SHORT- AND LONG-RUN EFFECTS OF DEVALUATIONS: EVIDENCE FROM ARGENTINA

LUCIANO CAMPOS
Universidad de Alcalá and RedNIE[a]

ABSTRACT

Devaluations were traditionally considered to be expansionary in the short run and have no real long-run effects. Alternatively, some observers in developing countries found that devaluations were contractionary on impact, and that they might foster long-term growth. Using Argentina as a case study, which is convenient due to its long series availability and its subsequent switches in exchange rate regimes, four structural shocks are identified in line with the traditional and alternative views. It is found that devaluations were mostly contractionary, and that real long-run effects were only possible when inflation was either low or moderate. In light of the estimates, a historical revision of Argentinean devaluation episodes from 1854 to 2018 has been carried out.

Keywords: exchange rate devaluations, economic growth, structural BVARs, Argentina

JEL code: C32, F31, N16

RESUMEN

Tradicionalmente se consideraba que las devaluaciones eran expansivas a corto plazo y no tenían efectos reales a largo plazo. Por otra parte, algunos observadores de países en desarrollo encontraron que las devaluaciones eran contractivas y que podían fomentar el crecimiento a largo plazo. Tomando a Argentina como caso de estudio, lo cual es conveniente por su disponibilidad de series largas y sus subsecuentes cambios en los regímenes cambiarios, se identifican cuatro choques estructurales en

[a] Departamento de Economía, Alcala de Henares, Spain. luciano.campos@uah.es

Vol. 41, No. 2: 213–241. doi:10.1017/S0212610922000064

línea con las visiones tradicionales y alternativas. Se encuentra que las devaluaciones fueron mayoritariamente contractivas y que los efectos reales a largo plazo solo fueron posibles cuando la inflación fue baja o moderada. A la luz de estos resultados, se realiza una revisión histórica de las devaluaciones argentinas de 1854 a 2018.

Palabras clave: devaluaciones cambiarias, crecimiento económico, BVARs estructurales, Argentina

> «Currency devaluations is one of the most dramatic—even traumatic—measures of economic policy that a government may undertake». (Cooper 1971)

1. INTRODUCTION

In traditional economic theory, nominal exchange rate devaluations are considered to be expansionary on impact and, as such, have been recommended in stabilisation programmes since the 1950s. The generalised idea is that devaluations can help a country with underemployed resources to switch expenditures from the non-tradable to the tradable sector. Hence, the current account can be expected to improve and boost economic activity. In the long run, a devaluation cannot have any permanent effects; according to the relative purchasing power parity condition, any real effect would dissipate as the real exchange rate returns to its equilibrium level.

However, this traditional view has been challenged by several observers who have analysed the performance of developing economies. Among them, Díaz-Alejandro (1963) proposed that devaluations can affect real activity in the short run negatively because workers (mostly consumers) were constrained, while capitalists (mostly savers) benefited. Net exports displayed a strong increase in impact, but this effect was due primarily to a dramatic reduction in imports.

As for the long-run effects of devaluations, some works, motivated by the experiences of several Asian and Latin American countries since the 1960s, suggested a possible relation between real undervaluation and long-term growth[1]. This argument relies on nominal devaluations that succeed in maintaining an undervalued real exchange rate for some time and can, hence, deliver long-run growth. Among the works that have sought to

[1] In this text, a devaluation (an increase in the nominal exchange rate) can cause a real exchange rate undervaluation (an increase in the real exchange rate). This syntax is used to conform to that in the literature on the real exchange rate and growth.

uncover the mechanisms through which a high real exchange rate level might contribute to development in emerging economies, Rodrik (2008) stands out because of its popularity. Rodrik stated that increases in the real exchange rate acted as a *second-best* mechanism to reallocate resources in tradable activities, which contributed more to growth than non-tradable sectors.

The contribution of this paper is the design of an empirical model, implemented via Bayesian vector autoregressive (VAR) analysis, where the short- and long-run effects of devaluations can be evaluated within the same set-up. In particular, a low-scale VAR with only four variables is used to decompose the distinct sources of disturbances affecting the exchange rate at different horizons; on the one hand, *expansionary* and *contractionary* devaluations can be recovered by imposing sign restrictions on impact following, respectively, the traditional theory and Díaz-Alejandro's approach. On the other, *nominal* and *real* shocks can be identified with exclusion and sign restrictions in the long run under the PPP condition and Rodrik's real undervaluation-growth theory, respectively. The empirical model proposed here is appealing due to its simplicity.

Our case study is Argentina, which has been selected for two reasons: firstly, because of its long-term series data availability, not usual for developing countries. In fact, the model is estimated with annual data from 1854 to 2018, which allows us to study the situation throughout the country's modern history. Secondly, during this period, Argentina has experienced several changes in its currency regime, which makes it a unique case study, as noted by Díaz-Bonilla and Schamis (2001) and Cerro and Meloni (2014).

The main results of our investigation are as follows: firstly, devaluations were mainly *contractionary*, just as Díaz-Alejandro proposed in his work. Secondly, the model is unable to recover *expansionary* devaluations from the data-generating process (DGP). Hence, devaluations were not of this sort. Thirdly, devaluations with long-run effects on growth occurred primarily when inflation was either low or moderate, so that the real exchange rate could remain devalued for some time. Fourthly, *nominal* shocks were especially relevant during highly volatile and inflationary years, which proves that the real effects of devaluations became weaker amid rising prices.

The remainder of this article proceeds as follows: section 2 presents a literature review and highlights the contribution of the present article, section 3 describes the data and justifies Argentina as an unparalleled case study, section 4 summarises the theory on which the empirical analysis is based, section 5 describes the empirical approach, section 6 presents the evidence obtained and section 7 concludes the paper.

2. LITERATURE REVIEW AND CONTRIBUTION

This article relates primarily to three strands of the literature: the short-run impact of devaluations, the relationship between the real exchange rate and economic growth, and the economic history of Argentina.

The first line of inquiry can be traced back to the early works of Laursen and Metzler (1950), Harberger (1950) and Alexander (1959). These authors studied the effects of exchange rate devaluations and supported the view, which is here called the traditional approach, that devaluations expand output by stimulating exportable and import-substitution goods. A note by Johnson (1976) summarised the argument that there was an expenditure-switching effect from non-tradables to tradables, which increases output if there are unemployed resources or raises prices if this is not the case. In addition, Gylfason and Schmid (1983) provided evidence that devaluations were expansionary in most countries. This perspective has since become the dominant story in most economic textbooks.

Nevertheless, the empirical evidence obtained in some developing countries is not consistent with this traditional belief about the effects of devaluations. Instead, findings indicate that devaluations provoked a contraction in output with a strong current account increase. In particular, Díaz-Alejandro (1965) studied the Argentine economy during the 1950s and focused on the devaluation carried out in 1958. He performed a case study of this episode with the intention of deriving a generalised pattern of the consequences of devaluations in semi-industrialised countries. His views were summarised in Díaz-Alejandro (1963), where he argued that devaluations had contractionary effects because workers (who have a high propensity to consume) were more affected than capitalists (who have a high propensity to save). These ideas were sustained by the model of Krugman and Taylor (1978) and the empirical results in Edwards (1986), based on data from twelve developing countries from 1965 to 1980[2].

There are other possible explanations for the fact that devaluations can be contractionary: the price increase caused by a devaluation might contract aggregate demand, delivering a negative real balance effect (Johnson 1977), or demand may be inelastic with respect to price (i.e. the Marshall–Lerner condition does not hold). An increase in input costs is another probable cause of output contraction, but from the supply side (Gylfson and Schmid 1983). However, Sidrauski (1968) proposes that devaluations can be contractionary if, as was the case in 1958 and 1962 in Argentina, they are complemented with an excessively tight

[2] It must be said that the work of Edwards (1986) analyses a period in which economic growth was sluggish almost everywhere. Hence, it is not surprising that devaluations were estimated to be contractionary in this work.

monetary policy. Nevertheless, the focus in this article is on the explanation provided by Díaz-Alejandro because it has become very popular in the literature.

More recently, Bahmani-Oskooee and Miteza (2006) used a panel cointegration model and concluded that devaluations were contractionary in non-OECD countries for different model specifications. Later, Cerra and Saxena (2008) showed that devaluations associated with debt crises were especially harmful in the short run in Latin America. In fact, devaluations are typically associated with rising debt costs (Bordo and Rockoff 1996) and, ultimately, sovereign debt default (Boonman 2017). Kohn *et al*. (2020), however, described how the increase in exports stimulates aggregate demand following large devaluations, thanks to firms' sales reallocation across markets.

As for the VAR literature on the effects of devaluation in emerging economies, examples include Kamin and Rogers (2000) for Mexico, Berument and Pasaogullari (2003) for Turkey, Hsing (2004) for Argentina, Odusola and Akinlo (2001) for Nigeria and Tang (2015) for China. The first three of these works found devaluations to be contractionary, the fourth found them to be expansionary, and the last did not observe any significant short-run effect. Compared with these articles, the present work makes the contribution of providing evidence based on a longer sample, which permits the identification of not only short- but also long-run effects of devaluations in a unified setting.

