Cuba's Monetary Reform and Triple-Digit Inflation

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Abstract

Diverse elements have driven inflation in the Cuban economy in the early 2020s, but the big-bang devaluation of the peso in 2021—the key measure that unlocks monetary reform—stands out as the main determinant. Analysis indicates that the inflation rate ranged between 174% and 700%, well above the government's 2021 consumer price index estimate (77%) and closer to the deflator of household consumption derived from the national income accounts (442%). Even with this larger inflation, there is room for a real depreciation of the peso in the short term. The relative rise of tradable goods prices and incomplete pass-through from the exchange rate to inflation create new incentives and enhance financial transparency in the short term. However, the absence of sufficient structural reforms, the complex macroeconomic scenario, and the persistence of high fiscal deficit, inflation, and devaluation of the peso in the informal market after 2021 put most of the potential benefits of the monetary reform at risk. Monetary instability is a deep, continuing problem.

Keywords: dual exchange markets; pass-through; exchange rate unification; inflation; Cuba

Resumen

Diversos elementos impulsaron la inflación en la economía cubana desde principios de la década de 2020; destacándose la sustancial devaluación del peso en 2021, medida clave de la reforma monetaria, como el principal determinante. Los análisis indican que la tasa de inflación osciló entre el 174% y el 700%, muy por encima de la estimación del IPC del gobierno para 2021 (77.3%) y más cerca del deflactor del consumo de los hogares derivado de las cuentas nacionales (442%). No obstante, dentro de esta mayor inflación, hubo espacio para una depreciación real del Peso a corto plazo. El aumento de los precios relativos de los bienes transables y la transmisión incompleta de la tasa de cambio a la inflación crearon nuevos incentivos y mejoraron la transparencia financiera a corto plazo. Sin embargo, la ausencia de suficientes reformas estructurales, las complejidades del escenario macroeconómico, así como la persistencia de altos déficits fiscales, la inflación y la devaluación del peso en el mercado informal después de 2021, pusieron en riesgo la mayoría de los posibles beneficios de la reforma monetaria. La inestabilidad monetaria se ha convertido es un problema grave y perseverante en la economía cubana.

Palabras claves: mercado dual de cambio; traspaso de la devaluación; unificación del tipo de cambio; inflación; Cuba

The Cuban Central Bank, amid a complex macroeconomic scenario in 2021, decided to go ahead with its much-expected monetary reform. In the three decades to 2021, monetary and currency arrangements created distortions and obstacles to the smooth functioning of the economy. There were two currencies in circulation, the Cuban peso (CUP) and the convertible peso (CUC), as well as limited use of the US dollar. Exchange rates were set for the two currencies at CUP 1 = US$1 for official transactions in the state enterprise sector and CUC 1 = CUP 24 = US$1 in the rest of the economy. Fixed exchange rates resulted in the marked overvaluation of the two currencies. This was reflected in the informal currency market. The currency and monetary arrangements created antiexport bias and distorted prices, and led to large compensatory transfers to firms and consumers, which severely affected fiscal policy. For more than a decade, Cuban and foreign experts advocated the unification of the two currencies and the exchange rate. The authorities kept postponing the needed reforms and ultimately carried out the monetary reform while the country suffered a deep economic crisis.

The key measure that unlocks the current monetary reform process is the twenty-four-fold devaluation of the peso exchange rate to a new official rate of CUP 24 = US$1, while the CUC was eliminated. The Central Bank did not choose the option of gradual devaluations but rather a "big bang," albeit one mitigated by a regulatory framework in which the state enterprise continues to dominate. The decision to push through a significant and rapid devaluation of the Cuban peso is exceptional in the context of a very slow reform process of the Soviet-style model. In particular, readers should note the slow development of the institutional framework for a more flexible functioning of the economy, which hinders the allocation of resources, inflicts undue weight on the public sector, and restrains consumption and production.[1]

The design of the reform was ambitious in scope. The package included the correction of the official exchange rate and the elimination of the convertible peso (CUC) but also changes in salaries, pensions, and subsidies. The end goal of economic authorities is to generate greater financial transparency and incentivize exports, import substitution, and economic efficiency (Cubadebate 2020).

The monetary reform is putting an end to almost three decades of price stability in the Cuban economy. The prospect of inflation is uncertain given the multiple factors that are driving inflation up and because the official Consumer Price Index (CPI) seems to be disguising much higher inflation. To reach the intended benefits of the monetary reform, the Central Bank and Ministry of Finance need to control inflation. An incomplete pass-through of the exchange rate to consumer prices is indispensable to obtaining intended changes.

The share of countries with multiple exchange rate regimes across the world has shrunk over the past forty years. In the past decade, only Venezuela, Argentina, and Cuba had parallel rates in Latin America (De la Torre and Ize 2014).

A comprehensive study from Kiguel and O'Connell (1995) examines the difficulties suffered in economies that used to employ multiple exchange rates in the 1970s and the 1980s. The authors find that experience with multiple exchange rates in developing countries was frustrating. Large and persistent parallel premiums created various distortions and generated rent-seeking and corruption. Econometric estimates find that the exchange rate premium had a significant, negative impact on investment productivity and economic growth.

After examining several representative cases, Kiguel and O'Connell (1995) concluded that, generally, the monetary reforms to unify the exchange market were not part of a well-planned strategy but instead took place in the middle of a crisis (Venezuela in 1989,

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[1] See Mesa-Lago (2017) and Torres (2016) for a recent characterization of the structural reforms in the Cuban economy.

Mexico in 1987, Argentina in 1989). The former socialist countries also transformed dual exchange markets as part of their market-oriented reforms and during a crisis.

Another important takeaway from the Kiguel and O'Connell (1995) study is that, in economies with tougher controls on the exchange market, unification was a prolonged process (as in Turkey, Ghana, and Tanzania). A final important lesson from their study is that the exchange rate regime must be congruent with the credit and fiscal policies. Empirical studies reveal a positive connection between the parallel premium and the fiscal deficit. Exchange unification entails new trends for the fiscal deficit, money supply, and inflation.

In general, the economics literature on countries that have unified dual exchange markets recognizes the diversity of factors that influence the success of this type of reform. For instance, Lizondo (1987) finds that the impact on the exchange rate and the balance of payments relies on the composition of the private sector's portfolio, the policy choices under the dual regimen, the domestic credit path, and the share of exports and imports. Agenor and Flood (1992, 924) underscore the importance of expectations about the postreform policies: They state that "the impact of such a policy shift on the short- and long-run behavior of the exchange rate and inflation can be ambiguous. In the long run, the macroeconomic effects depend on the fiscal impact of the exchange rate reform." In another study on exchange unification, Dorsainvil (2006) uses early warning systems to highlight the importance of credibility on domestic versus foreign asset holdings at the onset of exchange reforms.

