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Keynesian Policy Space in "Globalized" Economies

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KEYNESIAN POLICY SPACE IN "GLOBALIZED" ECONOMIES

Abstract

This article shows that in highly internationally financially integrated ("globalized") economies, policymakers' ability to implement effective expansionary macroeconomic policies, referred to in the article as "Keynesian policy space," is influenced by the portfolio decisions of a specific group of investors known as "Global investors." This conclusion arises from a two-country, open-economy model in which Global investors allocate capital internationally based primarily on their perception of the policy credibility of the countries where they invest their managed wealth. In countries that Global investors deem highly credible, expansionary macroeconomic policies prove effective in terms of stimulating output and resource employment. Conversely, in countries perceived as having weak credibility, the portfolio decisions of these investors may undermine the effectiveness of such policies. Consequently, the anticipated real effects of these policies may dissipate into domestic currency depreciation and higher inflation. Following the derivation and evaluation of this conclusion, the article explores various options for countries to establish and maintain Keynesian policy space.

PREAMBLE[1]

As a Keynesian economist, with this article I intend to speak to all Keynesians who believe, as I do, that aggregate demand steers economic performance (not only in the short term but also in the long run), and show them that in highly internationally financially integrated ("globalized") economies the space available to policymakers for carrying out effective expansionary macroeconomic policies is in fact constrained by the portfolio decisions of a special class of agents – the so called "Global investors."

This article intersects to some degree with the findings of Fritz et al. (2018), which, from a Keynesian-structuralist standpoint, elucidates how the international monetary asymmetry associated with currency hierarchy imposes significant limitations on the implementation of Keynesian policies in globalized economies. However, it diverges from this research in several aspects, as elaborated below. The article builds upon my recent work, which delves into the role of Global investors and

[1] I wish to thank Karsten Kohler and the anonymous reviewer of the previous version of this article for their very helpful comments and advice. Obviously, I remain the only responsible for the opinions expressed in the article and any errors it might contain.

investigates how their choices in international portfolio allocation influence the policy space accessible to national policymakers for implementing effective expansionary macroeconomic policies.[2]

Accordingly, the market power of the Global investors is such that their portfolio decisions erode the effectiveness of Keynesian policies when these are enacted by countries characterized by weak credibility, so that their anticipated *real* effects dissipate into *nominal* effects (i.e., domestic currency depreciation and higher inflation).

The conclusion is that the weaker (stronger) the credibility that Global investors attribute to a country, the narrower (larger) the policy space they grant to it, and the less (more) successful the effects of its expansionary policy measures. This article shows how the above results are derived and discusses its policy implications. The Postscript to the article briefly frames it in a critical context.

1. INTRODUCTION

My point of departure is that, as I have several times emphasized,[3] despite the history of trade and financial globalization the world has gone through over several decades, the economic models that are typically employed to analyze the impacts of monetary and fiscal policies fail to acknowledge explicitly the influence wielded by Global investors on the market price of public sector claims, encompassing both money and debt. This holds true for conventional orthodox (mainstream) modeling, where local agents—families, businesses, and institutions—are depicted as sovereign entities making optimal allocative decisions within a set of possible options, as well as for heterodox approaches (see, for instance, recently, the case of Modern Money Theory, MMT), whereby governments are assumed to possess the capacity to issue all necessary money to finance public spending. Both paradigms, in fact,

[2] See Bossone (2019; 2020a, b; 2021; 2022; and 2023).

[3] See my works cited in the footnote #1.

start from presuming that local agents have full sovereignty over their economic choices and (can) make optimal choices.

Especially in open and financially globalized economies, the valuation of public sector liabilities and the available space for expansionary monetary and fiscal policies—henceforth broadly referred to as "Keynesian policy space" or simply “policy space” – are determined by the expectations and trading activities of Global investors.[4] Consequently, a comprehensive macro-analysis must bring Global investors to the forefront to comprehend how policies operate in the global financial context and to assess their impact on the real economy. This becomes even more imperative with the growing significance of the international bond market as a substantial source of external finance for numerous countries, coupled with a noteworthy surge in debt issuance following an extended period of low interest rates before the resurgence of inflation caused by the supply shocks caused by the COVID19 pandemic, first, and the Russian invasion of Ukraine, subsequently.