Regarding the second line of inquiry, the traditional idea of long-run money neutrality was confronted by authors who claimed that there was a causal relationship between real exchange rate undervaluation and economic growth. The prescription derived from this alternative argument was that countries could, and should, use the real exchange rate as a policy variable to pursue economic development. The argument made by Rodrik (2008), who claimed that a high real exchange rate is a second-best mechanism for switching resources from non-tradables to tradables, was intended to explain why countries such as China and India had used it as a pro-development policy tool since the 1960s. In the same vein, Razmi *et al*. (2012) relied on the existence of hidden unemployment being absorbed in tradable sectors as a source of growth when the real exchange rate is high for a long period. On the contrary, Levy-Yeyati *et al*. (2012) did not find relevant export-led growth from undervaluations but rather non-tradable sector improvements with higher savings and investment and a decline in unemployment. Not only have these works conceptually challenged the mainstream view, but empirical evidence has also been provided to support these alternative theories in the works of Hausmann *et al*. (2005), Frenkel and Rapetti (2008), Bussière *et al*. (2012) and Guzmán *et al*. (2018).

In addition, I intend to enrich the debate about the particular case of Argentina from an economic history perspective, which leads us to the

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

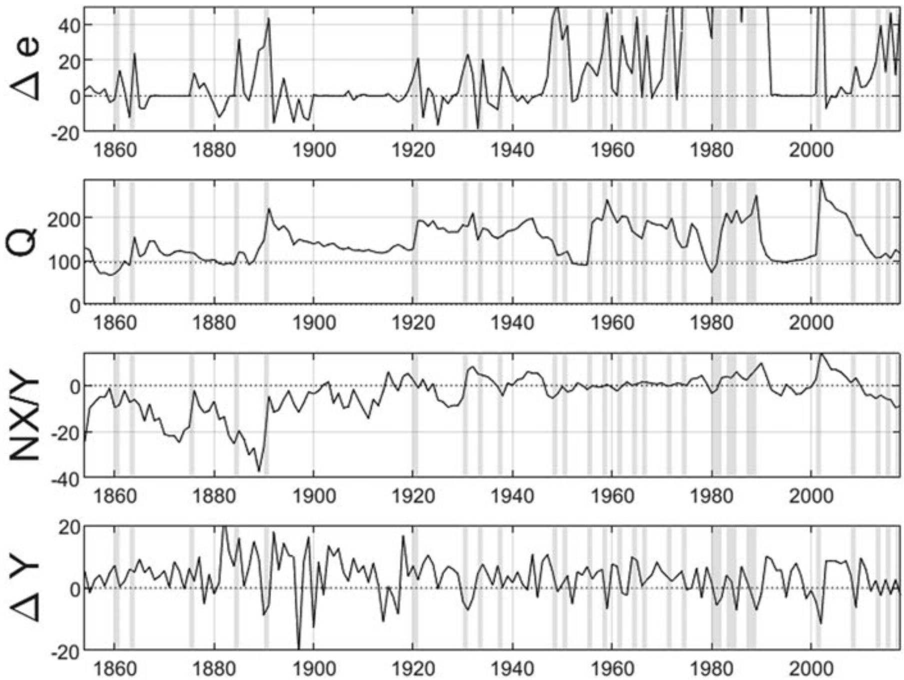
third strand of literature. The fact that Argentina was one of the most developed countries in the world in the 1920s and has since suffered a relative decline until today, makes it a unique case to study. Many contributions were made trying to disentangle the reasons for this relative decay. Among them, Gerchunoff and Llach (2009) focus on the varying nature of Argentinean relative factor endowments from 1880 until 2000, Sanz (2009) builds an index of economic freedom to evaluate its relative performance from 1875 until 2000, González and Viego (2011) suggest there was a relative decline in total factor productivity in a study from 1870 to 2000, Buera *et al*. (2011) and Cerro and Meloni (2013) blame the permanent fiscal imbalances in the 19^{th} and 20^{th} centuries, Brambilla *et al*. (2018) analyse the effects of pernicious trade policies using data from 1890 to 2006, and Taylor (2018) summarises many of the explanations for Argentine divergence with data from 1820 until 2003. While this study has drawn on these works, as on others cited below, I concentrate on the effects of the numerous devaluations experienced by Argentina in its turbulent monetary history. So, in a sense, this article can contribute to the history of Argentinean devaluations. As far as I am aware, there is no other work in the literature with such a goal.

The aim of the present work is to enrich these lines of enquiry. In particular, the empirical strategy followed makes it possible to estimate all possible outcomes of devaluations according to the different (and contradictory) theoretical approaches available. To the best of my knowledge, there is no other work in any of these strands of the literature that has adopted such an empirical strategy.

3. THE ARGENTINEAN CASE

Although the intention of this work is to contribute to developing economies in general, Argentina is used as a case study for two main reasons: on the one hand, it has long time series for the selected variables, which makes it possible to estimate the short- and long-run effects of devaluations. On the other, it is an appealing country to evaluate due to its subsequent switches in monetary policy. As early as 1899, an observer noted, «the Argentines alter their currency almost as frequently as they change their presidents. No people in the world take a keener interest in currency experiments than the Argentines» (Ford 1962). Little has changed since then. Throughout Argentinean history, there have been free and dirty floats, crawling pegs and full convertibility; there have been currency controls with multiple exchange rates followed suddenly by a unified free market value and violent devaluations; and trade openness was replaced by tariffs and export taxes, with policy shifting back and forth from free trade to autarky. Such an erratic exchange rate policy makes Argentina a unique case study.

FIGURE 1
VARIABLES' TIME SERIES AND DEVALUATION EPISODES.



Note: Evolution of the yearly variations in the nominal exchange rate, the real exchange rate, net exports and output growth in Argentina from 1854 until 2018 (see the Appendix for data details).

Figure 1 shows the evolution of the nominal exchange rate variations (Δe), the real exchange rate (Q), net exports/output ratio (NX/Y) and GDP growth (ΔY) in Argentina from 1854 until 2018. The grey areas indicate nominal devaluations greater than 10% during this period, which amounted to almost thirty episodes of different magnitudes. The first panel shows that the nominal exchange rate was more stable until the 1930s and that violent devaluations of more than 40% have not been unusual since the 1950s. In the 1970s and 1980s, during hyperinflationary episodes, devaluations were massive and surpassed the maximum scale of the graph, set at 50%. During the 1990s, there was a fixed exchange rate period that was abandoned with a strong devaluation in 2002, followed by increasingly stronger devaluations in the 2010s.

The real exchange rate, plotted in the second panel, parallels the evolution of the nominal rate; the relative stability observed until the 1950s has since been replaced by marked volatility. The graph also shows that periods of high real exchange rates, such as in the 1960s, 1980s and 2000s, alternated with periods of low real exchange rates such as the late 1970s, 1990s and 2010s. The real exchange rate was calculated using the British pound until 1932, because Great Britain was Argentina's main trading partner during that period. From then on, the US$ was used. In addition, as Argentina implemented exchange rate controls in several years of the sample, the «free» real exchange rate is replaced by the average of the real price of imports and exports since 1932. The gap between both real exchange rates is significant from 1945 until 1960, but not for the rest of the sample. The Appendix describes the data in more detail.

The third and fourth panels depict the evolution of net exports and output growth, respectively. Some devaluations coincided with output and current account contractions, while others coexisted with expansions. So, *a priori*, there is no clear pattern in the short-run effects of devaluations on these variables. The empirical model proposed here makes it possible to evaluate not only the contribution of each source of innovation to nominal exchange rate volatility (through a variance decomposition) but also the weight attributable to the disturbances in each devaluation episode (using a historical decomposition).

4. THEORETICAL BACKGROUND

As mentioned above, the traditional view regards devaluations as expansionary in the short run, mainly due to a relative price effect; as both exports and imports become more expensive in the local currency, local production increases if the Marshall–Lerner condition holds, that is, if demand elasticities are high enough. However, as many authors have claimed, devaluations in developing countries have been contractionary rather than expansionary. This section summarises the ideas developed in Díaz-Alejandro (1963) and Rodrik (2008) to justify the identification scheme proposed in the empirical design below. Readers already familiar with these theories can proceed directly to the following section.

Díaz-Alejandro stated that the traditional view of price elasticities of demand for exports and the supply of imports was overly optimistic. He argued that, as these elasticities are low in the short run, the negative income effect associated with the reduction in real wages prevails, such that aggregate output could fall (rather than rise) after a devaluation[3].

[3] Note that the view that devaluations can be contractionary is not the same as the output reduction that occurs whenever net exports display a J-curve. While the latter refers to some lags, typically between 6 months and 1 year, until the effects of the devaluation become fully effective because of volume rigidities, the former refers instead to a deep economic contraction because of the devaluation. The interested reader can see Bahmani-Oskooee (1985) for evidence on the J-curve.

Specifically, if the economy is modelled with a tradable and a non-tradable sector, the effects of a devaluation on output would be:

$$dY = (dY^T + dY^{NT})de \tag{1}$$

where Y is the aggregate output, Y^T is the production of tradables, Y^{NT} is the production of non-tradables and e is the price of tradables in domestic currency (i.e. the exchange rate), such that de refers to a devaluation.