For the Cuban case, De la Torre and Ize (2014) reflect that a significant pass-through effect is likely from the official exchange rate to consumer inflation. Inflation could become entrenched if the initial shock produces wage-price spirals exacerbated by an accommodative monetary policy and a high fiscal deficit.

Historical data exposes that postunification inflation tended to be higher in economies with high preunification inflation (Argentina, Peru) or in economies with high pre-unification spreads (Venezuela, Peru). On the contrary, postunification inflation was not high for economies with low preunification inflation and spreads (Ecuador, Dominican Republic). The Cuban case is a mixed bag: preunification inflation is low, but the spread is extremely high relative to previous experiences in the region with dual exchange regimes. The spread between the official and the parallel exchange in Cuba was 2,300%, the biggest in post–World War II Latin America (De la Torre and Ize 2014).

High and out-of-control inflation and dual exchange rate arrangements seem to be something of the past in most Latin American countries. During the postwar period until the 1980s, inflation in Latin America hovered around two and three digits. Inflation increased during the 1980s with several episodes of hyperinflation (Argentina, Bolivia, Nicaragua, Peru). In the late 1990s, "most Latin American economies conquered inflation," thanks to progress in macroeconomic policies and institutions, central bank independence, fiscal consolidation, and adoption of inflation targets to conduct monetary policy (De Gregorio 2019). The decline in inflation was also a global phenomenon, partly explained by growing competition due to globalization and deregulation (Rogoff 2004). In 2021, central banks predict reflation trends due to what seems to be a temporary impact of the pandemic on international supply chains. Budianto and colleagues (2021) assert that the pickup in inflation can be attributed to the base effect and that a more persistent increase in inflation would require a pickup in labor costs and inflation expectations.

This article makes the most of scarce available data for the Cuban economy to evaluate the main factors that are behind the current inflationary trends. Our empirical strategy focuses on the impact of peso devaluation on consumer inflation: the pass-through effect. We consider an accounting exercise and an estimation of the Phillips curve to approach short-term inflationary pressures. Nevertheless, we complement our result by evaluating the peculiar conditions in which Cuba's monetary reform takes place and pay careful

attention to the macroeconomic context, the policy choices, and other leading variables identified in the literature on exchange unification.

The rest of this article is organized as follows. The following section describes key elements of the macroeconomic context and the exchange rate arrangements from the early 1990s to the present. We then present the accounting exercise to approach short-term inflationary pressures. We then discuss the results arising from the Phillips curve. Finally, we put forward the policy implications of an incomplete pass-through and highlight elements of the post–monetary reform scenario that tend to nullify its potential favorable effects.

Macroeconomic context: Low inflation coming to an end

For more than two decades, Cuban state-owned enterprises, self-employed workers, cooperatives, foreign-invested enterprises, farmers, and households were operating in a low-inflation economy. The inflation rate from 2000 to 2019 was around 1.3%. In the early 1990s, after the collapse of the socialist bloc, there were three years of very high inflation. The inflation rate peaked in 1993 at 183% and averaged 77% in the period 1990–1993.

In those years, the average exchange rate—the weighted mean between the official and parallel rates (Vidal 2020)—was devalued at an annual pace of 53.8%. The devaluation and macroeconomic imbalances—especially a fiscal deficit of around 25% of gross domestic product (GDP) and an accumulated GDP contraction of 35%—contributed to that episode of monetary instability. Monetary instability brought about the partial dollarization of the economy and gave rise to the dual currency and exchange rate system that prevailed for three decades (Vidal and Pérez, 2014). Direct use of the US dollar was allowed from 1993 until November 2004. More recently, starting in 2019, state dollar stores were established where consumers use dollar accounts (Moneda Libremente Convertible, or MLC) in state banks as a means of payment for consumer goods.

Figure 1 shows the impressive process of disinflation since 1994, which included some years of deflation. The structural reforms of those years and the fiscal adjustment measures tamed imbalances and controlled inflation. The Cuban economy did not show substantial CPI inflation between 1994 and 2019, although there were years such as 2011 and 2015 when the index rose to over 2.5%. Given the centralized nature of the production system, there is some degree of price control and subsidies for goods, services, and state companies, yet underlying factors have helped guarantee price stability in the long run, especially fixed exchange rates, low fiscal deficit, and tight control on state wages (Vidal and Perez 2014).

A fixed exchange rate regime for the Cuban peso (CUP) and the convertible peso (CUC) was in place throughout this time. Therefore, the pass-through effect of the nominal exchange rate to consumer prices remained nullified. The exchange rate arrangement in Cuba included two national currencies and multiple exchange rates and exchange controls, with a marked difference between individuals and organizations (De la Torre and Ize 2014; Vidal and Perez 2014). The official exchange rates of the Cuban peso and the convertible peso had operated at parity with the US dollar until the monetary reform was deployed in 2021. There was a black market for both currencies, though with a low premium for the US dollar since the late 1990s. Only in 2020 and 2021 did the parallel exchange rate suffer a new steep devaluation.

The second key determinant, fiscal deficit, remained under control since 1994 (Figure 1). From 2000 to 2019, the fiscal deficit as a proportion of GDP stood at 4.2%. This allowed for greater stability in the growth of the money supply, which is highly dependent on fiscal imbalances due to the use of monetization (only after 2014 public bonds began to be used). Fiscal spending dropped from 78.1% of GDP in 2008 to an all-time low of 60.8% in 2014.
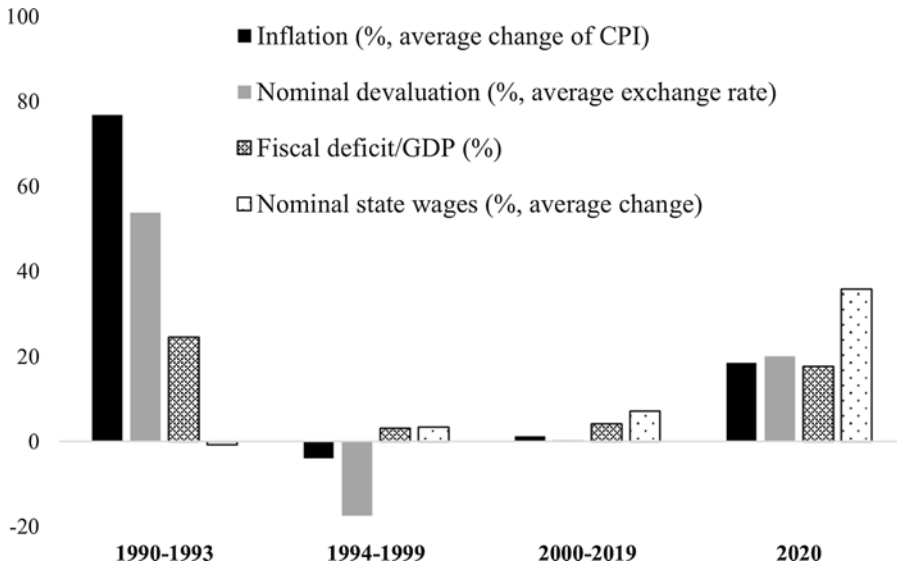
Figure 1. Cuba: Key inflation determinants, 1990–2020 (%, average change, fiscal deficit in level), based on ONEI data.