The arguments in this article revolve around the Portfolio Theory of Inflation (PTI), which I have developed and discussed in my previously cited works, and its implications. In the following sections, the micro- and macro-foundations of the PTI model are illustrated, which offer a rigorous framework for the analysis of Global investors' portfolio choices and their impact on the effectiveness of monetary and fiscal policies. The PTI analyzes how capital allocations by Global investors interact with monetary and fiscal policies.[5] Specifically, it examines how a country's level of policy credibility

[4] Precisely, "policy space" denotes the leeway available to policymakers for implementing expansionary monetary and fiscal policies without jeopardizing the viability of public sector liabilities. It also implies the threshold at which measures may become imperative to guarantee long-term sustainability, potentially leading to the reconsideration or reversal of the initial policy measures.

[5] In this context, some corrections are made (and noted in the text) to some of the formal results I derived in previous works.

factors into the international capital allocation decisions of Global investors and how these decisions shape the country's policy space.

In the following, Section 3 reviews the literature on which the PTI builds; Section 4 discusses the role of Global investors in today's globalized economies, and how this role shapes the policy space available to countries; Section 5 reconsiders economic sovereignty in the context of globalized economies; Section 6 describes the economic model underpinning the PTI; Section 7 evaluates the results from the application of the PTI model to the dynamics of exchange rate, inflation and output following macro-policy shocks. Section 8 appraises the policy implications of the results; Section 9 considers the policy options available to countries for recovering usable policy space and closes the article with some concluding remarks. Four appendices supplements the contents of the article: the first appendix shows that countries with higher (lower) policy credibility enjoy larger (narrower) policy space, using a "Allais-Baumol-Tobin" demand-for-money function modified to incorporate country credibility; the second appendix discusses the analytical foundations of country policy credibility; the third appendix derives analytically the utility delivered by money and other financial assets to their holders; the third appendix describes narratively the transmission mechanisms of fiscal and monetary policy impulses in globalized economies and evaluates their effectiveness; the fourth and last appendix

2. REVIEW OF THE LITERATURE

The PTI-based arguments developed in this article overlap to some extent with those of Fritz et al. (2018), which show from a Keynesian-structuralist perspective that the international monetary asymmetry related to currency hierarchy imposes major constraints on the adoption of Keynesian policies in globalized economies. These constraints, accordingly, vary over time and space and depend on certain structures, such as the specific global monetary regime, as well as on domestic institutions and policy variables.

While consistent with the currency-hierarchy arguments, and possibly complementing them, the PTI differs from their underpinning theory. First, in PTI analysis, country credibility – not currency hierarchy – is the factor that ultimately shapes an economy's policy space:[6] a country may be (geo-economically) peripheral, and its currency low-hierarchy (in terms of international acceptance), but if it is perceived (by Global investors) to be highly credible, it enjoys a large policy space.[7] Second, whereas in the structuralist tradition the adjective "peripheral" is typically referred to "emerging market economies," in PTI analysis peripheral countries can include advanced economies that are attributed (by Global investors) different levels of credibility even though they share the same high-hierarchy currency: in this case, the policy space of each of these countries would be differently constrained.[8] In fact, a country could be peripheral in the structuralist sense, and thus belong to the group of emerging market economies, and yet be reputed as more credible than advanced economies.[9] Finally, PTI analysis is centered on a special class of market players – the Global investors – who hold the power to affect the policy space of the countries where they invest their manage wealth; PTI models the portfolio choice process adopted by Global investors and shows analytically how this choice process shapes the policy space of globalized economies and how the asset price dynamics in markets

[6] Undeniably, country credibility and currency hierarchy are closely interrelated, the former being a necessary (though not sufficient) condition for the currency of a country to achieve and maintain high-hierarchy status. Appendix A uses a modified version of the Allais-Baumol-Tobin (ABT) inventory model for transaction money demand to show the relation between the demand for a currency and country credibility.

[7] Examples would include Abu Dhabi, Denmark, Hong Kong, New Zealand, Norway, Qatar, Singapore, South Korea, Taiwan, UAE.

[8] Examples are the EU countries.