It is not unreasonable to assume the supply of tradables to be inelastic in the short run in commodity-exporting countries. For example, agricultural commodities can increase their production only during the following harvest. The supply of non-tradables is assumed to be elastic, as idle resources exist. Hence, the devaluation effects captured in [1] can be reduced to the non-tradable sector only:

$$dY = dY^{NT}de$$

The main contribution of Díaz-Alejandro was to focus on the redistributive effects between capitalists and workers. He argues that omitting these effects would lead to a partial (and incorrect) evaluation of devaluations in middle-income countries. He claimed that including these two social classes makes it possible to model not only substitution but also income effects as follows:

$$dY^{NT} = [\underbrace{m_{nc}(Y_s^T - Y_{dc}^T)}_{\text{inc eff cap}} - \underbrace{m_{nw}(Y_{dw}^T)}_{\text{inc eff wor}} + \underbrace{Y^{NT}E_{ne}}_{\text{subs eff}}]de \tag{2}$$

where there is a positive income effect for the capitalists, which depends on the tradables initially produced (Y_s^T) and consumed (Y_{dc}^T) by them, together with their marginal propensity to consume (and invest in) non-tradables (m_{nc}). Workers suffer a negative income effect that depends on their initial consumption of tradables (Y_{dw}^T) and their marginal propensity to consume non-tradables (m_{nw})[4]. Finally, there is an expenditure-switching effect

[4] In the empirical model of the next section there is an implicit assumption that income elasticities remain stable in time. However, these deep parameters might have changed in such a long period of time. In particular, the transition from a rural to an urban economy and the strong influx of immigrants that took place in Argentina between the end of the 19th and the beginning of the 20th centuries, might have affected these elasticities. In order to verify the effects of this potential structural break in our results, a robustness check was carried out where the model displayed in the next section is estimated using data from two subperiods: 1853-1936 and 1936-2018, as the 1930s is typically considered as the decade of industrial intensification (Bértola and Ocampo 2012). As shown in the Appendix, the IRFs and the variance decomposition estimates are not significantly different in general.

from tradables to non-tradables, which depends on the cross-elasticity of demand for non-tradables with respect to the exchange rate (E_{ne}).

Under the assumption that the trade balance is originally equilibrated:

$$Y_s^T = Y_{dc}^T + Y_{dw}^T$$

then, expression [2] can be summarised as:

$$dY^{NT} = \left[\underbrace{(m_{nc} - m_{nw})Y_{dw}^T}_{\text{inc eff}} + \underbrace{Y^{NT}E_{ne}}_{\text{subs eff}} \right] de \tag{3}$$

It is reasonable to assume that workers' marginal propensity to consume non-tradables is higher than that of capitalists, who are typically more biased towards consumption of (and investment in) imports, such that $m_{nc} - m_{nw} < 0$. Furthermore, if the negative income effect is large enough, it might more than compensate for the substitution effect, which is typically small for developing countries. If this is the case, then devaluations can be contractionary. It now becomes apparent that devaluations have redistributive effects because capitalists (exporters) benefit at the expense of workers through the change in relative prices between tradables and non-tradables.

For the trade balance, Díaz-Alejandro proposed that the drop in imports was quite strong because of the negative income effect suffered by workers after devaluations. Thus, the immediate effect was an abrupt increase in net exports. In particular, the evolution of the trade balance depends on the increase in the domestic supply of and demand for tradables:

$$dTB = dY_s^T - dY_d^T \tag{4}$$

Again, by assuming an inelastic supply of tradables in the short run, the trade balance will improve only if demand for tradables decreases. As before, this depends on income and substitution effects, although the latter is now the expenditure switching from non-tradables to tradables. Hence, the result for the trade balance after a devaluation will be the opposite of:

$$dY_d^T = \left[\underbrace{m_{tc}(Y_s^T - Y_{dc}^T)}_{\text{inc eff cap}} - \underbrace{m_{tw}(Y_{dw}^T)}_{\text{inc eff wor}} - \underbrace{Y^{NT}E_{ne}}_{\text{subs eff}} \right] de \tag{5}$$

where m_{tc} and m_{tw} are the marginal propensity to consume tradables for capitalists and workers, respectively. Furthermore, by considering the propensity of capitalists and workers to save as $s_c = 1 - m_{nc} - m_{tc}$ and $s_w = 1 - m_{nw} - m_{tw}$, respectively, and assuming that trade is originally balanced, then [5] can be reduced to:

$$dY_d^T = \left[\underbrace{(s_w - s_c)Y_{dw}^T}_{i} + \underbrace{(m_{nw} - m_{nc})Y_{dw}^T}_{ii} - \underbrace{Y^{NT}E_{ne}}_{iii} \right] de \tag{6}$$

where the second and third terms are the pure income and substitution effects, respectively, depicted in [3] but with opposite signs. As the income effect is assumed to exceed the substitution effect, then $ii - iii > 0$. However, the first term is likely to be negative because workers' marginal propensity to save is lower than that of capitalists. If this term dominates, such that $|i| > ii - iii$, then [6] is negative, and thus, [4] becomes positive. That is, a devaluation will be both contractionary for output and have a positive effect on the trade balance.

Let us turn to the long-run effects of devaluations. According to the traditional view, the real effect of a devaluation is expected to dissipate because of the (relative) purchasing power parity condition. Ultimately, all real variables would return to their initial levels. However, alternative theories suggest that nominal devaluations might have long-run effects if the price of tradables *vis-à-vis* that of non-tradables (i.e. the real exchange rate) is significantly affected for a sustained period of time. According to these alternative theories, devaluations can have lasting effects on the real exchange rate whenever there is no strong passthrough to local prices. If this is the case, there would be an increase in the trade balance that tends to be permanent and, as a consequence, there can be a long-term effect on output[5].

The main argument of these alternative neo-mercantilist theories is that «developing countries achieve more rapid growth when they are able to increase the relative profitability of their tradables». This is the case because tradables are «special» in that «they suffer disproportionately from market failure» in information—as in Rodrik (2008)—or there are labour market rigidities—the hidden unemployment mentioned in Razmi *et al*. (2012)—. Consequently, «an increase in the relative price of tradables acts as a second-best mechanism to partly alleviate the relevant distortion, foster desirable structural change, and spur growth»[6].

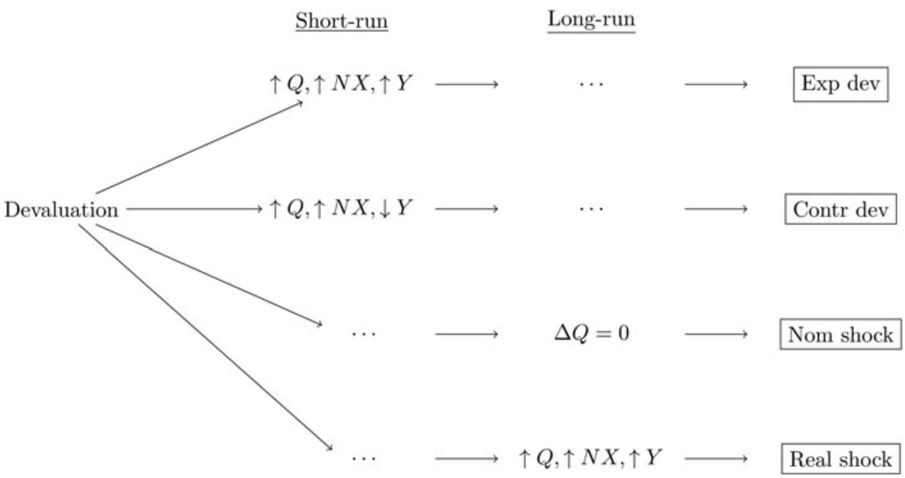
Figure 2 summarises the four different disturbances that will be used in the identification scheme below. *Expansionary* and *contractionary* devaluations are expected to provoke a real devaluation and an increase in net

[5] Burstein *et al*. (2005) and Burstein *et al*. (2007) found that large devaluations generate strong increases in the real exchange rate because of sticky non-tradable prices.

[6] All the quotations in this paragraph are from Rodrik (2008, p. 370).

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

FIGURE 2
SHORT- AND LONG-RUN EFFECTS OF DEVALUATIONS.



exports in the short run. Instead, *nominal* and *real* shocks to the exchange rate are identified based on their expected long-run real effects[7].

5. THE EMPIRICAL APPROACH

This section describes the empirical strategy used to identify the sources of disturbance affecting the nominal exchange rate by decomposing its variations into different types of structural shocks. In particular, imposing exclusion and sign restrictions both on impact and in the long run that are consistent with the traditional and alternative approaches described in the previous section makes it possible to disentangle the four innovations: *expansionary* and *contractionary* devaluations and *nominal* and *real* shocks.

Let us consider the following time series vector:

$$y_t = \begin{bmatrix} \Delta e_t \\ Q_t \\ NX_t/Y_t \\ \Delta Y_t \end{bmatrix}$$

[7] Note that the *real* shock identified here is based on Rodrik (2008), who associates real devaluation with growth. Instead, a traditional real shock to the exchange rate, as an innovation to productivity or consumer preferences in the domestic relative to the international economy, typically relates long-run growth to real appreciations. The interested reader can consult Enders and Lee (1997) for an identification strategy for traditional real shocks.