These results, with a better balance of payments and the renegotiation of the country's foreign debt (including Paris Club debt), make Cuba's macroeconomic management look more favorable. However, the Venezuelan crisis (main trade partner) and sharpening economic sanctions under the Trump administration damaged the external accounts and triggered an expansive fiscal policy with the intent of softening the impact (Mesa-Lago and Vidal 2019). Since 2016 there were five consecutive years with a fiscal deficit that ranged between 6% and 8% of GDP.

Equally important for monetary stability has been the salary policy (Fig.1). The decision to keep nominal wages in the state sector (and pensions) frozen during the crisis of the 1990s, and to make very few upward adjustments in the following years, with exceptions (2005 and 2006: 16%; 2014 and 2015: 20%). Over the entire period 1990–2019, the nominal average wage in the state sector grew at an annual rate of 7.1%. Adjusted for inflation, the average wage in the state sector fell in 1989–2020.

These three fundamental determinants of the low-inflation economy in previous decades experienced a big swing because of the pandemic and monetary reform in the 2020s.

Cuba did not have the financial support of the International Monetary Fund or other multilateral institutions to manage the monetary reform (Feinberg 2011) or navigate the pandemic. The Cuban government strained public spending even further to address the health crisis and increase subsidies to paralyzed companies. A sizable increase in nominal salaries for state workers (and pensions) was orchestrated to protect a large group of households from devaluation and inflation. The accumulation of sharp fiscal deficits overwhelmed public bond financing through state banks and forced monetary expansion to cover excess spending.

The data from the National Statistics Office (ONEI) shows that wages in the state sector increased by 35.8%, the fiscal deficit expanded to 17.7%, and CPI inflation picked up to 18.5% in 2020. In 2021, wages in the state sector increased on average by five times, the fiscal deficit was 11.7% of GDP, and official CPI inflation accelerated to 77.3% (ONEI 2021). One key reason the ONEI's CPI underestimates true inflation is that its base is outdated

(2010), and it has only an 18% weight for nonstate markets within the household consumption basket. A broader index, the deflator of household consumption expenditures derived from the national income accounts, shows a 442% yearly rise (ONEI 2022). The deflator measures the price of consumption expenditure by households and is weighted by outlays in each consumption item in the national accounts. The CPI index, in contrast, largely measures consumer prices in the state sector and thus understates consumer inflation derived from unregulated private-sector prices.

The rise in state salaries and pensions was a onetime measure. There is not any known intention of implementing a mechanism for indexing salaries and pensions to inflation. This would avoid an escalation of consumption demand from state workers and pensioners in the coming years.

When on January 1, 2021, the Central Bank devalued and set the unified official exchange rate at 24 pesos per dollar, the dollar traded at 40 in the informal market. In December 2021, the exchange rate in the parallel market hovered at around 80 pesos per dollar. In terms of the average nominal exchange rate (official and parallel), the depreciation was around 20% in 2020 and 831% in 2021. Although the government unified the official exchange rates at US\$1 = CUP24, in the black market the dollar had a spread of 233% (in December 2021) to the unified official exchange rate. This is a significant spread, although it is much smaller than the 2,300% before the monetary reform.

Despite the monetary reform, the government maintains exchange controls over capital and current account movements, and the official exchange rate continues to be fixed after abandoning the parity with the dollar. In addition, dollarization has been expanded because of inflation and because the government resorted to the dollar to insulate some subsectors and markets from the balance-of-payments crisis and monetary instability (Luis 2020). Dollarized sectors are rather immune to the impact of peso devaluation. Redollarization reduces some of the intended impacts of monetary reform.

The impact of the US sanctions and the pandemic on the tourism industry has produced an acute shortage of foreign exchange (Torres 2018; Pérez-López 2017). By 2020, exports had accumulated seven consecutive years of decline. At the same time, Cuba's large trade surplus with Venezuela arising out of the export of medical and other services has dwindled (Luis 2021). Imports have had to adjust until reaching their lowest level in the last 10 years, decreasing 50% from 2013.[2] The National Statistics Office reported a GDP contraction of 10.9% in 2020, one of the deepest in the region (ECLAC 2021), and a disappointing recovery of only 1.3% in 2021. The population suffers shortages of food, medicines, supplies, and consumer goods as much as it did after the fall of the Soviet Union (Hoffmann 2021).

All this creates a scenario for 2021 with several sources of inflationary pressures from the negative supply shock, excess domestic demand, pass-through effects, and uncertainty about the way out of the economic crisis and the future course of monetary policy. Like most cases examined by Kiguel and O'Connell (1995), Cuba is trying to unify the exchange market during a crisis. Pre- and postunification fiscal imbalance is a trait in common with experiences of the 1980s, and as then, it will be essential in the determination of the long-term path of the parallel rate and inflation.

Accounting approach

We use the study of Burstein, Eichenbaum, and Rebelo (2005) as a main reference to examine short-term inflationary implications of the peso devaluation from an accounting approach, considering data constraints and specific treatment that the Cuban case deserves.

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[2] Foreign exchange assets of Cuban banks which by 2018 had recovered following the 2016 debt restructuring agreements with the Paris Club of creditor countries contracted by 57% in 2018–2021 as reflected in banking statistics from the Bank for International Settlements (BIS 2021).

