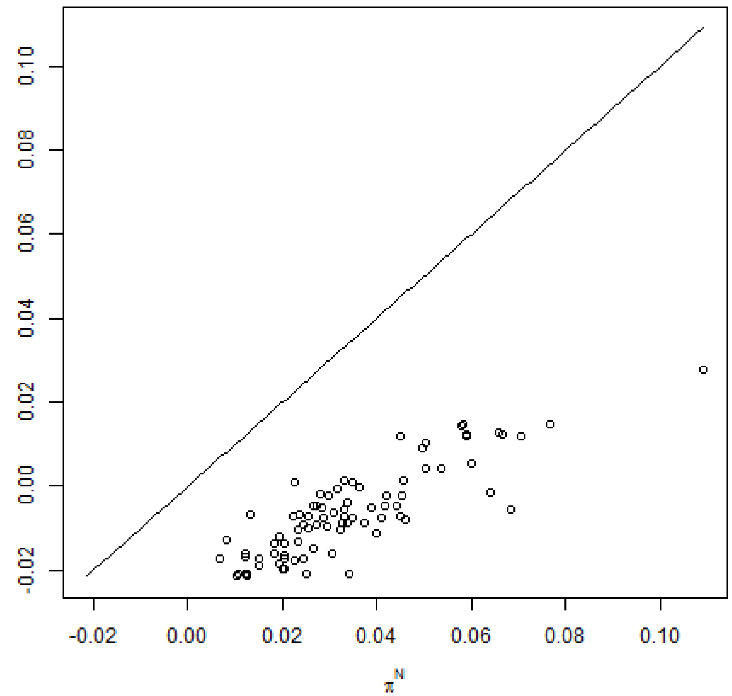


Figure 5. Non-tradable inflation and non-tradable profit rate dynamics

(a)



(b)



5.2.2. Official exchange rate depreciations and commodities price shocks

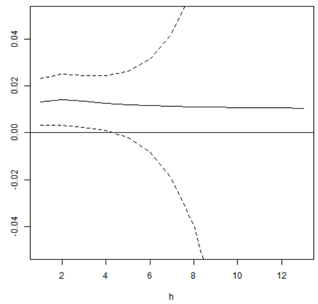
Let us now examine the effects of depreciation of the official ER. The estimates indicate that this has a contemporaneous statistically significant effect on r_t^T, but not r_t^N (except for Model 3 where the effect is not statistically significant). Together with the results in the previous paragraph, this indicates that an exchange rate shock affects, first, the profit rate in the T sector (and thus T prices), and then, this propagates through the economic system to N. Similar results are obtained when studying the effect of an increase in the price of exported commodities. These results give support to hypothesis H2, since, on impact, devaluation of the official exchange rate (and commodities price shocks) affects sector T profit rate only, but in the longer run it propagates to sector N as well, through the action of competition.

In Model 1, provided that devaluation has a small but negative effect in N profitability, this also affects T at the state variable level, and the initial shock slightly reduces across time. For Models 2 and 3, the overall effects are of positive feedback, thus the long-run effect is larger than the initial one for both state variables. Figure 6 below plots the estimated accumulated impulse response function of an official ER devaluation shock for Model 1, (a) and (b), Model 2, (c) and (d), and Model 3, (e) and (f). Qualitatively similar results are obtained for a shock in commodities' prices, see Figure 7.

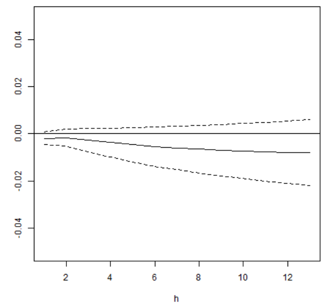
Figure 6. Accumulated impulse response function of a shock in the official ER