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

where Δe_t, Q_t, NX_t/Y_t and ΔY_t are nominal exchange rate variations, the real exchange rate, net exports over output and output growth, respectively (see the data Appendix for details). This model has the following structural VAR (p) representation:

$$B_0 y_t = B_1 y_{t-1} + B_2 y_{t-2} + \cdots + B_p y_{t-p} + w_t \qquad w_t \sim (0, I_K) \tag{7}$$

where B_i, $i = 0, \ldots, p$ are square coefficient matrices, and w_t are the structural residuals in the sense that they are mutually uncorrelated and have an economic interpretation derived from the theoretical framework.

The VAR(p) model in its reduced form can be expressed as:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + u_t \qquad u_t \sim (0, \Sigma_u) \tag{8}$$

where the coefficient matrices $A_i = B_0^{-1} B_i$, $i = 1, \ldots, p$ and $u_t = B_0^{-1} w_t$.

As is clear from comparing the structural representation [7] and its reduced form [8], the impact matrix B_0^{-1} becomes essential because it makes it possible to recover the structural shocks from the reduced-form residuals with:

$$w_t = B_0 u_t$$

The lag order is one, according to the Akaike information criterion, and residual non-autocorrelation and normality checks are passed[8]. As Bayesian methods of inference is typically used when identifying shocks with sign restrictions, the VAR model [8] is estimated with Bayesian techniques using the independent Gaussian-inverse Wishart prior and the Gibbs sampler to build a posterior distribution. In particular, a posterior distribution is obtained from:

$$g(\theta|y) \propto f(y|\theta) g(\theta) = l(\theta|y) g(\theta)$$

where $g(\theta)$ is the prior distribution, $l(\theta|y)$ is the likelihood function, $f(y|\theta)$ is the joint sample, $g(\theta|y)$ is the posterior distribution and $\theta = (\alpha, \Sigma_u)$ are the parameter estimates (where α represents the VAR coefficients)[9]. If the

[8] The residual tests are not presented here but are available upon request.

[9] Figure 1 suggests that there might have been a structural change in some of the variables and, as such, time-varying parameters should be used. However, the estimation is performed with constant coefficients because one of the main goals of the present paper is to conduct a historical decomposition, although it is not clear how to obtain this when using time-varying parameters (Kilian and Lütkepohl 2017). To verify the strength of possible structural changes, and hence the danger of relying on constant parameters' estimations, subsamples have been used to obtain IRFs. As mentioned in footnote 4, the Appendix shows that the IRFs and the variance decomposition are not significantly different. The results presented here can, then, be considered robust.

independence of the priors of α and Σ_u is assumed, as the independent Gaussian-inverse Wishart prior does, then the prior distribution is as follows:

$$g(\alpha, \Sigma_u) = g_\alpha(\alpha) g_{\Sigma_u}(\Sigma_u)$$

with

$$\alpha \sim \mathcal{N}(\alpha^*, V_\alpha)$$

$$\Sigma_u \sim \mathcal{IW}_K(S_*, n)$$

As Figure 1 shows some of the time series used exhibit considerable persistence. Thus, a random walk prior is selected for the prior mean (α^*). For the prior variance $V_\alpha = \eta I_K$, the hyperparameter is set at $\eta = 1$, which reflects the ignorance about its true value. Regarding the hyperparameters of the covariance matrix, the draws are obtained from the Wishart distribution with prior $S_* = I_K$ and n degrees of freedom. A burn-in sample of 20,000 draws is run, and then 10,000 draws are kept to obtain the estimates of the reduced-form VAR parameters $\theta = (\alpha, \Sigma_u)$.

Next, the structural estimation is performed based on the algorithm developed by Arias *et al*. (2014). In particular, it is drawn with replacement from the reduced-form estimates to obtain orthogonal short- and long-run impact matrices using the Cholesky decomposition as an initial guess[10]:

$$L_0 = \text{Chol}(\Sigma_u)$$

$$L_\infty = (I_K - A_1 - \cdots A_p) L_0$$

$$L = [L_0 \quad L_\infty]'$$

That is, a candidate matrix L is obtained through dynamic sign restrictions, that is, that include restrictions both on impact (L_0) and in the long run (L_∞). At the same time, a rotation matrix Q is calculated with the QR decomposition of a normal distribution $\mathcal{N}(0, I_K)$ draw. The candidate matrix $B_0^{-1} = L_0 Q$ is retained only if the following conditions on L are

[10] Note that the Cholesky decomposition is used here for orthogonalisation only, not for identification. This is common practice in sign restriction schemes. The interested reader can consult footnote 3 in Fry and Pagan (2011).

satisfied:

$$\begin{bmatrix} \Delta e_t \\ Q_t \\ NX_t/Y_t \\ \Delta Y_t \end{bmatrix} = \underbrace{\begin{bmatrix} + & + & + & + \\ \cdot & + & + & \cdot \\ \cdot & \cdot & + & \cdot \\ \cdot & \cdot & - & + \end{bmatrix}}_{L_0} \begin{bmatrix} w_t^n \\ w_t^r \\ w_t^c \\ w_t^e \end{bmatrix} \quad (\text{at } \ t = 0) \tag{9}$$

$$\vdots \quad = \underbrace{\begin{bmatrix} \cdot & \cdot & \cdot & \cdot \\ 0 & + & \cdot & \cdot \\ \cdot & + & \cdot & \cdot \\ \cdot & + & \cdot & \cdot \end{bmatrix}}_{L_\infty} \quad \vdots \quad (\text{at } \ t = \infty) \tag{10}$$

where w_t^n, w_t^r, w_t^c and w_t^e are a *nominal* shock, a *real* shock, a *contractionary* devaluation and an *expansionary* devaluation, respectively. All structural shocks are in line with the theoretical approaches developed in the previous section. In the short run, an *expansionary* devaluation would increase the nominal exchange rate and expand output, while a *contractionary* devaluation would reduce output. The corresponding signs for the real exchange rate and net exports of *expansionary* devaluations are left unrestricted because few successful draws can be recovered if they are imposed. As noted below, this suggests that *expansionary* devaluations were infrequent in the sampled data.

In the long run, *nominal* shocks would have no effect on the real exchange rate. Although the long-run effects on net exports and output should also be set to zero, they are left unrestricted because, again, very few draws could satisfy these conditions. One possible explanation for this is that *nominal* shocks can have negative effects on long-run output, even if the real exchange rate remains unchanged. Finally, the *real* shock *à la* Rodrik must have a positive effect on all real variables in the long run.

Of the 10,000 reduced-form bootstrapped series, an equal number of structural impact matrices are obtained using the algorithm of Arias *et al*. (2014) with the restrictions described in [9] and [10]. Once the impact matrices are obtained, impulse response functions (IRFs) can be calculated with:

$$\Theta_i = (JA^iJ')B_0^{-1} \tag{11}$$

where A is the companion form of [8], J is its corresponding operational matrix and $i = 0, 1, 2, \ldots, H$ is the desired horizon. Accumulated responses

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

are also displayed, which can be interpreted as the response in the *level* of the variable.

In addition, the mean squared prediction error at the h-step ahead horizon:

$$MSPE(h) \equiv \mathbb{E}\big[(y_{t+h} - y_{t+h|t})(y_{t+h} - y_{t+h|t})'\big] = \sum_{i=0}^{h-1} \Theta_i \Theta_{i'}$$

can be used to obtain the contribution of shock j to variable k at horizon h:

$$MSPE_j^k(h) = \Theta_{kj,0}^2 + \cdots + \Theta_{kj,h-1}^2 \tag{12}$$

and the sum of the contribution of the j shocks to each variable k at horizon h:

$$MSPE^k(h) = \sum_{j=1}^{K} MSPE_j^k(h) = \sum_{j=1}^{K} (\Theta_{kj,0}^2 + \cdots + \Theta_{kj,h-1}^2) \tag{13}$$

from which the variance decomposition can be calculated by dividing [12] by [13]. That is, the contribution of the jth shock to the overall variance of variable k at horizon h:

$$VarDec_j^k(h) = MSPE_j^k(h)/MSPE^k(h) \tag{14}$$

The historical decomposition of shock j to variable k for a given point of time i is calculated as:

$$\hat{y}_{kt}^j = \sum_{i=0}^{t-1} \Theta_{kj,i} w_{j,t-i}$$

The median of $\Theta_{kj,i}$ is used to obtain the contribution of each shock to the variations in the nominal exchange rate as:

$$\delta_{et}^j = \frac{\hat{y}_{et}^j}{\Delta e_t} 100 \tag{15}$$

and the residual:

$$\varepsilon_{et}^j = \frac{\Delta e_t - \sum_{j=1}^{J} \hat{y}_{et}^j}{\Delta e_t} 100 \tag{16}$$

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

Lastly, the historical decomposition [15] is rescaled as follows:

$$\frac{\delta^{j}_{e\tau}}{\sum_{j=1}^{J} |\delta^{j}_{e\tau}| + \varepsilon^{j}_{e\tau}} \tag{17}$$

where τ are the years of the analysed devaluation episodes. The focus is only on positive contributions, which makes it possible to see which structural shock was more important during each of the particular devaluation events that took place in Argentina during the sample period.