[9] Using credit ratings as a proxy for country credibility, see the list at https://tradingeconomics.com/country-list/rating.

dominated by Global investors causes the real effects of Keynesian policies in weakly credible countries to dissipate in currency depreciation and higher inflation.

As regards the PTI specifically and the related literature, reference is made here to the research that is pertinent to each of the two pillars upon which the theory rests: i) the portfolio balance approach (PBA) to exchange rate determination, as modified to incorporate intertemporal choices by Global investors, and ii) the relationship between policy credibility, exchange rate and inflation.

First pillar. In the PTI, the exchange rate is determined as in the PBA.[10] Here, financial markets create demand for predetermined stock supplies of domestic and foreign assets (e.g., money and bonds) and assets are imperfect substitutes. As in the PBA the PTI assumes that assets are part of the investor portfolios and changes in asset supplies induce investors to re-balance their portfolios based on risk-return considerations, setting in motion an adjustment process that influences, inter alia, the exchange rate via changes in the demand for assets denominated in different currencies. However, the PTI also goes beyond the PBA in that it assumes a highly integrated world capital market driven by investors who act globally and allocate resources across countries based on intertemporal optimization criteria (to be discussed below). Furthermore, the PTI gives prominence to governments' intertemporal budget constraint as an essential component in the market process to determine the value of national public debts. Finally, the PTI model encompasses a central role for money both as a monetary policy tool and as one of the economy's assets.

The PTI relies on a micro-founded model with intertemporal decisions, which draws inspiration on the Modern Open Economy Macroeconomics (MOEM).[11] Yet, it also diverges significantly from it. Rather than focusing on individual countries as intertemporally optimizing agents, as MOEM does,

[10] See references in Branson (1985) and Wang (2009).

[11] See Obstfeld and Rogoff (1995, 1996).

the PTI places emphasis on investors making critical cross-country resource allocation decisions from a global perspective and studies how such decisions choices affect the effectiveness of monetary and fiscal policies in countries with different policy credibility.

Distinctively, and to summarize, while the analysis of macro policy effectiveness typically assumes implicitly (as in the case of the PBA) or explicitly (as in the case of MOEM) that resource allocation decisions are taken by domestic agents, the PTI assumes that critical resource allocation decisions in globalized economies are taken by Global investors and uses this assumption to show that these decisions affect the effectiveness of monetary and fiscal policies at the country level.

Second pillar. The PTI falls within the strand of research on credibility initiated by Agénor (1994) and Calvo and Végh (1991), and further developed by Calvo and Reinhart (2002) under their "fear of floating" concept. In the literature, most research related to this topic is empirical and covers both the analysis of the pass-through effect from the exchange rate to inflation and the relationship between policy credibility and the intensity of the exchange rate pass-through (ERPT). On the ERPT effect, a relevant reference is the work by Benigno and Faia (2016), which uses US data to evaluate the channels through which globalization (especially in trade) has raised the degree of ERPT due to trade openness, greater competition, and the growing share of foreign products sold domestically. Furthermore, in 2016 the central bank of Sweden found that, since 2014, domestic inflation had shown a rising trend mostly led by krona depreciation (Sveriges Riksbank, 2016). More generally, as a study from the Bank for International Settlements has found, while the ERPT effect in emerging market economies has decreased following the 2008-09 financial crisis, the effect in advanced economies has remained relatively low and stable over time (Jašová et al., 2016).[12] These findings suggest that policy

[12] As regards emerging market economies, the following country studies on the ERPT effect are worth mentioning. Zelealem and Musila (2018) examine the temporal relationships between inflation and exchange rate changes, and their implications for the trade balance, and find that in the long run a real depreciation leads

credibility – all else being equal – weakens the link between the exchange rate and inflation. In Canada, for example, where exchange rate movements have historically had a material impact on the prices of consumer goods, the ERPT effect has recently been shown to have only a transitory influence over the rate of inflation, which is explained by long-run inflation expectations having being anchored near the Bank of Canada's inflation target, thereby playing a mitigating role on the ERPT (Savoie-Chabot and Khan, 2015). This causal relationship seems to be supported by a number of studies. Aleem and Lahiani (2014) show that a lower ERPT is associated with a credible monetary policy aiming at controlling inflation and find evidence that the EPRT is higher in Latin American countries than in East Asian countries, where it has declined since the adoption of an inflation targeting monetary policy.[13] A similar result was observed by Edwards (2006) examining emerging market economies, and by Takhtamanova (2008) analyzing OECD countries. Carrière-Swallow et al. (2016) and Lopez-Villavicencio and Mignon (2016) identify strong links between the ERPT and the monetary policy regime's performance in delivering price stability in several emerging economies. This result is further corroborated by Kabundi and Mlachila (2018) for South Africa and by Winkelried (2014) for Peru. Looking at the Brazilian experience, Ferreira de Mendonça and Tostes (2014) find that not only monetary but also fiscal policy credibility matters for reducing the pass-through on inflation of market prices and inflation expectations.