Model 1

(a) T profit rate

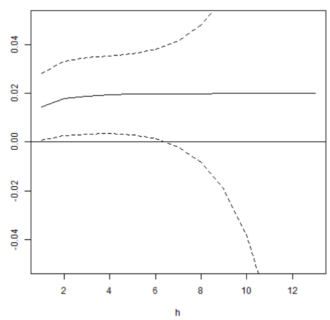


(b) N profit rate

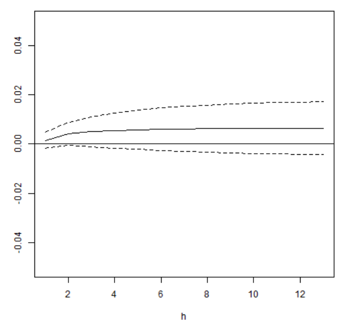


Model 2

(c) T profit rate

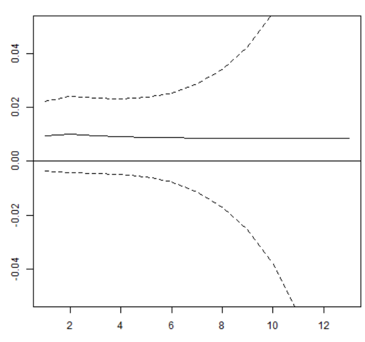


(d) N profit rate



Model 3

(e) T profit rate



(f) N profit rate

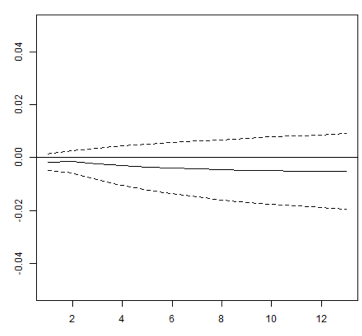
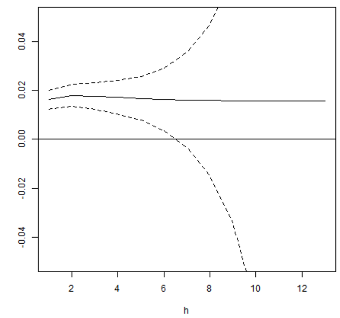


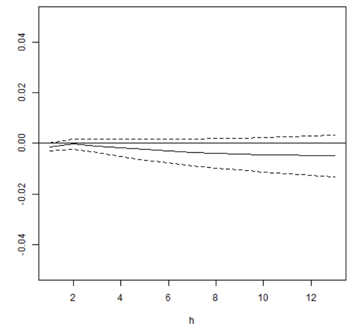
Figure 7. Accumulated IRF of a shock in prices of exported commodities