6. THE EVIDENCE

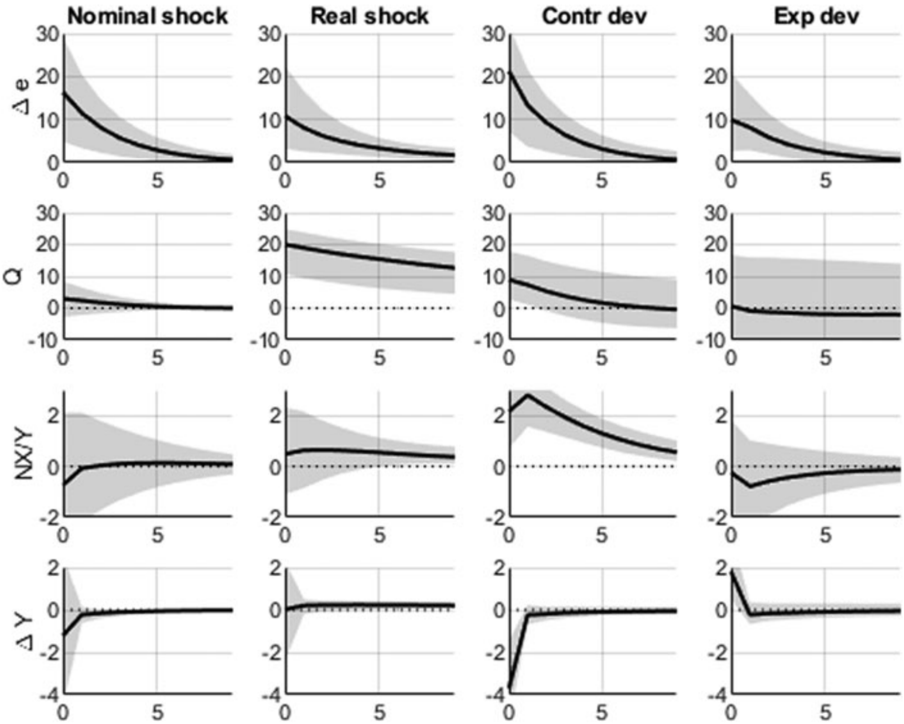
This section presents the evidence obtained by showing the IRFs and the accumulated responses, which reveals the average effects of structural shocks throughout the sample period. In addition, a forecast error variance decomposition describes how much of the nominal exchange rate volatility can be explained by each of these shocks. Finally, a historical decomposition reveals which disturbance had a greater effect during each devaluation episode.

Figure 3 presents the IRFs as described in [11]. Several conclusions can be derived from this plot. The first row shows that *contractionary* devaluations can be associated with *large* devaluations, as they typically have stronger effects over the nominal exchange rate than the rest of the innovations. Secondly, *contractionary* devaluations are extremely traumatic events, as they typically generate massive output contractions of approximately –4%, as shown in the last row of the third column.

Thirdly, *expansionary* devaluations are related primarily to real exchange rate appreciations and decreases in net exports. This implies that these disturbances occurred under high inflation and had no similarity with the *expansionary* devaluations described by the traditional approach. Several other identification schemes were employed in an effort to recover an *expansionary* devaluation of the traditional sort but without success[11]. In fact, Gerchunoff and Llach (2018) state, «the experience of the Argentine economy does not indicate that devaluations are generally expansionary, since the impulse of exports must be subtracted from the (often significant) fall in domestic demand associated with falling real wages» (p. 512). It seems, then, that *expansionary* devaluations raised

[11] The attempts to recover an *expansionary* devaluation consisted of imposing signs on the first- or second-period responses. For example, one of these attempts imposed that net exports be negative on impact but positive in the second year, possibly describing a J-curve. However, the algorithm did not provide impact matrices satisfying these restrictions. The routines programmed are available upon request.

FIGURE 3
IRFs: POSTERIOR MEDIAN AND 68% POSTERIOR ERROR BANDS.



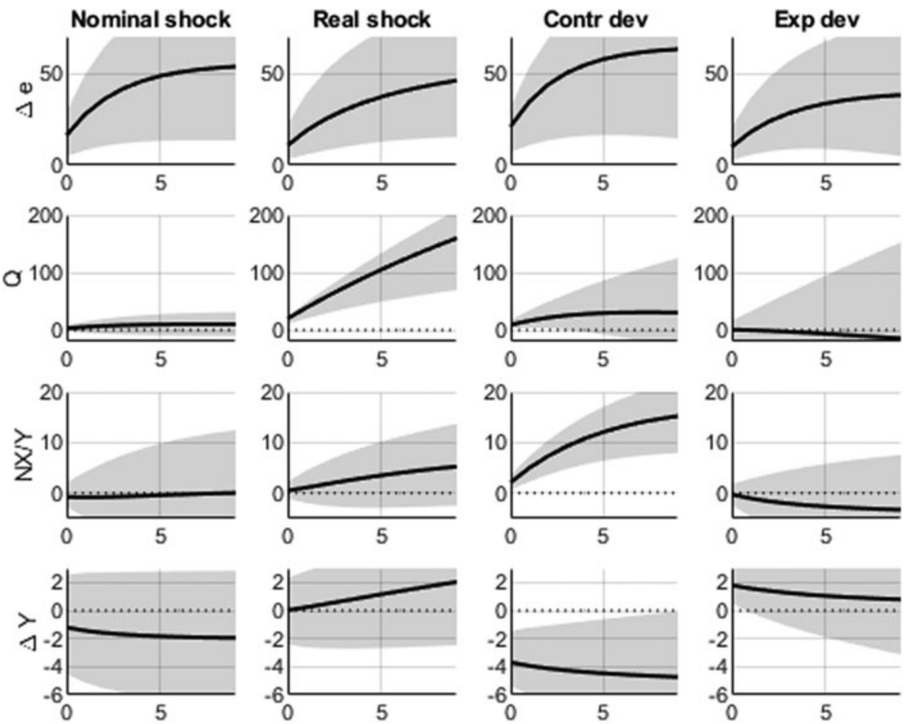
Note: Based on VAR elements of the estimated posterior distribution satisfying the signs and exclusion restrictions imposed on models [9]–[10].

output not through the transmission mechanism considered by the traditional approach but through a real appreciation[12].

Figure 4 plots the accumulated responses. The most important evidence that can be derived from this graph is the effect of the *real* shock on output shown in the last row of the second column. In particular, the impact on accumulated output growth can be interpreted as that on its long-run level. According to the point estimate, a *real* shock associated with a devaluation of 10% tends to increase the level of output by nearly 2% by the tenth year. Thus, there is evidence for the existence of *real* shocks *à la* Rodrik, albeit with no statistical significance.

[12] See Kamin and Rogers (2000) and Berument and Pasaogullari (2003) for the association between real appreciations and expansions.

FIGURE 4
ACCUMULATED RESPONSES: POSTERIOR MEDIAN AND 68% POSTERIOR ERROR BANDS.



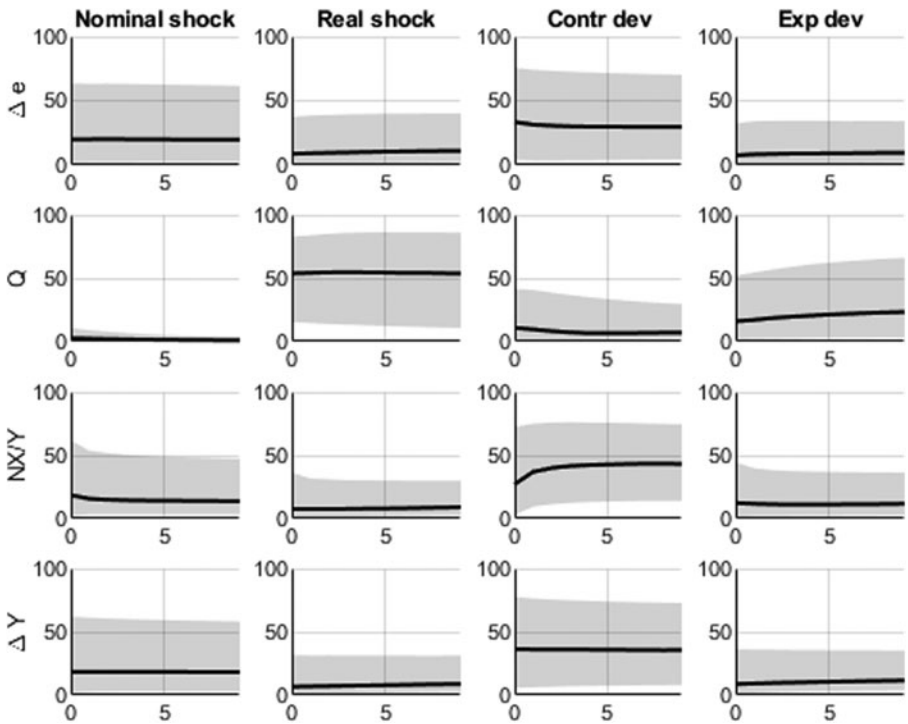
Note: Based on VAR elements of the estimated posterior distribution satisfying the signs and exclusion restrictions imposed on models [9]–[10].