Data from the National Statistics Office show that Consumer Price Index inflation reached 18.5% in 2020, while the Household Consumption Deflator registered a rise of 5.3%. The marked difference between the two indexes in 2020 comes about because of different weighting methods, as the deflator is an annual average weighted by the overall nominal outlay in different categories as against the end-year fixed weights used in the CPI. Price controls, subsidies for basic goods and services, and a fixed dual exchange rate add some degree of distortions to available statistics.

Cuba had a fixed exchange rate for the CUP and CUC against the dollar for decades. This means that the official exchange rate does not affect prices directly. To be sure, overvaluation of the currency distorted prices. At the same time, a complex system of subsidies for state firms and consumers masked inflation driven by internal demand and constraints on supply.

A way to describe consumer prices, P_C, and its relationship to international prices, P_I, is to use a basic relation:

$$P_C = (eP_I)^{\alpha} P_N^{(1-\alpha)} \tag{1}$$

P_T and P_N are prices of tradable and nontradable goods, and $P_T = eP_I$. The nominal exchange rate in domestic currency per dollar is e, and α is the elasticity of consumer prices to changes in the price of tradable goods. Also, α is approximately the share of tradable goods in the consumer price index, while $(1 - \alpha)$ is approximately the share of nontradable goods.

When the exchange rate is fixed, tradable good prices will directly reflect the change in international prices. A devaluation, on the other hand, will also cause domestic prices to vary in proportion to the movement in the exchange rate. In experience, the relation between P_C, P_I, and e will not be instantaneous and will take place over time so that a devaluation, for example, will impact prices over several months or longer (Borensztein and Heidelken 2016). The existence of two currencies and two exchange rates prior to January 2021 is also a peculiar aspect of the Cuban monetary system. It means that up to the end of 2020, e is a composite of the exchange rates for the two currencies (official and CUC/parallel). This continued in different forms after the January 1, 2021, devaluation in the parallel foreign exchange market when the CUP rather than the CUC became the main domestic transaction in the unofficial currency market.

The import deflator is used as a reasonable proxy for the price of tradable goods, while the government consumption deflator represents the price of nontradable goods. It is feasible to approximate α, the implicit elasticity of the household consumption deflator to the price of tradable goods, using the data from the national accounts. From Equation 1, we have that $\alpha = (\ln P_C - \ln P_N)/(\ln P_T - \ln P_N)$, where ln is the logarithm. The average α for 2011–2020 is 0.218 and .237 for 2016–2020. Tradable goods are thus a little more than one-fifth of the household consumption deflator. At first look, this might appear reasonable as nontradable services such as education, health, internal security, distribution, and others are a large part of the Cuban economy. The exclusion of export prices in the proxy index for tradable good prices does not introduce a substantial bias. The main exports, tourism, professional services, and nickel are segmented from the rest of the economy and do not compete directly with domestic products.

Data from ONEI show a smooth path of consumer prices in 1994–2019 (see Figure 1), which is remarkable given the volatility of import prices. The answer lies in the overvaluation of nontradable versus tradable goods because of the fixed exchange rate. This means that α is substantially understated by the high relative price of nontradable goods. For example, α ranged from .43 to .59 in Burstein, Eichenbaum, and Rebelo (2005), covering five developing economies, or two- to three-times the Cuban share of tradable goods in GDP and equally in the consumption price deflator. However, available data from the Cuban statistical office indicates a considerable share of food and beverage expenditures in the consumer price index, which are mostly tradable goods (ONEI 2021).

Calculations for the impact of the devaluation can be based on the accounting relation (Equation 1). This relation can be widened to include the two currencies in Cuba at the time of the devaluation and to account for the distribution margin in retail goods. The retail price of tradable goods PT^r can be written:

$$P_T{}^r = \Theta\left(e_p P_I\right)^\beta (ke_c P_T)^{1-\beta} \tag{2}$$

In Equation 2, e_p and e_c are the exchange rates for the CUP and CUC, β is the share of CUPs in foreign exchange transactions, and θ is the distribution margin of retail goods, which is a nontradable service. The constant, $k = 24$, is the internal rate of exchange between the two currencies; that is, CUC1 = CUP24.

Likewise, we can establish a relation accounting for the retail price of nontradable goods PN^r:

$$P_N{}^r = \Theta w^\gamma P_T{}^{\acute\eta} \tag{3}$$

This relates the retail price of nontradable goods to unit labor costs, w, the price of tradable goods and the distribution margin. The parameters γ, $\acute\eta$ and θ are the implicit elasticity of nontradable good prices to unit labor costs, the share of tradable goods used to produce nontradable goods, and the distribution margin in retail prices. Equations (2) and (3) describe the links of prices to the exchange rate, foreign prices, and labor costs and are accounting relations, not mechanisms for market price determination. As we mentioned, there is an element of price controls determined by the state that affects prices in Cuba.

From Equations 1–3, we obtain estimates of the impact of the devaluation on consumer prices for 2021. The parameters of the three equations are obtained from the Cuban national income accounts and correspond to proportions in price indices described above for tradable goods, nontradable goods, and wages. Assumptions about the use of CUPs and CUCs in foreign transactions are derived from ONEI data on consumption in private businesses and monetary time series. The proportion of the parallel exchange market within the Cuban national accounts is estimated at 6% (see Vidal, 2020). Foreign prices are non-fuel-dollar commodity prices at the rate forecast by the IMF (2021) or 26.5% for 2021. The share of tradable goods used in the production of nontradable goods, $\acute\eta$, is a tentative assumption. We use 15% for this value, which is the share of imports in GDP in 2010–2020.

Table 1 presents two scenarios for the twelve-month impact of devaluation on consumer inflation P_C, and prices of tradable and nontradable goods P_T and P_N. P_C is measured by the household consumption deflator in the national accounts, which is used to derive the parameters of Equations 1 to 3. Besides the devaluation of the official and parallel-market peso, a crucial input is the rise in unit labor costs in 2021. We use the announced rise of average wages by a multiple of 5 as a proxy for unit labor costs. This is somewhat greater than the increase in state sector wages but less than in state enterprises, as indicated by (Mesa-Lago 2021). The calculations mentioned above use the IMF projection of 2021 commodity dollar inflation. We assume no change in θ, the distribution margin. However, the current scarcity of many essential foodstuffs and market segmentation suggests that there is an increase in retail margins in the private sector while the government exerts pressures on state companies to contain margins by increasing efficiency.