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to an increase in inflation. Suleiman et al. (2018) estimate the quantitative effects of exchange rate depreciation on budget deficit and inflation in Nigeria and find that the impact of the exchange rate on inflation is positive, although it is not statistically significant. Also, a substantial ERPT effect, although incomplete and slow, has been found for Egypt by Helmy et al. (2018), who attribute the reason for the incompleteness and slowness to the circumstance that the consumer price index in Egypt include a relatively large number of subsidized commodities and goods with administered prices.

[13] In other words, the more credible the central bank, the quicker inflation returns to its steady-state level from before it suffered a shock.

Finally, the PTI results discussed in this article, on the effectiveness of macroeconomic policies in relation to the credibility of the countries undertaking them, are in line with the empirical findings by Calderón et al. (2004) based on a panel of 11 emerging market economies and time-series data for Chile. These findings show that the cyclical properties of macroeconomic policies depend critically on policy credibility and support the conclusion that countries with higher credibility (as reflected by lower country risk levels) can conduct countercyclical fiscal and monetary policies, while countries with less credible policies fail to do so.

3. THE RELEVANCE OF GLOBAL INVESTORS

In a globalized economy, local investors typically act as price takers and route their investments through Global investors (or through local intermediaries which then operate through Global investors), even if they hold a substantial share of the economy's wealth and engage in foreign investments. The pricing of internationally traded assets is in fact determined by Global investors, which act as "marginal" investors due to their size, interconnectedness, and comparative advantage.[14]

These global players may include various types of entities, ranging from international banks to institutional investors, broker-dealers, money market funds, private equity companies, hedge funds, asset managers, and special purpose entities. While not necessarily foreign entities, Global investors encompass a diverse range, including resident individuals, domestic subsidiaries of foreign entities, and foreign entities collaborating with local agents. With access to substantial resources and information processing capabilities, Global investors operate with significantly lower trading costs compared to local agents. Unlike local agents, they are not subject to "home bias" and allocate only a modest fraction of their managed wealth to local consumption. Alternatively, those Global investors

[14] Bartholdy and Kate (2004) and more recently Chen and Zhang (2018) study the role of marginal investors in finance.

residing in major global financial centers may indeed feature home bias (Subramanian et al., 2009); yet they are indifferent to the "home interests" that relate to the other countries where they invest, which then amplifies the effects of their portfolio reallocation decisions away from these countries when their risk perception of these countries deteriorates. In all cases, the primary objective pursued by Global investors is to maximize the net returns from the financial wealth they manage, prioritizing the protection and growth of their investments. They are not interested in the stability of the countries where they invest, until and unless expectations of instability put the value of their investments at risk. In such cases, Global investors may deem a country's public sector liabilities as less safe and swiftly reallocate their investments elsewhere. And since they determine the value of these liabilities at the margin, the demand for these same liabilities from local agents might not be enough to prevent its depreciation.

4. GLOBAL INVESTORS AND ECONOMIC SOVEREIGNTY

Although debt contracts are commonly denominated in nominal terms, investors acquire them as claims on real resources, anticipating the recovery of the full real value of their investment along with interest. Contracts expressed in domestic currency are expected to yield returns, net of risk, at least equivalent to those expressed in foreign reference currencies, typically high-hierarchy reserve currencies that serve as benchmarks for world real resources. Repayments in depreciating currencies, not adequately compensated by extra returns, may not legally constitute default but are economically equivalent to it. To prevent governments from exploiting the potential "free lunch" by borrowing in their domestic currency while having unlimited money printing capabilities, contracts should be structured to make subscribers indifferent between different currencies.