Model 1

(a) T profit rate

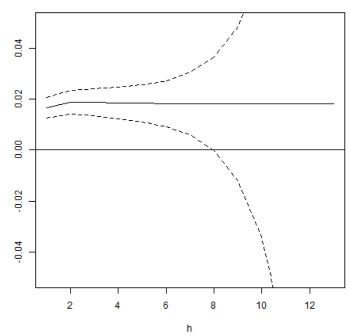


(b) N profit rate

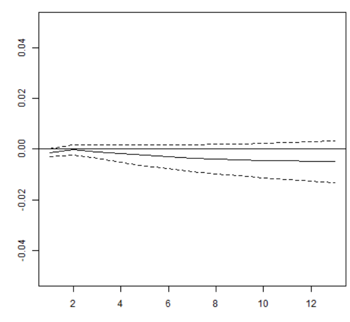


Model 2

(c) T profit rate

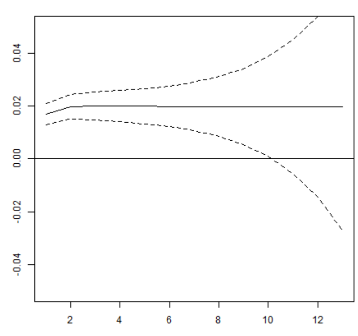


(d) N profit rate

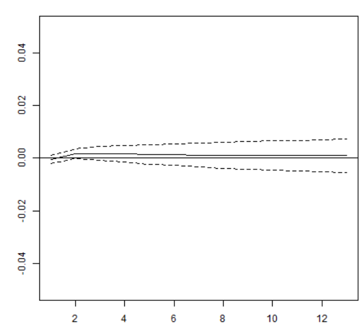


Model 3

(e) T profit rate



(f) N profit rate



5.2.4. Financial exchange rate depreciation

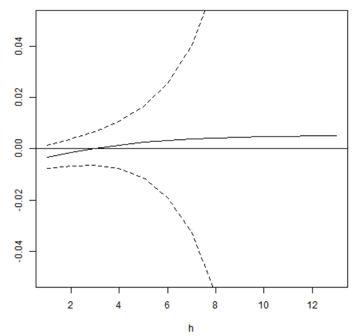
Consider finally the effect of a shock in the financial ER, f, or a rise of the FX gap. Ceteris paribus the level of the official ER, an increment in the parallel exchange rate corresponds to a change in the expectation of a future devaluation of the official exchange rate. The empirical results show that a rise of f has a contemporaneous effect on r_t^N, but no statistically significant contemporaneous effect on r_t^T. This finding supports the first part of hypothesis H3. However, if we also consider the results of section 5.2.1 regarding the connection between profit rates (H1), then, if the FX gap, and hence the increase in r_t^N, are sufficiently persistent, eventually r_t^T will increase too. This applies when the magnitude of the FX gap is sufficiently "large". That is, as models 2 and 3 show, the effect on r_t^N is larger at higher values of the FX gap, with non-linear dependence on the gap, which gives support to the second part of H3. Then, to the extent that r_t^N is affected by both, the *existence* and the *magnitude* of an ER gap, this means that, if the FX gap is persistent and large enough, then a depreciation in the financial ER will have an indirect effect on r_t^T through the autoregressive persistent of the latent state variables. It should be noted here, as mentioned above, that, periods of large FX gaps coincide with the existence of temporary and specific ER, such as for instance, one for soybean exports in certain months since the second half of 2022, then extended to other exportable primary commodities. As such, the effect of a devaluation of the financial ER with a large FX gap may in fact identify the specific effect of those ER temporary adjustments.

Figure 8 shows the accumulated impulse response functions for FX gap of 0 and 1, which mostly correspond to the period of analysis in Argentina, the FX gap ranging from 0 to 100%. The graphs clearly illustrate the magnitude of these effects, with the effects being virtually zero for FX gap of 0 and much bigger effect with a FX gap of 1.

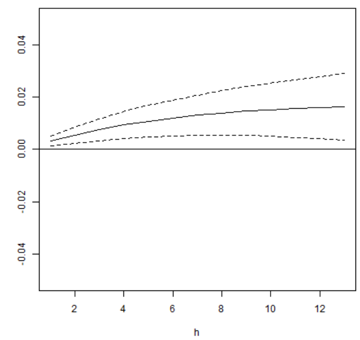
Figure 8. Accumulated impulse response function of a shock in the financial ER

Model 1

(a) T profit rate

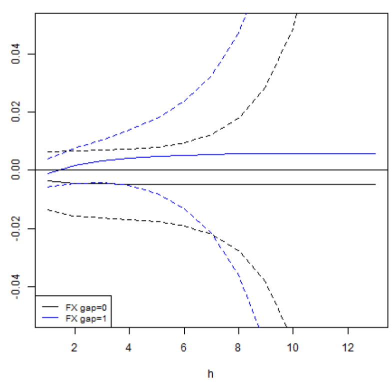


(b) N profit rate

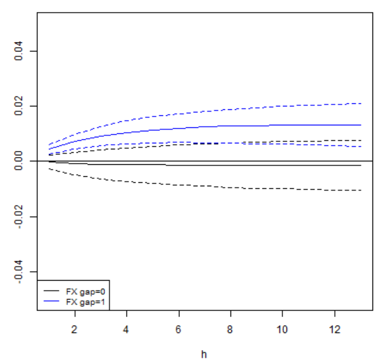


Model 2

(c) T profit rate

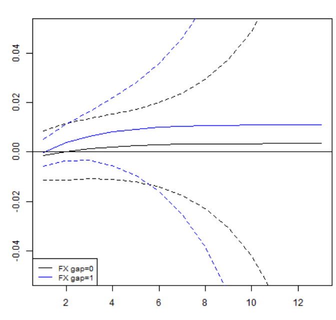


(d) N profit rate

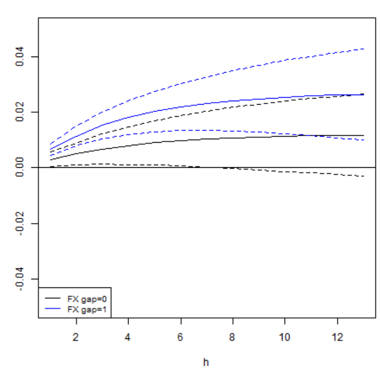


Model 3

(e) T profit rate



(f) N profit rate



5.2.5. Effect of imported inputs and wages

We finally consider the effect of input costs on T and N prices. The model estimates profitability as the unobserved component of price dynamics, after controlling for the effect of inputs and wages. As such, the main idea is to control for cost determinant variables of T and N inflation given by $z_{1t} = (\pi_t^W, \pi_t^M)$.