The calculations indicate twelve-month consumer inflation ranging from a multiple of 4.1 to 5.5 in 2021, that is, inflation of 310% to 450%. Scenario I uses average parameters from the national accounts and shows inflation of 310%. Scenario II assumes a higher inflation elasticity to the price of tradable goods as indicated by the 2020 national income accounts. This is nearer the proportion of tradable goods in relatively closed economies. In this scenario, we also use a unit-labor-cost elasticity of nontradable goods of .70, implied by analysis of episodes of large state salary increases in Cuba. Scenario II results in year-end consumer price inflation of 450%. Both scenarios far surpass ONEI's consumer price

Table 1. Consumer prices after the 2021 peso devaluation: Two scenarios (price level multiple from December 2020)

		P_T	P_N	P_C
I	$\alpha = 0.24$, $\beta = 0.94$, $\gamma = 0.55$, $\acute{\eta}=0.15$	11.78	2.97	4.13
II	$\alpha = 0.30$, $\beta = 0.94$, $\gamma = 0.70$, $\acute{\eta} = 0.15$	11.78	4.00	5.53

Notes: α is the share of tradable goods in the economy. β is the share of the official rate in foreign exchange transactions. γ is the unit labor cost elasticity of nontradable prices. $\acute{\eta}$ is the proportion of tradable goods used in nontradable production.

inflation for 2021 (77.3%). However, Scenario II results in inflation of 450%, close to the level in the deflator of household consumption expenditure (442%).

In this accounting framework, the devaluation of the peso's impact on the price of tradable goods is the main factor driving consumer inflation, as opposed to factors related to the cost of domestic goods such as wages. Import prices in pesos at the dock change by the amount of the devaluation. This, in turn, impacts retail prices, given the distribution margin. In this calculation, a constant distribution charge is used though the government has some ability to alter it through its influence on state enterprises and financial subsidies. The implicit pass-through to consumer prices from the devaluation, defined as the change in consumer retail prices over average devaluation, are 0.44 and 0.59 for Scenarios I and II, respectively.

While actual consumer inflation is uncertain, surely there is a swift rise in the price of tradable versus nontradable goods providing a needed incentive to improve the allocation of resources and the balance of payments shortfall. The scenarios in Table 1 show a fall of as much as 66% in the relative price of nontradable goods. Another way to look at this is the lag of nontradable prices to overall inflation. This means there is room for attaining a real devaluation of the currency as is intended by the Cuban government to change economic incentives and enhance financial transparency.

Phillips curve estimates

Another way we used to approach short-term inflation is the framework of the Phillips curve:[3]

$$\pi_t = \beta_0 + \beta_1 \Delta e_t + \beta_2 y_t + \beta_3 \pi_{t-1} + \varepsilon_t, \qquad (4)$$

where π_t is the annual CPI inflation; Δe_t is the annual devaluation of the average exchange rate (domestic currency per dollar), averaging the Cuban peso's official and parallel exchange rates with 6% weight for the latter (see Vidal 2020); y_t is the output gap or excess demand approximated by the difference between change in average state wages and change in labor productivity; π_{t-1} captures inflationary inertias, and ε_t stands for supply shocks and other omitted factors. Logarithmic difference was used to compute annual change.

Table 2 summarizes the econometric results. Column 1 shows estimates of the short-term elasticities using annual data from 1987 to 2020. The model has white-noise errors and fits 85% of the historical variation in the CPI. All beta coefficients are statistically significant except the elasticity to the output gap. We tried other metrics of the output gap

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[3] Abbas, Bhattacharya, and Sgro (2016) present a broad literature review on the Phillps curve. Stock and Watson (2008) evaluated the mixed performance of the Phillips curve in inflation forecasts. World Bank (2014) employs the Philips curve to estimate the pass-through rate across thirty-five high-income and forty-five developing countries.

Table 2. Cuba: Phillips curve estimates, 1985–2020, dependent variable π_t

	(1)	(2)	(3)	(4)
		Annual Consumer Price Index inflation		
	OLS coefficients estimate	*Contribution of each explanatory variable to annual inflation*		
	1985–2020	*2021*	*2020*	*1991–1993*
Pass-through effect	$\hat{\beta}_1$=0.833* (0.081)	$\hat{\beta}_1\Delta e_t$=1.86	$\hat{\beta}_1\Delta e_t$=0.15	$\hat{\beta}_1\Delta e_t$=0.45
Output gap	$\hat{\beta}_2$=0.085 (0.200)	$\hat{\beta}_2 y_t$=0.14	$\hat{\beta}_2 y_t$=0.04	$\hat{\beta}_2 y_t$=0.10
Inflationary inertias	$\hat{\beta}_3$=0.461* (0.070)	$\hat{\beta}_3\pi_{t-1}$=0.08	$\hat{\beta}_3\pi_{t-1}$=-0.01	$\hat{\beta}_3\pi_{t-1}$=0.18
Constant	$\hat{\beta}_0$=0.011* (0.006)			
	Adjusted R^2 =0.852			
	F statistic= 57.51			

Notes: Numbers in parentheses correspond to the standard error.
*$p < .01$.

(e.g., the difference between GDP and potential GDP calculated with the Hodrick-Prescott filter), and the same result holds. The fact that nominal wages were frozen during the crisis of the 1990s at a time of accelerating inflation could explain the failed statistical significance of the output gap (later we use an estimation period without these years, and the output gap results are statistically significant at 10%).

In the 2020s, the output gap is likely to gain explanatory power. The government's decision to raise average wages by a factor of five (as part of the monetary reform) when productivity stagnated explained the output gap expansion by 400% in 2021. The output gap turned positive, with double-digit growth since 2019 generating demand-side pressures on consumer inflation. The decline in GDP over the past three years, but especially in 2020, hand in hand with the policy of not laying off state workers in the tourism industries and other sectors (despite the impact of lockdowns), took a heavy toll on productivity and helps to explain the rising trajectory of the output gap in 2019–2021 (Figure 2).

Given the estimated Phillips curve (1987–2020) and state wage increases (five times), GDP stagnation, and the average exchange rate devaluation (831%), 706% consumer inflation is forecast for 2021. This number also places the inflation rate well above ONEI's number for the CPI.

Columns 2–4 compute the contributions of each explanatory variable to consumer inflation in the past two years and the early 1990s: each variable's annual average change (logarithmic difference) is multiplied by the estimated short-term elasticity. In these three events of high inflation, the pass-through effect stands out as the primary source of inflationary pressures. This resulted from the combination of a sizable pass-through rate (column 1) and sharp devaluations, more notable in 2021 (Figure 3). Another takeaway from the variables' contribution is that inflationary inertias played a more critical role in the early 1990s, yet the contribution of the output gap is more prominent in the early 2020s. In 2021, as expected, all three determinants were pushing inflation upward.