For globalized economies whose liabilities trade in international financial markets, Global investors evaluate the government's debt repayment capacity in real world resource terms, setting prices for liabilities based on this capacity, regardless of the currency denomination.

While allowing governments to print infinite amounts of domestic currency, monetary sovereignty does not reduce the risk of real losses investors may incur on contracts denominated in the local currency. Contracts in international financial markets are written so that investors would be equally protected from risks of future losses, whether these originate from government failures to repay their debts or from repaying their debts with a depreciated (and depreciating) currency.

Losses, if any were to be realized, would influence the terms of future contracts, incorporating extra protection for investors. Lower credibility of an issuing government may lead to a higher risk of currency depreciation, prompting investors to demand a higher interest rate premium on its liabilities.

Thus, in a globalized world, no government is truly sovereign, and all governments are subject to an intertemporal budget constraint (IBC). The IBC requires governments to commit to generating the real resources needed to fulfill financial obligations to investors. Governments with monetary sovereignty are not exempt from the IBC, as Global investors consider the credibility of issuing governments. Anticipations of undisciplined fiscal and monetary policies erode a government's credibility, affecting the demand for its liabilities, and thereby influencing the IBC.

Every government faces an IBC with endogenous elasticity to Global investor decisions. The concept of "elasticity" reflects the range within which the constraint may expand without compromising financial stability (in the eyes of the markets). Different levels of credibility attributed to a country result in varying constraints on government policy action. Countries with stronger credibility benefit from more flexible IBCs, allowing them greater latitude in policy actions, while countries with weaker credibility face tighter constraints.

More specifically, a government that is reputed to be capable to satisfy its IBC would be perceived as credible by the markets, and vice versa. The stronger its credibility, the higher the elasticity of its IBC and the greater the market’s readiness to absorb larger amounts of its liabilities at the given price. Conversely, with weaker credibility, the prospects of the government raising sufficient resources to repay its future obligations would be perceived as uncertain and the resulting tighter IBC

would cause the price of its liabilities to fall. Further erosion of credibility might lead Global investors to no longer buy or hold the government liabilities and to shift their portfolios toward foreign assets, thus limiting the space available for active macro-policies.[15]

5. THE MODEL OF THE ECONOMY

The model of the economy discussed in this article includes two open economies and has two sides – a micro and a macro side – that are inter-linked by a representative Global investor. The two sides of the economy are considered in turn.

A. THE MACRO SIDE

The PTI model's macro section consists of two open and internationally highly financially integrated (globalized) country economies *D* and *F*, where *F* is large ("central") and *D* is small ("peripheral"). Country *F* acts as price setter in the international markets for goods and services, and *D* is price taker. The issuance of government debt bonds B_j in country j, where $j = D, F$, and their market value are tied to the country government's IBC:

(1) $P_{j,t}^{B} B_{j,t} = P_t \, \delta_j^t \beta_{j,t}^t|_{\omega_t} \sum_{\tau=t}^{\infty} \left[E_\tau \left(s_{j,\tau} + \Delta m_{j,\tau} \right) | \omega_t \right]$ with $0 \leq \beta_j \leq 1$

(2) $B_{j,t} = B_{j,t-1} + \Delta B_{j,t} = B_{H,j,t} + B_{CB,j,t}$

(3) $P_t = P_{D,t}^{\alpha} (e_t \; P_{F,t})^{1-\alpha}$ with $0 \leq \alpha \leq 1$

(4) $P_{D,t} = \Phi_D (e_t \; P_{F,t})^{\eta} \Pi \left(X_{j,t} - X_{j,t}^* \right)^{1-\eta}$ with $0 \leq \eta \leq 1$; $\Pi_X > 0$

[15] The terms "tighter" and "less stringent" should not be conflated with "harder" and "softer" when applied to the concept of a budget constraint. "Harder" and "softer" denote the degree to which a budget constraint genuinely constrains an agent, while "tighter" and "less stringent" have a more specific quantitative connotation and refer to how high or low the limit on the budget deficit is set relative to metrics like GDP.