The results show that the effect of imported inputs, π_t^M, is positive. In Model 1, the coefficient is statistically significant for both sectors, while in Models 2 and 3 the estimates have varying degree of significance. The results are expected for sector N (recall that ER expectations are supposed to affect r_t^N indirectly, through its effect on inputs costs), but less clear for T, a price taking sector whose domestic costs should not influence its selling price. This is probably due to the correlation of z_{1t} with ER dynamics because an ER devaluation affects the cost of imported inputs, directly. Note finally that we are using internal WPI prices to compute π_t^M, and then, ER devaluation expectations, as reflected by the financial ER, may affect the price of these inputs depending on the varying degree of market power and government import restrictions. Probably, this is why the effect of this variable on the N sector price dynamics is less robust than on the T sector.

Wages, π_t^W, are positive and statistically significant for N, and negative but not significant for the price taking sector T, as expected.[16] Now, while in the longer run profit rates tend to move in the same direction, to the extent that wage dynamics affects N inflation only, one can conjecture that this would tend to widen, in the shorter run, the differences in relative profitability. This will specially the case if wage inflation is the consequence of workers reaction against non-tradable goods inflation, originally caused by an increase in the financial ER -whose effect, recall, is to raise r_t^N relative to r_t^T in the short run. These sorts of "perverse" dynamics, which will cause a *profit squeeze* of sector T, may end up reinforcing the distributive conflict. This is because, as it has

[16] Besides T being a price taking sector, it must be noticed that labor in the agricultural sector is mostly informal and thus, it is difficult to construct a proper wage index for the T sector.

been well documented by empirical literature on foreign exchange controls in Latin America (Gahn, 2017; Libman, 2018), episodes of ER unification -hence the tendency to profit rate equalization- will inevitably prevail in the long run. However, the elimination of ER gap will occur through a depreciation of the official ER, rather than an appreciation of the financial one; a movement, moreover, that will be more intense the higher is the magnitude of the ER gap.

6. CONCLUSIONS

In this paper we have explored, both theoretically and empirically, little noticed sectorial profit rates dynamics in a small, price-taker peripheral economy with foreign exchange controls and parallel exchange rate markets. With a state-space econometric representation of the Argentine economy for the period 2016-2023, we have found evidence to support three main hypotheses derived from the theoretical models. First, an official exchange rate depreciation increases tradable goods profit rates, but has no effect on non-tradeable goods profitability. Second, the rise of the financial exchange rate increases sector N's profit rate but has no effect on T's. Moreover, this effect depends on the magnitude of the ER gap in a positive, but in a non-linear, way. Third and finally, we have seen that, over sufficient time, both profit rates tend to influence each other, through the action of competition. This means that, eventually, and increase (depreciation) in the official exchange rate exerts its influence in sector N's profit rate; while, if sufficiently persistent and big enough, a rise in the financial ER ends up affecting sector T's profit rate too.

To conclude, it must be stressed that this tendency to the equalization of the sectorial profits rates in the long run, does not mean that forces in the opposite direction may not dominate in the shorter run. For as we have also seen that, after wage increases, only N sectors, not directly exposed to international competition, are able to pass-through the increase in production costs to the selling price of their products. Surely, one must pay serious attention to these "perverse" dynamics. For to the extent that behind wage rises there is workers' attempt to protect against the negative effects of persistent financial devaluation on N money prices, divergent profit rate dynamics may create a profit squeeze in sector T. And this reinforces the distributive conflict; since the tendency towards profit rate equalization will most likely occur in this case, through a devaluation of the official ER, which will be higher, the larger the magnitude of the gap.

7. REFERENCES

- Bastian, E.; Setterfield, M. (2020) "Nominal exchange rate shocks and inflation in an open economy: towards a structuralist inflation targeting agenda", *Cambridge Journal of Economics*, 6, 1271-1279.
- Bernanke, B.; Blanchard, O. (2023) "What Caused the U.S. Pandemic-Era Inflation?", *Hutchins Center Working Paper,* No 86.
- Blecker, R. (1989) "International competition, income distribution and economic growth*", Cambridge Journal of Economics, 13(3),* 395-412.
- Braun, O.; Joy, L. (1968) "A model of economic stagnation: a case study of the Argentine economy", *Economic Journal*, 78(312), 868–887.
- Diamand, M. (1973) *Doctrinas Económicas, Desarrollo e Independencia*. Buenos Aires: Paidós.
- Dvoskin, A.; Alvarez, R. (2022) "On income distribution dynamics in Argentina during the 1976-1983 dictatorship: A Classical-Structuralist interpretation", *Review of Political Economy,* 35(3), 738–761.
- Dvoskin, A.; Feldman, G. (2018) "Income distribution and the balance of payments: A formal reconstruction of some Argentinian Structuralist contributions – part I: technical dependency"; *Review of Keynesian Economics*, 6(3), 352–368.
- Dvoskin, A; Feldman, G. (2022) "On Dutch disease and its neutralization: A classical perspective"; *Review of Keynesian Economics*, 10(3), 382-405.