An exceptional case of pass-through effect

The estimated pass-through coefficient from the exchange rate to inflation ($\hat{\beta}_1$) of 0.83 indicates that, on average, over the period 1987–2020, a permanent 10 percent
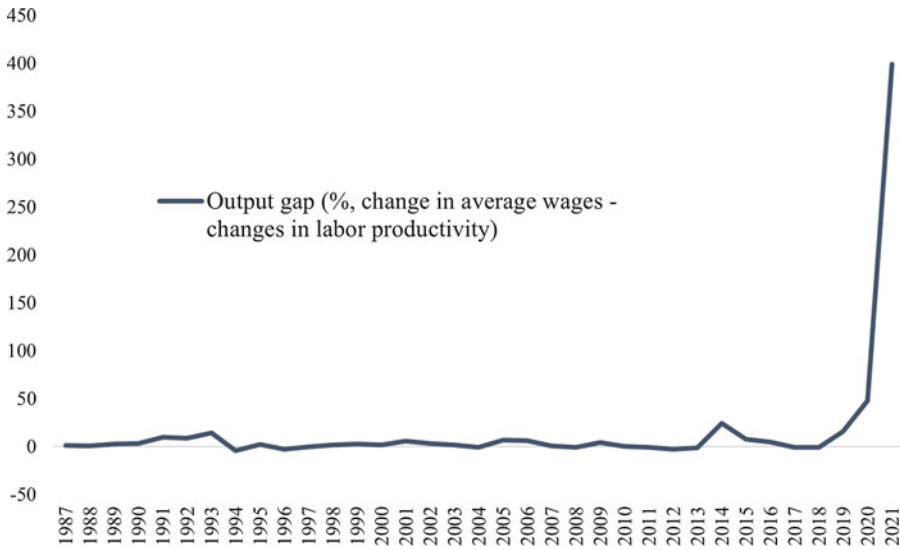
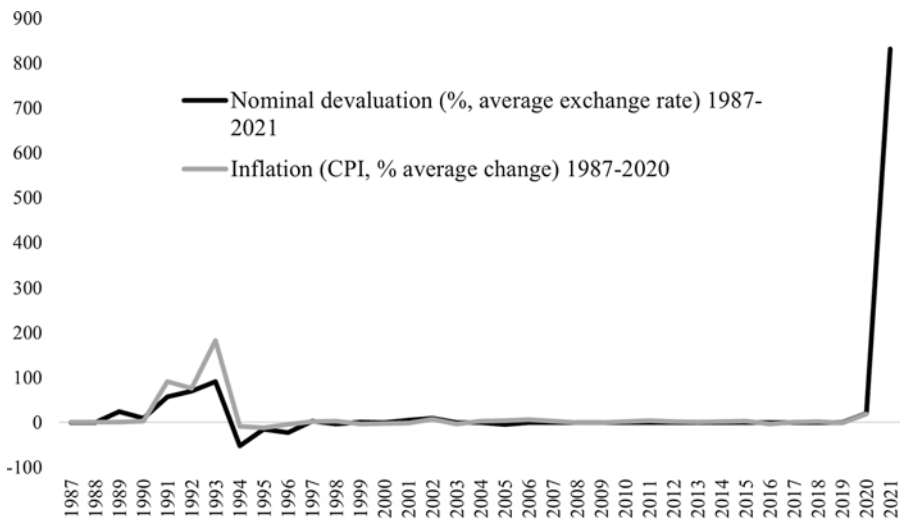**Figure 2.** Cuba: Annual trajectory of the output gap, 1987–2021, based on ONEI data.

Figure 3. Cuba: Annual trajectory of nominal devaluation and inflation, based on ONEI data.

depreciation in the average exchange rate adds around 8 percentage points to consumer price inflation during the first year. This is the short-term elasticity, without considering inflationary inertia. When considering it, the long-run elasticity $\hat{\beta}_1/(1 - \hat{\beta}_3)$ or accumulated pass-through increases to 1.54. This is a high pass-through coefficient compared to the average value of 0.3 estimated by the World Bank (2014) with a sample of forty-five developing countries, and it is larger than that of the above calculations from the national income accounts.

Some caveats must be noted about our results. The high pass-through is clearly influenced by what happened in the early 1990s, when inflation and the exchange rate moved practically in tandem (Figure 3).

The devaluation in the 1990s was entirely produced by the informal exchange rate, given that the official exchange rate held its parity with the dollar. On the contrary, in the early 2020s, both exchange rates contributed to peso devaluation. This implies that, in the 1990s, the pass-through effect occurred directly through the consumer market and mostly in informal circuits, bypassing most of the productive system and predominant value chains, which left the government with fewer policy options to influence these monetary channels. But given the dominant role of state ownership in importing companies, in the productive sector and in wholesale and retail markets, the government has room to intervene administratively and control the pass-through effect when the devaluation occurs in formal markets. This is what happens in the 2020s in contrast with the 1990s.[4]

The government used all the tools to suppress the inflationary effect of peso devaluation in the 2020s. The most important are the following:

- Through administrative actions, the government prevented state-owned enterprises from raising prices in the same proportion as the exchange-rate devaluation. It pressured them to maintain profit margins through efficiency rather than by raising prices. The Finance Ministry sets maximum prices by sector and sub-sector to achieve an average pass-through of the official exchange rate to wholesale prices of 50% so that companies can raise prices to twelve times, not twenty-four times (Cubadebate 2020).
- The government also intervened administratively in the pass-through of wholesale and retail prices. To this end, it pushed to reduce the profit margins of state-owned companies operating in retail consumer markets. In addition, it maintained the rationing book and consumer price subsidies on various products, such as medicines, certain foods, and electricity tariffs (i.e., the monetary reform includes eliminating subsidies but not on all products).
- The authorities also aim to restrain inflation in agricultural and private markets. Some tax incentives have been given to the private and cooperative sectors. But in addition, the national government has defined a top-priority policy objective for local governments to avoid "abusive and speculative prices," which falls into a gray area.

Nevertheless, reducing the pass-through beyond certain limits using administrative tools is not feasible, as it would cause negative profit margins in most sectors and would put almost all sectors in an unviable situation. In addition, all companies in the early 2020s work with restrictions on inputs and financing in foreign currency, making it difficult to boost efficiency and respond to the incentives of the new exchange rate.[5]

In the Cuban case, managing the inflationary impact of devaluation is complicated by the absence of market mechanisms to help correct relative prices. In an economy with a larger number of economic actors and more open and competitive markets, most of the relative price corrections could be entrusted to the interactions and counterweights of the

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[4] Another way to look at this is by considering the endogeneity of the informal exchange rate and inflation in the early 1990s working through inflationary expectations. This phenomenon could reoccur after the 2021 monetary reform if inflationary expectations become entrenched in the context of an acute shortage of foreign exchange.