The forecast error variance decomposition in Figure 5 measures the contribution of each structural shock to the observed variables' volatilities obtained with [14]. In the third column, the point estimates indicate that almost half of all variables' volatilities are explained by *contractionary* devaluations, except for the real exchange rate, for which the main source of volatility are the *real* shocks. For the purposes of this study, the variance decomposition of the nominal exchange rate shown in the first row is of particular interest. These findings indicate that, although nominal exchange rate variations are explained primarily by *contractionary* devaluations, other disturbances also had an effect.

Next, a historical decomposition of the variations in the nominal exchange rate reveals the accumulated contributions of structural shocks at each point in time. The focus is on the main devaluation episodes, the historical decompositions of which are rescaled with [17]. Figure 6

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

FIGURE 5
VARIANCE DECOMPOSITION: POSTERIOR MEDIAN AND 68% POSTERIOR ERROR BANDS.

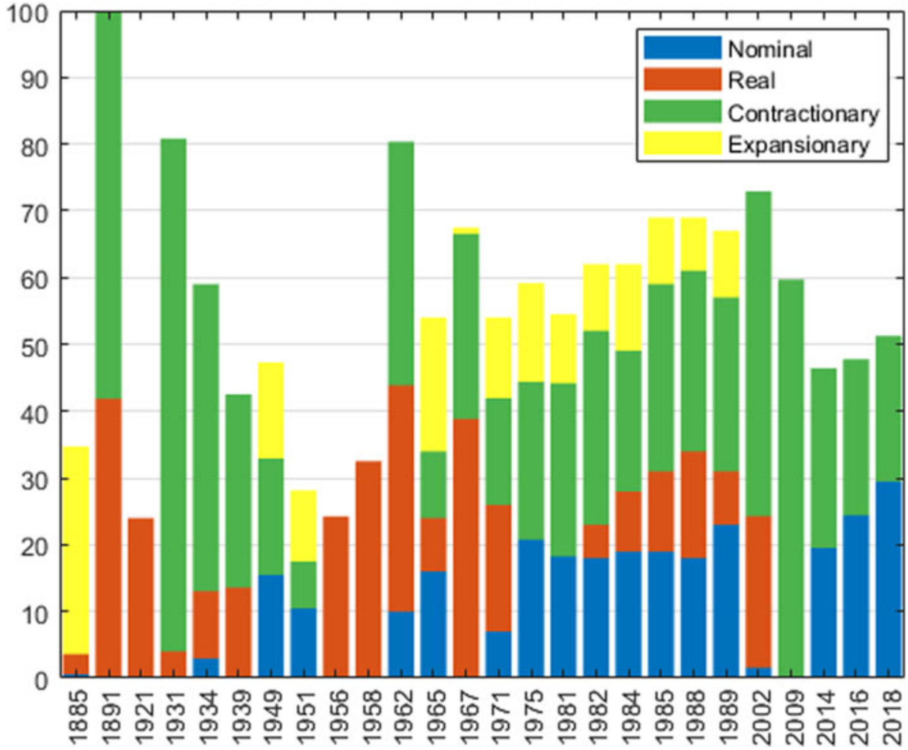


Note: Based on VAR elements of the estimated posterior distribution satisfying the signs and exclusion restrictions imposed on models [9]–[10].

highlights the importance of *contractionary* devaluations (in green), as they influenced almost all the registered episodes. On the contrary, expansionary devaluations (in yellow) were hardly ever significant. As for the long-run effects, Figure 6 shows that *real* shocks (in red) had a considerable influence until the mid-1970s, when *nominal* shocks (in blue) gained relevance. Although there are some exceptions to this pattern (such as the *nominal* shocks significance in 1949 and 1951 and the *real* shock significance in 2002), this threshold coincides with the volatility rise Argentina experienced in the 1970s.

Some background on Argentinean economic history facilitates the interpretation of the results obtained from the historical decomposition. Henceforth, in the following paragraphs, a brief description of the country's history is given in light of the historical decomposition estimates.

FIGURE 6
HISTORICAL DECOMPOSITION OF THE NOMINAL EXCHANGE RATE DURING DEVALUATION EPISODES.



Note: Based on VAR elements of the estimated posterior distribution satisfying the signs and exclusion restrictions imposed on models [9]–[10].

The period between the nation's foundation in 1810 and the consolidation of the National State in 1880 was extremely chaotic in every dimension, and the monetary system was no exception. A number of local and foreign currencies coexisted, forming an anarchic monetary system which was nothing but the result of the difficulties that Argentina experienced during its first turbulent decades as a sovereign nation. These were years of social turmoil and civil wars that intensified from 1852 until 1880, during the so-called «National Organisation Period». Once this period was concluded, the country enjoyed several decades of prosperity. During the *Belle Époque*, Argentina integrated successfully into the world economy as a privileged commodity supplier thanks to its comparative advantages (Taylor 1998).

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

Although the exchange rate market was often intervened through gold convertibility to avoid currency appreciation when capital inflows were too abundant or the implementation of export taxes and exchange rate controls to mitigate devaluation effects, it would be fair to state that the nominal exchange rate was mostly endogenously determined until the 1940s. In fact, commitment to gold convertibility was considered an advantage because of its results in terms of price stability (Díaz Fuentes 1998). Devaluations had different causes; sometimes they took place following international crises, such as during World War I, the 1929 crash and the 1937 recession. Other times, they were the unavoidable outcome of a domestic depression, such as the Baring Brothers crisis of 1890. What all these devaluation episodes had in common was that they were mainly *contractionary*, but they also had long-term *real* effects, as shown in Figure 6.

The 1929 crash was especially traumatic for Argentina. Subsequently, the exchange rate was understood as an exogenous policy tool rather than an endogenously determined variable. In fact, the country implemented exchange rate controls in the early 1930s and multiple exchange rates were introduced thereafter (Rapoport 2012).

In the 1940s, Argentina accelerated its switch from trade openness to autarky, and the currency was deliberately manipulated through exchange rate controls (Díaz-Alejandro 1970) and consciously used to boost local industry (Ferrer 2004). In fact, the historical decomposition plotted in Figure 6 shows that *real* shocks were still prominent in this era. During this period, there were recurrent shortages of the foreign currency needed for the new industrial inputs, the so-called external constraint, which caused autonomous inflation (decoupled from foreign prices evolution). Devaluations were no longer the consequence of international crises but idiosyncratic phenomena necessary to compensate for rising domestic prices. Hence, they became more frequent and violent beginning in the 1950s, as shown in Figure 1.

In 1974, Argentina entered a period of great volatility with high inflation and poor economic performance. As shown in Figure 6, *nominal* shocks gained prominence during these turbulent years. After the hyperinflation of the 1980s, the country applied a tough currency board (the Convertibility Plan), that started as a poster child because of its macroeconomic stability and investment boom, but ended up as a basket case because of the high unemployment, rise in inequality and social unrest, as noted by Edwards (2002) and Frenkel (2002). The aftermath was the debt default and the huge devaluation of 2002. It was probably because this devaluation took place after 10 years of nominal stability that it had persistent real effects.

Nevertheless, subsequent devaluations have had no real effects whatsoever. Although the monetary authority continued its attempts to

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

manipulate the currency through export taxes and exchange rate controls, devaluations lost their ability to display the virtuous dynamics described by Rodrik (2008), which came as a natural result of a highly volatile environment and rising inflation.

7. CONCLUSIONS

This work empirically investigates the effects of devaluations in the short and long run in developing countries. Argentina is selected as a case study for this purpose as it has more than 100 years of available data and experienced almost thirty devaluation episodes during the sample period. A VAR analysis is performed, and four sources of structural disturbances are identified: an *expansionary* devaluation of the traditional type, a *contractionary* devaluation in line with Díaz-Alejandro's distributional effects, a *nominal* shock with no long-run real effects, and a *real* shock consistent with the idea of a real exchange rate-output growth channel.

The results show that devaluations were mainly *contractionary* and that these shocks were typically large and pernicious. None of the *expansionary* devaluations described by traditional theory can be recovered from the DGP. Instead, the results indicate that devaluations were *expansionary* only if they were associated with real exchange rate appreciations, which can occur amid high-inflation environments. Regarding the long-run effects, devaluations with *real* shocks *à la Rodrik* can be particularly relevant when the exchange rate is used as a policy tool. However, such events are not possible during volatile periods, such as the one Argentina has been experiencing since the 1970s.

To deal with potential structural breaks in such a long period of study, a robustness check is carried out, splitting the sample when the structural break is suspected and verifying that neither the IRFs nor the variance decompositions are significantly different.

The effects of devaluations have been, and still are, heatedly debated among Argentinean economic historians. This work can contribute to this discussion providing an original empirical model that makes it possible to calculate and compare antagonist theories about devaluations in a unified set-up. Furthermore, the empirical model here proposed is easily extensible to other middle-income countries to evaluate the contribution of the different innovations in devaluation episodes.

ACKNOWLEDGEMENTS

Received 21 December 2020. Accepted 1 December 2021.

The author is especially grateful to Martín Rapetti. In addition, this paper has benefited from comments by Rolf Campos, Hernán Seoane, Martín

González Eiras, Jorge Carrera, Juanjo Dolado, Galo Nuño, Helmut Lütkepohl, David Guerrero and by participants in the 2018 Workshop on Macroeconomic Research (Cracow University of Economics), LACEA 2018 meeting in Guayaquil, the 2018 RIDGE Workshop on Macroeconomics and Development (University of Buenos Aires) and seminars at the Bank of Spain, the Central Bank of Argentina and the *Corporación Andina de Fomento*. The author is also thankful for the suggestions made by two anonymous referees.