(5) $\Phi_{D,t} = \Phi(\eta, \beta_{D,t})$ with $\Phi_\eta > 0; \Phi_\beta < 0$

(6) $\Delta B_{CB,j,t} = \Delta M_{j,t} = \mathrm{M}\left(i_t^{B_j}\right)$ with $M_i < 0$

(7) $i_t^{B_j} - i_N^{B_j} = \gamma\left(p_{D,t} - p_{D,t}^*\right) + (1-\gamma)\left(X_{j,t} - X_{j,t}^*\right)$ with $0 \le \gamma \le 1$

(8) $X_{j,t} - X_{j,t}^* = X_{j,t} - X_{j,t-1}^*(1+\mathrm{x}) = \mathrm{X}\left(i_t^{B_j} - i_N^{B_j}, \frac{e_{j,t}}{P_{Dj,t}}, \Delta g_{j,t}\right)$, with $\mathrm{X}_i < 0, \mathrm{X}_{e/P_D} > 0, \mathrm{X}_g > 0$

(9) $\Delta g_{j,t} = \frac{\Delta\left(G_{j,t} - T_{j,t}\right)}{P_{D,t}} = \frac{\left(-S_{j,t} + i_{t-1}^{B_j} B_{j,t-1}\right)}{P_{D,t}} = \frac{\Delta B_{j,t}}{P_{D,t}} = \Delta b_{j,t}.$

Eq. (1) is the IBC of country *j*'s government and requires that the current market value of government bonds *B* equal the present discounted value of the future expected streams of government primary surpluses s_t and monetary financings Δm_t by the central bank (if any), based on information set ω_t available to the investors at time *t*. In the equation: δ is the time discount rate; *P* is the world price deflator used by Global investors to gauge at any time the real value of their wealth; *E* is the expectations operator; *B* is the number of nominal (interest-bearing) bonds issued by the government at a contractual value that is equal to 1 unit of money, and their market value is expressed as a ratio P^B to the bond's contractual value.[16] All else being equal, this ratio changes directly with credibility factor $\beta_{j,t}|_{\omega_t}$, a time-varying factor, conditional on information set ω_t, which acts as a scale factor that *corrects* the value of the IBC in the perception of the markets, based on the credibility that investors attribute to country *j*'s policy. This factor is key in the PTI context and is discussed in Appendix A: it

[16] This ratio generally varies between 0 and a value less than 1. Following the Global Financial Crises, however, cases were observed where the value of the ratio exceeded 1. These are cases where some assets (typically bonds issued by highly reputed governments) are considered by the markets to be especially safe, and trade at prices above their contractual value, thereby earning negative yields (see *Why do investors buy negative yield bonds?*, Financial Times, April 12, 2006). In such cases, private creditors of the issuing governments are de facto turned into private debtors.

reflects the Global investor views of a country's credibility and recognizes country credibility as a core aspect of international capital allocation in global financial markets; it plays a special role in linking the macro and micro dimensions of such allocations; and it is a realistic feature, since establishing *ex ante* the credibility of a government to determine its debt repayment capacity is an ordinary practice of international finance.

According to Eq. (2), total public debt, which equals the stock of government bonds inherited from the previous period plus any current new bond issuance, is held by representative Global investor *H* and the central bank *CB* of the issuing country.

World price index *P* in Eq. (3) is used by Global investors to calculate the real value of relevant financial variables and is calculated as the weighted geometric mean of the general price level attaining in individual countries, P_D and P_F, with weights proxying the relative size of each country investment within the Global investor's portfolio, and P_F taken as exogenous. Country *D*'s price level P_D is determined from the cost side by foreign price level P_F via the nominal exchange rate *e*, and the exchange rate pass-through (ERPT) factor Φ, and from the demand side by the output gap (Eq. (4)), each with weight characterized by the openness of the economy to foreign trade. According to Eq. (5), ERPT factor Φ raises (structurally) with the degree of openness of the economy, η, and declines with country credibility as higher credibility anchors inflation expectations and attenuates the impact on inflation caused by the ERPT effect (as discussed in Section 2).

Eq. (6) reflects the central bank's decision to purchase or sell government bonds (and thus to issue money *M* or to withdraw it from circulation) following the Taylor rule of Eq. (7): the higher the target interest rate vis-à-vis the neutral level $i_N^{B_j}$, the larger the amount of bonds purchased and, thus, the larger the amount of money withdrawn from the economy.