[5] The elasticity of supply is expected to remain low in the short term given the balance of payments crisis that forces it to restrain imports of inputs and capital and limit access to international financing. The supply response will depend largely on the speed of recovery of the economy, tourism, and exports once the COVID-19 pandemic fades away. The Cuban pharmaceutical and biotechnology industry has developed and produced national vaccines, so Cuba has made early progress in immunizing its population and has signed contracts to export its vaccines (Frank 2021a, 2021b).

Table 3. Cuba: Phillips curve estimates, 1994–2020, dependent variable π_t

	Annual Consumer Price Index inflation		
	(1)	(2)	(3)
	OLS coefficients estimate	*Contribution of each explanatory variable to annual inflation*	
	1994–2020	*2021*	*2020*
Pass-through effect	$\hat{\beta}_1=0.324^*$ (0.086)	$\hat{\beta}_1\Delta e_t=0.72$	$\hat{\beta}_1\Delta e_t=0.06$
Output gap	$\hat{\beta}_2=0.160^{***}$ (0.082)	$\hat{\beta}_2 y_t=0.26$	$\hat{\beta}_2 y_t=0.07$
Inflationary inertias	$\hat{\beta}_3=0.138^{**}$ (0.062)	$\hat{\beta}_3\pi_{t-1}=0.02$	$\hat{\beta}_3\pi_{t-1}=-0.02$
Constant	$\hat{\beta}_0=0.005$ (0.008)		
	Adjusted $R^2 =0.567$		
	F statistic$= 12.36$		

Notes: Numbers in parentheses correspond to the standard error.
$^*p <. 01$. $^{**}p < .05$. $^{***}p < .10$.

productive system. Given the monopolistic and close structure at the outset of the Cuban monetary reform, there is little room for self-correcting market mechanisms (Díaz 2016). If pricing were left to Cuba's more than fifty state enterprise holdings (OSDE), none would give up their monopoly power to raise prices and stay afloat. Without competition and with their monopoly over foreign trade, the OSDE could fully pass through devaluation to consumer prices and maximize profits without any efficient, productive transformation.

Therefore, even though it is a suboptimal situation, given the characteristics of the markets in Cuba, the Ministry of Finance (MFP) has placed limits on price increases. It is suboptimal because the MFP must set hundreds of prices without sufficient information to do so efficiently. This has always been the Achilles' heel of centrally planned economies, an issue exacerbated by the magnitude of the relative price adjustment that the Cuban economy is undergoing in the 2020s.

To partially compensate for the rigidity and inefficiency inherent in centralized price setting, the MFP and other economic authorities hold a dialogue with state company executives, farmers, private entrepreneurs, foreign businesspeople, and local governments (Cubadebate 2020). Negotiation and recalibration bring some flexibility to centralized pricing, but they also open a dangerous door to discretion and decisions motivated by pressure and political lobbying by certain groups. It should also be noted that much of the recalibration that has been made implies more subsidies, which will result in higher fiscal deficits.

In short, extrapolating the pass-through effect of the 1990s might result in overstating inflationary pressures in the early 2020s. There are some characteristics of the Cuban economy and the centralized planning system that could be used to contain inflation in format markets, to a degree. Indeed, if we restrict the estimation period to 1994–2020, to exclude those early years of the 1990s crisis in which informal markets played a definitive role, the pass-through effect comes down to 0.32 (Table 3).[6] It is a pass-through rate close to the World Bank (2014) estimation for developing economies.

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[6] Between late 1993 and 1994 the Cuba government authorized agricultural markets, self-employment, accepted the American dollar as a legal tender, created official exchange houses (CADECA) among other structural transformations that added a great deal of formality to the economy.
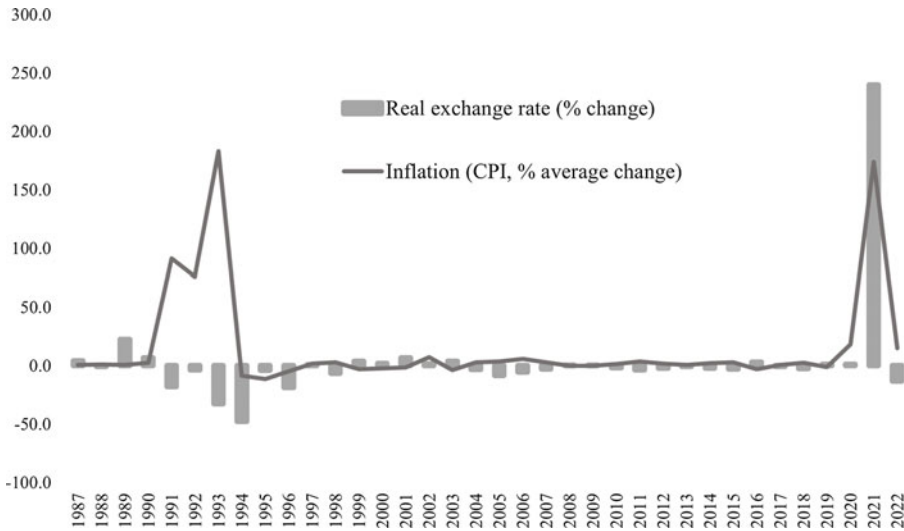
Figure 4. Cuba: Annual trajectory, and 2021–2022 forecast, of inflation and real exchange rate (pesos per dollar adjusted by CPI), based on ONEI data and Phillips curve.

With the new estimation period, the elasticity of inflation to the output gap increases and becomes statistically significant at 10%. The inflationary inertia coefficient declines but still is statistically significant at 5%. The contribution of every explanatory variable to consumer inflation in the past two years shifts according to the new elasticities; even so, the pass-through effect continues to be the primary source of inflationary pressures in the 2020s. In this alternative estimate of the Phillips curve, the inflation forecast for 2021 downgrades to 174%, a rate close to the maximum level of inflation in the early 1990s (183%). This number is below that of Scenario I from the national income accounts. In sum, implicit elasticities in national accounts and the Phillips curve point to triple-digit inflation ranging between 174% and 700% for 2021.