APPENDIX

A.1. DATA

The data are in annual frequency from 1853 until 2018. The data source is Ferreres (2005) until 2004 and the Argentinian National Statistics Institute (INDEC) and Central Bank (BCRA) for the period 2004-2018.

The real exchange rate is calculated using the British pound until 1932, approximately when the United Kingdom was overtaken by the United States as Argentina's main trade partner, and the US$ since then with:

$$Q_t = \frac{e_t P_{04}^{Ar} P_t^*}{P_t^{Ar} P_{04}^*}$$

where e_t is the nominal exchange rate of the AR$ against the British pound or the US$, P_{04}^{Ar} is the CPI of Argentina in 2004 and P_{04}^* is the British or U.S. CPI for the same year. The Argentinian CPI (P_t^{Ar}) is obtained from Cavallo (2012) for the period 2007-2015, as the official index was underestimated for those years. The U.S. CPI (P_t^*) is from the Federal Reserve Bank of St. Louis (FRED) and the British CPI (P_t^*) is from Ferreres (2005).

In addition, considering that exchange rate controls were applied in some years of the sample, the «free» real exchange rate is replaced by the average of the real price of imports and exports taken from Ferreres (2005) since 1932. The gap between both real exchange rates was particularly significant from 1945 until 1960, but not for the rest of the sample.

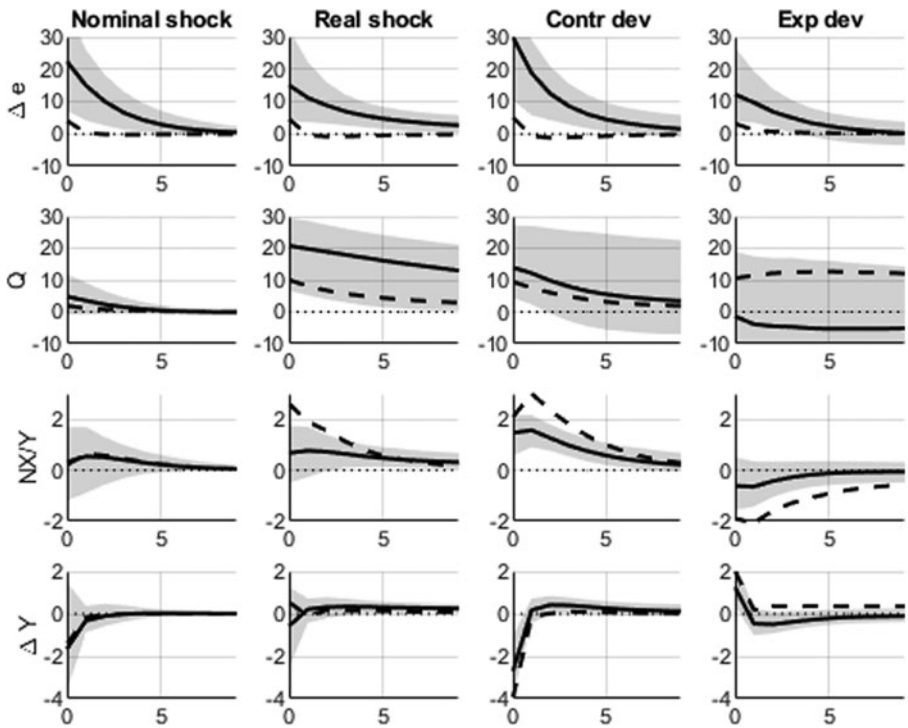
A.2. ROBUSTNESS CHECK

Parameter stability is an issue when dealing with such long periods. In the present case, there might have been a structural break during the 20th century, when Argentina became an urban economy. In order to check whether this potential structural break might affect the results, the model is estimated using two subperiods: the first subperiod is

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

FIGURE A1

IRFs, POSTERIOR MEDIANS OF 1ST AND 2ND SUBPERIODS (DISCONTINUOUS AND CONTINUOUS LINES, RESPECTIVELY) WITH 2ND SUBPERIOD 68% POSTERIOR ERROR BANDS.



Note: Based on VAR elements of the estimated posterior distribution satisfying the signs and exclusion restrictions imposed on models [9]–[10].

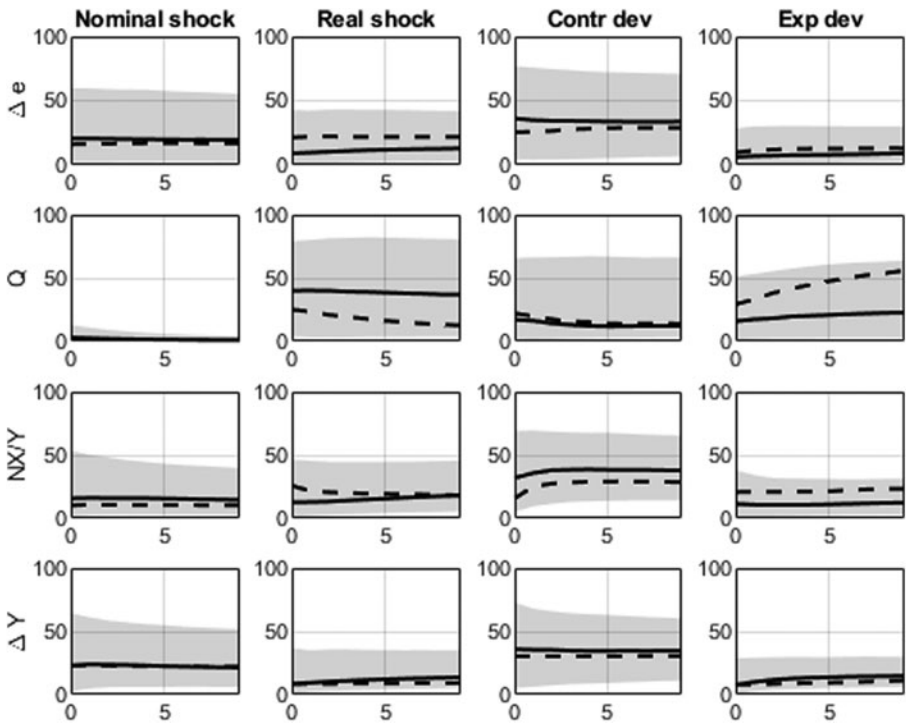
1853-1936, while the second is 1936-2018. Both subperiods have the same number of observations (84), which are enough to estimate the model accurately. The results are displayed in Figures A1 and A2.

Figure A1 does not show that IRFs are significantly different in general. One exception are the IRFs of the nominal exchange rate Δe, which are lower for the first subperiod. This is simply because devaluations were generally of lower magnitude during the first subperiod, as shown in Figure 1. The other exceptions are net exports, which display a stronger response in the first subperiod, though the qualitative impact is similar.

As for the variance decomposition plotted in Figure A2, there do not seem to be significant differences between both estimates. Based on this evidence, it is assumed that the potential structural break that took place

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

FIGURE A2
VARIANCE DECOMPOSITION, POSTERIOR MEDIANS OF 1ST AND 2ND SUBPERIODS (DISCONTINUOUS AND CONTINUOUS LINES, RESPECTIVELY) WITH 2ND SUBPERIOD 68% POSTERIOR ERROR BANDS.



Note: Based on VAR elements of the estimated posterior distribution satisfying the signs and exclusion restrictions imposed on models [9]–[10].

in the 1930s did not affect the general results described in the text significantly.

Lastly, using data as distant as the late-19th and early-20th centuries can be a concern in terms of its quality and reliability. Correspondingly, this robustness check indicates that the results obtained in this work are not sensitive to this potential flaw.