- Dvoskin, A.; Feldman, G. Ianni, G. (2020) "New-Structuralist exchange-rate policy and the pattern of specialization in Latin American countries", *Metroeconomica*, 71(1), 22–48.
- Feldman, G.; Moldovan, P. (2023) "The role of foreign exchange controls in the Periphery. Lessons from the recent Argentine experience", *Proceedings of the 2022 Thomas Guggenheim Conference*, Accademia Nazionale dei Lincei (forthcoming).
- Frenkel, R. (1979) "Decisiones de precio en economías de alta inflación", *Desarrollo Económico*, 19(75), 1-44.
- Gahn, S. (2017). "Control de cambios y brecha cambiaria en Argentina (1946–2016)", *Propuestas para el Desarrollo*, 1(1), 15–34.
- García-Cicco, J.; Garegnani, L. Gómez Aguirre, M.; Kryza, A.; Libonatti, L. (2023) "Regularidades empíricas de la inflación en América Latina", *Ensayos Económicos,* 81, 1-50.
- Lavoie, M. (2014) *Post-Keynesian Economics*. Edward Elgar. Second Edition.
- Libman, E. (2018). "La relación entre el tipo de cambio oficial y el tipo de cambio negro en América Latina", *Cuadernos de Economía*, 41, 43-55.
- Montes-Rojas, G.; Toledo, F. (2022) "External shocks and inflationary pressures in Argentina: A post-Keynesian-structuralist empirical approach", *Review of Political Economy*, 34(4), 789-806.
- Morlin, G. (2022) "Inflation and conflicting claims in the Open Economy", *Review of political Economy*, 35(3), 762-790.
- Pivetti, M. (1991) *An Essay in Money and Distribution*. London: Macmillan.
- Pinkusfeld (2002) "Price stabilization in Brazil: A classical interpretation for an indexed nominal interest rate economy", Unpublished Ph.D. dissertation, *New School for Social Research*.
- Shumway, R.H.; Stoffer, D.S. (2017) *Time Series Analysis and Its Applications. With R Examples.* Berlin: Springer.
- Sraffa, P. (1960) *Production of Commodities by Means of Commodities*, Cambridge, UK: Cambridge University Press.

- Steedman, I. (1999) "Production of commodities by means of commodities and the open economy", *Metroeconomica*, 50(3), 260–276.
- Trajtemberg, L; Valdecantos, S. (2015) "Los determinantes de la inflación en América Latina: Un estudio empírico del período 1990-2013", in Bárcena et al. (eds.), *Estructura productiva y política macroeconómica: Enfoques heterodoxos desde América Latina*, CEPAL, pp. 163-190.
- Vernengo, M. (2001) "Foreign exchange, interest and prices: the conventional exchange rate', in Rochon", L.P; Vernengo, M. (eds), *Credit, the Interest Rate and the Open Economy*. Cheltenham, UK and Northampton, MA: Edward Elgar Publishing, pp. 256–270.
- Vernengo, M. (2006) "Technology, finance, and dependency: Latin American radical political economy in retrospect", *Review of Radical Political Economics*, 38(4), 551–568.
- Vernengo, M.; Perry, N. (2015) "Exchange Rate Depreciation, Wage Resistance and Inflation in Argentina (1882-2009)", *Economic Notes, Banca Monte dei Paschi di Siena*, 47(1), 125-144.
- Vernengo, M.; Pérez Caldentey, E. (2023) "Price and prejudice: reflections on the return of inflation and ideology"; *Review of Keynesian Economics*, 11(2), 129-146.
- Weber, I.; Wasner, E. (2023) "Sellers' inflation, profits and conflict: why can large firms hike prices in an emergency?", *Review of Keynesian Economics*, 11(2), 183-213.
- Lorenzoni, G; Werning, I; (2023). "Inflation is Conflict", *NBER Working Paper,* No. w31099.