Benefits and doubts of the monetary reform

Figure 4 shows one likely path for inflation and the real exchange rate in 2021 and 2022, given the second estimation of the Phillips curve (Table 3). In this forecast, we recognize that the government has a real chance to influence the pass-through effect in the short term and that we should not extrapolate the events of the early 1990s that took place purely in the informal market. We also assumed that the nominal devaluation and wage increase in 2021 were a one-off shift.

In the 2020s, these numbers reveal that there is room for a real depreciation of the peso in the short term, given that the official exchange rate was devalued 2,300% and the average exchange rate (weighted mean between the official and parallel rates) depreciated 831% while inflation increases less than that according to our estimates and the ONEI's household consumption deflator.

After the collapse of the Soviet Union, the inflation rate exceeded the nominal devaluation, thus producing an appreciation of the real exchange rate. Therefore, we might expect more favorable real effects on the economy in the short term because of today's exchange rate adjustment than in the 1990s. The magnitude of the real exchange depreciation in 2021 is without precedent in the study period.

An incomplete pass-through from the exchange rate to inflation fosters fundamental economic changes. With the real devaluation of the Cuban peso, much is gained in accounting and financial transparency throughout the economic system. The dysfunctionality of the economic system was already known, but with the corrections of relative prices, the primary sources of inefficiency and the main bottlenecks of the economic system can be pinpointed. The monetary reform further exposes the cost of postponing necessary structural reforms.

State enterprise groups are plagued by zombie companies, which have been operating for decades at levels of efficiency and competitiveness that do not merit their existence (De la Torre and Ize 2014; Vidal and Perez 2014; Diaz 2016). The devaluation of the official exchange rate reveals losses in many companies and entire sub-sectors of the economy that have suffered continuous decapitalization and technological obsolescence of their infrastructure, equipment, and machinery, which burden them in any effort to compete in the new monetary environment.

The Cuban government announced that five hundred state-owned enterprises showed losses in 2021, a fourth of the total (Cubadebate 2021). This reflects, to a large extent, the shift in relative prices brought about by the real devaluation of the peso. The government needs to find a lasting solution to the inefficiencies and imbalances brought to light by the monetary reform. Fiscal-deficit expansion and bank credit help mitigate short-term impacts and buy time, but they cannot remain unbalanced indefinitely.[7] Lasting solutions inevitably involve restructuring the state sector and the gradual closure or reconversion of unprofitable companies. To facilitate the downsizing of the state sector and labor realignment, the Cuban government allowed in October 2021 the incorporation of small and medium-sized private businesses (SMEs).

Even though the monetary reform brought about a transparency shock in the short term due to the real devaluation, this does not guarantee positive effects in the medium and long term. Several factors stand out in the postmonetary reform scenario that do not favor it and tend to nullify its potential favorable effects.

First, the economy and tourism have recovered very slowly after the pandemic. This has extended the severity and duration of the economic and balance of payments crisis to levels that equal or exceed the crisis of the early 1990s. This limits the productive sector's response capacity to take advantage of the new price signals and the balance sheet transparency shock generated after the devaluation. The lack of financing, dollars, and inputs has reduced the productive system's eventual positive reaction to the peso's devaluation. This was a risk that the Cuban government took by implementing the monetary reform at a time when the economy was being affected by the pandemic.

Second, the government has not introduced further structural reforms after opening to SMEs. SMEs continue to operate in an excessively restrictive regulatory framework. Structural reforms needed to be accelerated to provide the productive system with a renewed responsiveness and degrees of freedom to effectively substitute imports, increase exports and make better decisions adjusted to the new exchange rate. However, the structural reforms remained excessively gradual and partial before, during, and after the monetary reform.

Third, the complicated macroeconomic scenario has reduced the government's fiscal revenues. Therefore, excessive fiscal imbalances remain, and their monetization with money printing fuels price growth. Inflation has been much more persistent in this

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[7] Vidal (2019) uses five indexes and a vector autoregression model along with Cuba's GDP growth rate to simulate and analyze the macroeconomic effects of monetary, fiscal, and external shocks. The analysis suggests that monetary reform would create negative pressure on goods production and on households' living conditions, which could not be mitigated by an expansionary fiscal policy. Instead, the negative effects of such shocks can be mitigated through greater international openness.

context of high fiscal deficits, continued product and foreign exchange shortages, and balance of payments crises. The Cuban government has been slow to design and implement a macroeconomic stabilization program.

In short, high inflation in 2022 and 2023 and a fixed exchange rate for the state sector erode the benefits of the January 2021 maxi-devaluation and monetary reform. State companies are not ready managerially and financially to take advantage of the real devaluation, while the small firms in the private sector are overregulated and lack capital and access to international markets. Distortions in the exchange rate and the price system re-create similar problems to those that preceded the monetary reform. While there has been some progress in streamlining state enterprises and adding some flexibility to prices, monetary instability is again a significant obstacle to the healthy development of the economy.

Conclusions

Different forces drive inflation in the Cuban economy in the early 2020s, but the big-bang devaluation of the peso in 2021—the key measure that unlocks the monetary reform—stands out as the primary determinant. We arrived at this conclusion after examining implicit elasticities in national accounts and the sizable contribution of the pass-through effect in the Phillips curve.

Implicit elasticities in national accounts and the Phillips curve point to triple-digit inflation, ranging between 174% and 700%, well above the CPI rate for 2021 (77.3%) and closer to the deflator of household consumption expenditure in 2021 derived from the national income accounts (442%). It is also well above the planned inflation when the monetary reform was officially presented (40%). Even with this larger inflation rate, there is room for a real depreciation of the peso in the short term, given that the official exchange rate was devaluated 2,300% and the average exchange rate (weighted mean between the official and parallel rates) depreciated 831%. The relative rise in tradable goods prices and incomplete pass-through from the exchange rate to inflation creates new economic incentives and greater financial transparency.

One important lesson we can extract from the literature is that exchange unification and repercussions on inflation are highly context sensitive. In the Cuban case, the recovery of tourism and the overall economy after the pandemic have proved to be fundamental. The Cuban government took a high risk in implementing the monetary reform in such a complicated scenario.

The literature highlights the close correlation between the parallel rate, government deficit, and postreform policy expectations. We know little about the monetary policy strategy for the coming years and about the medium-term fiscal framework. The steady devaluation of the parallel rate before and after the monetary reform, the failure of the Central Bank to achieve a convergence of all exchange rates, and the persistent inflationary trends after 2021 are clear indications of uncertainty. All these factors will define the sustainability of the real exchange rate depreciation in the longer term and the convergence of exchange rates.

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