REFERENCES

Alexander, S. (1959): «Effects of a Devaluation: A Simplified Synthesis of Elasticities and Absorption Approaches». *The American Economic Review* 49 (1), pp. 22-44.

https://doi.org/10.1017/S0212610922000064 Published online by Cambridge University Press

Arias, J., Rubio-Ramírez, J., and Waggoner, D. (2014): «Inference Based on SVARs Identified with Sign and Zero Restrictions: Theory and Applications». *Working paper, Federal Reserve Board* (1100).
Bahmani-Oskooee, M. (1985): «Devaluation and the J-Curve: Some Evidence From LDCs». *The Review of Economics and Statistics* 67 (3), pp. 500-504.
Bahmani-Oskooee, M., and Miteza, I. (2006): «Are Devaluations Contractionary? Evidence from Panel Cointegration». *Economic Issues* 11 (1), pp. 49-64.
Bértola, L., and Ocampo, J. (2012): *The Economic Development of Latin America since Independence*. Oxford: Oxford University Press.
Berument, H., and Pasaogullari, M. (2003): «Effects of the Real Exchange Rate on Output and Inflation: Evidence from Turkey». *The Developing Economies* 56 (4), pp. 401-435.
Boonman, T. M. (2017): «The Economic Impact of Sovereign Defaults in Latin America 1870-2012». *Revista de Historia Económica/Journal of Iberian and Latin American Economic History* 35 (1), pp. 81-104.
Bordo, M. D., and Rockoff, H. (1996): «The Gold Standard as a ‹Good Housekeeping Seal of Approval›». *The Journal of Economic History* 56 (2), pp. 389-428.
Brambilla, I., Galiani, S., and Porto, G. (2018): «Argentine Trade Policies in the XX Century: 60 Years of Solitude». *Latin American Economic Review* 27 (4), pp. 1-30.
Buera, F., Navarro, G., and Nicolini, J. (2011): «The Argentine Economy after Two Centuries». *Latin American Journal of Economics* 48 (2), pp. 133-156.
Burstein, A., Eichenbaum, M., and Rebelo, S. (2005): «Large Devaluations and the Real Exchange Rate». *Journal of Political Economy* 113 (4), pp. 742-748.
Burstein, A., Eichenbaum, M., and Rebelo, S. (2007): «Modeling Exchange Rate Passthrough after Large Devaluations». *Journal of Monetary Economics* 54 (2), pp. 346-368.
Bussière, M., Saxena, S., and Tovar, C. (2012): «Chronicle of Currency Collapses: Reexamining the Effects on Output». *Journal of International Money and Finance* 31 (4), pp. 680-708.
Cavallo, A. (2012): «Online and Official Price Indexes: Measuring Argentina's Inflation». *Journal of Monetary Economics* 60 (2), pp. 152-165.
Cerro, A., and Meloni, O. (2013): «Crises and Crashes: Argentina 1825-2002». *Revista de Historia Económica/Journal of Iberian and Latin American Economic History* 31 (2), pp. 219-252.
Cerra, V., and Saxena, S. (2008): «Growth Dynamics: The Myth of Economic Recovery». *The American Economic Review* 98 (1), pp. 439-457.
Cerro, A., and Meloni, O. (2014): «Making Explosive Cocktails: Recipes and Costs of 20 Argentine Crises from 1865 to 2004». *Economic History Research* 10 (2), pp. 104-114.
Cooper, R. N. (1971): *Currency Devaluation in Developing Countries*. International Finance Section, Princeton, New Jersey, Princeton University Press.
Díaz Fuentes, D. (1998): *Latin America during the Interwar Period: The Rise and Fall of the Gold Standard in Argentina, Brazil, and Mexico. Latin America and the World Economy since 1800*. Cambridge, MA: Harvard University Press.
Díaz-Alejandro, C. (1963): «A Note on the Impact of Devaluation and the Redistributive Effect». *Journal of Political Economy* 71 (6), pp. 557-580.
Díaz-Alejandro, C. (1965): *Exchange-rate Devaluation in a Semi-Industrialized Country. The Experience of Argentina, 1955-1961*. Cambridge, MA: The MIT Press.
Díaz-Alejandro, C. (1970): *Essays on the Economic History of the Argentine Republic*. New Haven and London: Yale University Press.
Díaz-Bonilla, E., and Schamis, H. E. (2001): *From Redistribution to Stability: The Evolution of Exchange Rate Policies in Argentina, 1950-98. The Currency Game:*

Exchange Rate Politics in Latin America. Washington, DC: Johns Hopkins University Press.

Edwards, S. (1986): «Are Devaluations Contractionary?». *The Review of Economics and Statistics* 68 (3), pp. 501-508.

Edwards, S. (2002): «The Great Exchange Rate Debate after Argentina». *The North American Journal of Economics and Finance* 13 (3), pp. 237-252.

Enders, W., and Lee, B. (1997): «Accounting for Real and Nominal Exchange Rate Movements in the Post-Bretton Woods Period». *Journal of International Money and Finance* 16 (2), pp. 233-254.

Ferrer, A. (2004): La economía argentina. Desde sus orígenes hasta principios del siglo XXI. Buenos Aires, Fondo de Cultura Económica.

Ferreres, O. (2005): *Dos siglos de economía argentina 1810-2004*. Fundación Norte y Sur.

Ford, A. (1962): *The Gold Standard, 1880-1914: Britain and Argentina*. London: Clarendon Press.

Frenkel, R. (2002): «Argentina: A Decade of the Convertibility Regime». *Brazilian Journal of Political Economy* 22 (4), pp. 567-578.

Frenkel, R., and Rapetti, M. (2008): «Five Years of Competitive and Stable Real Exchange Rate in Argentina, 2002-2007». *International Review of Applied Economics* 22 (2), pp. 215-226.

Fry, R., and Pagan, A. (2011): «Sign Restrictions in Structural Vector Autoregressions: A Critical Review». *Journal of Economic Literature* 49 (4), pp. 938-960.

Gerchunoff, P., and Llach, L. (2009): «Equality or Growth: A 20th Century Argentine Dilemma». *Revista de Historia Económica/Journal of Iberian and Latin American Economic History* 27 (3), pp. 397-426.

Gerchunoff, P., and Llach, L. (2018): *El ciclo de la ilusión y el desencanto. Políticas económicas argentinas de 1880 a nuestros días*. Buenos Aires, Editorial Paidós, Crítica.

González, G., and Viego, V. (2011): «The Argentine Failure from A Comparative Perspective: The Role of Total Factor Productivity». *Revista de Historia Económica/Journal of Iberian and Latin American Economic History* 29 (3), pp. 301-326.

Guzmán, M., Ocampo, J., and Stiglitz, J. (2018): «Real Exchange Rate Policies for Economic Development». *World Development* 110, pp. 51-62.

Gylfason, T., and Schmid, M. (1983): «Does Devaluation Cause Stagflation?». *The Canadia*n Journal of *Economics* 16 (4), pp. 641-654.

Harberger, A. (1950): «Currency Depreciation, Income, and the Balance of Trade». *Journal of Political Economy* 58 (1), pp. 47-60.

Hausmann, R., Pritchett, L., and Rodrik, D. (2005): «Growth Accelerations». *Journal of Economic Growth* 10, pp. 303-329.

Hsing, Y. (2004): «Responses of Argentine Output to Shocks to Monetary Policy, Fiscal Policy, and Exchange Rates: A VAR Model». *Applied Econometrics and International Development* 4 (1), pp. 21-36.

Johnson, H. (1976): «Elasticity, Absorption, Keynesian Multiplier, Keynesian Policy, and Monetary Approaches to Devaluation Theory: A Simple Geometric Exposition». *The American Economic Review* 66 (3), pp. 448-452.

Johnson, H. (1977): «The Monetary Approach to the Balance of Payments: A Nontechnical Guide». *Journal of International Economics* 7 (3), pp. 251-268.

KAMIN, S., and ROGERS, J. (2000): «Output and the Real Exchange Rate in Developing Countries: An Application to Mexico». *Journal of Development Economics* 61 (1), pp. 85-109.

KILIAN, L., and LÜTKEPOHL, H. (2017): *Structural Vector Autoregressive Analysis*. Cambridge, United Kingdom: Cambridge University Press.

KOHN, D., LEIBOVICI, F., and SZKUP, M. (2020): «Financial Frictions and Export Dynamics in Large Devaluations». *Journal of International Economics* 122 (C), pp. 445-456.

KRUGMAN, P., and TAYLOR, L. (1978): «Contractionary Effects of Devaluation». *Journal of International Economics* 8, pp. 445-456.

LAURSEN, S., and METZLER, L. (1950): «Flexible Exchange Rates and the Theory of Employment». *The Review of Economics and Statistics* 32 (4), pp. 281-299.

LEVY-YEYATI, E., STURZENEGGER, F., and GLUZMANN, P. (2012): «Exchange Rate Undervaluation and Economic Growth: Díaz-Alejandro (1965) Revisited». *Economics Letters* 117 (3), pp. 666-672.

ODUSOLA, A., and AKINLO, A. (2001): «Output, Inflation and Exchange Rate in Developing Countries: An Application to Nigeria». *The Developing Economies* 39 (2), pp. 199-222.

RAPOPORT, M. (2012): *Historia Económica, Política y Social de la Argentina, 1880-2003*. Buenos Aires: Emecé.

RAZMI, A., RAPETTI, M., and SKOTT, P. (2012): «The Real Exchange Rate and Economic Development». *Structural Change and Economic Dynamics* 23, pp. 151-169.

RODRIK, D. (2008): «The Real Exchange Rate and Economic Growth». *Brooking Papers on Economic Activity* (2), pp. 365-412.

SANZ, M. I. (2009): «Macroeconomic Outcomes and the Relative Position of Argentina's Economy: 1875-2000». *Journal of Latin American Studies* 41 (2), pp. 309-346.

SIDRAUSKI, M. (1968): «Devaluación, Inflación y Desempleo». *Económica* 14 (1-2), pp. 79-107.

TANG, B. (2015): «Real Exchange Rate and Economic Growth in China: A Cointegrated VAR Approach». *China Economic Review* 34, pp. 293-310.

TAYLOR, A. (1998): «Argentina and the World Capital Market: Saving, Investment, and International Capital Mobility in the Twentieth Century». *Journal of Development Economics* 57 (1), pp. 147-184.

TAYLOR, A. (2018): «The Argentina Paradox: Microexplanations and Macropuzzles». *Latin American Economic Review* 27 (3), pp. 1-17.