APPENDIX: INFLATION IN *N* COMMODITIES

From (10) and (13) we can express p_t^N as:

$$p_t^N = (1 + \mu_t^N)\left(a_{MN} e_{t-1} p_{t-1}^{M^*}\right) + w_t \ell^N \tag{A1}$$

Dividing both terms of (A1) by p_{t-1}^{N} , defining $\pi_t^j \equiv \frac{p_t^j}{p_{t-1}^j} - 1$ and recalling that $x_t \equiv \frac{p_t^T}{p_t^N}$, we obtain:

$$1 + \pi_t^N = \frac{w_{t-1} l^N}{p_{t-1}^N}(1 + \pi^w) + (1 + \mu_t^N) a_{MN} x_{t-1} \frac{p_{t-1}^{M^*}}{p_{t-1}^{T^*}} \quad \text{(A2)}$$

Then, consider that: $\frac{w_t}{p_t^N} = \frac{w_t}{p_t^T}\frac{p_t^T}{p_t^N} = \frac{w_t}{e_t p_t^{T^*}} x_t = \frac{1}{\epsilon_t p_t^{T^*}} x_t$. We can replace this into (A4) to obtain:

$$1 + \pi_t^N = \frac{x_{t-1} l^N}{\epsilon_{t-1} p_{t-1}^{T^*}}(1 + \pi^w) + (1 + \mu_t^N) a_{MN} x_{t-1} p_t^* \quad \text{(A3)}$$

Let us now define $p_t^* \equiv \frac{p_t^{M^*}}{p_t^T}$

Consider that p_{t-1}^N can be expressed as:

$$p_{t-1}^N = \left(\frac{1 + \mu_{t-1}^N}{(1+\pi_{t-1}^e)(1+\pi_{t-1}^I)}\right)\left(e_{t-1} p_{t-1}^{M^*}\right) a_{MN} + w_{t-1} \ell^N \quad \text{(A4)}$$

Let us now define $p_t^* \equiv \frac{p_t^{T^*}}{p_t^{M^*}}$, then dividing (A4) by p_{t-1}^N and inserting p_t^*:

$$1 = \frac{w_{t-1} \ell^N}{p_{t-1}^N} + (1 + r^{NI}) a_{MN} x_{t-1} p_{t-1}^* \quad \text{(A5)}$$

with $1 + r^{NI} \equiv \frac{1 + \mu_{t-1}^N}{(1+\pi_{t-1}^e)(1+\pi_{t-1}^I)}$.

Recall now that: $\frac{w_{t-1} \ell^N}{p_{t-1}^N} = \frac{x_{t-1} l^N}{\epsilon_{t-1} p_{t-1}^{T^*}}$ we can re-express (A5)

$$\frac{x_{t-1} l^N}{\epsilon_{t-1} p_{t-1}^{T*}} = 1 - (1 + r^{NI}) a_{MN} x_{t-1} p_{t-1}^* \qquad (A6)$$

We can replace (A6) into (A3) to obtain:

$$1 + \pi_t^N = [1 - (1 + r_{t-1}^{NI}) a_{MN} x_{t-1} p_{t-1}^*](1 + \pi^w) + (1 + \mu_t^N) a_{MN} x_{t-1} p_{t-1}^* \qquad (A7)$$

Regrouping we obtain, $1 + \pi_t^N = a_{MN} x_{t-1} p_{t-1}^* [\mu_t^N - \pi^w - \pi^w r_{t-1} - r_{t-1}^{NI}] + (1 + \pi^w)$. If $\pi^w r_{t-1} \cong 0$, and noting that $\mu_t^N = \Delta\mu_t^N + \mu_{t-1}^N$ and that $(1 + \mu_t^N) = (1 + r^{NI})(1 + \pi^{NI}) = 1 + r^{NI} + \pi^{NI}$ (with $r^{NI}\pi^{NI} \cong 0$), this expression can be simplified to

$$\pi_t^N = a_{MN} x_{t-1} p_{t-1}^* (\pi^{NI} + \Delta\mu_t^N) + (1 - a_{MN} x_{t-1} p_{t-1}^*) \pi^w \qquad (A8)$$

Recalling that $(1 + \pi^{NI}) = (1 + \pi_{t-1}^e)(1 + \pi_{t-1}^I)$, we obtain equation (33) of the main text.