Reduced form Eq. (8) posits a demand-driven real output gap (i.e., the difference between actual and potential output) to change a) negatively with the deviation of current interest rate from its neutral

level, b) positively with the real exchange rate (assuming Marshall-Lerner condition), and c) positively with the fiscal deficit (assuming away full Ricardian equivalence), and assumes potential output to grow at gross rate $(1 + x)$.[17] Debt-financed fiscal deficits (under a non-accommodative monetary policy) also affect the real output gap negatively due to their impact on the interest rate, as captured under relation a) above. It is assumed, however, that the net effect of fiscal deficits on output is generally positive. Finally, Eq. (9) is the debt-financed fiscal deficit expressed in real terms where *S* is the nominal primary surplus.

The Micro Side

The PTI model's micro side draws from the conventional portfolio balance approach to the exchange rate determination, reframed in the context of optimal intertemporal allocation choices by a representative Global investor acting in internationally integrated financial markets and perceived by the representative "marginal" Global investor (see above). This agent maximizes financial wealth intertemporally (in utility terms), with a view to consuming it all at "the end of time" (if she is infinitely lived) or to pass it on to future Global investors (if she is finitely lived), who will behave similarly across the infinite time horizon, as if they all worked for a company with the same company purpose. Global investors, thus, act collectively as an intertemporal class of agents, which treat the assets in their portfolios as "vehicles" to the utility associated with the future streams of real resources to which they give access.[18] These agents may act in their own interest and/or they may intermediate financial

[17] This simplifying assumption is justified by the model's focus on aggregate demand and not on the supply-side sources of output growth. Incorporating a properly structured dynamic supply function is a possible extension of PTI analysis.

[18] Drawing on Bossone (2014), Appendix B derives the utility function of money and other financial assets.

resources intertemporally from surplus agents to deficit agents demanding resources for investment or consumption-smoothing purposes.[19]

Formally, representative Global investor *H* maximizes the intertemporal utility generated through wealth portfolio *W*:

(10) $U(\boldsymbol{W}_{H,t}) = Max_W E_t\left[\sum_{t=\tau}^{\infty} \delta_H^t u(\boldsymbol{W}_{H,t})\right]$

s. t.

(11) $W_{H,t} = M_{H,D,t} + e_t M_{H,F,t} + P_{D,t}^B B_{H,D,t} + e_t P_{F,t}^B B_{H,F,t} = M_{H,D,t-1} R_{t-1}^{M_D} + e_t M_{H,F,t-1} R_{t-1}^{M_F} + P_{D,t-1}^B B_{H,D,t-1} R_{t-1}^{B_D} + e_t P_{F,t-1}^B B_{H,F,t-1} R_{t-1}^{B_F} + \Delta W_{H,t-1}$

(12) $M_{H,D}, M_{H,F}, B_{H,D}, B_{H,F} \geq 0;\ \Delta W_H \gtreqless 0$

(13) $\sum_H P_{j,t}^B B_{H,j,t} + P_{j,t}^B B_{CB,j,t} = P_{j,t}^B B_{j,t} = P_t\ \delta_j^t \beta_{j,t}^t|_{\omega_t} \sum_{\tau=t}^{\infty} E_t\left[(s_{j,t} + \Delta m_{j,t})\right]$

and transversality condition

(14) $\lim_{t\to\infty} W_{H,t} = 0.$

In Eq. (10), $u(\cdot)$ is a standard strictly quasi concave, time-separable, and well-behaved utility function; ΔW_H is net additional investment or divestment taking place through Global investor *H*, where net divestments correspond to consumption decisions taken by agents who had previously invested in the portfolio of Global investor *H*;[20] and *R* is the real gross rate of return on any asset *Q* (here money

[19] While including the modelling of deficit and surplus agents would enrich the model, it would not change its results. What is being studied here is the allocation decisions of global investors, while the behavior of deficit/surplus units is not germane to the analysis.

[20] In other words, these agents liquidate (part of) their investment to finance current consumption. If they divest funds to re-invest them, their net effect on global investor *H*'s portfolio is zero ($\Delta W_H = 0$). On the other hand, if agents invest more money, then this adds to the global investor *H*'s portfolio ($\Delta W_H > 0$).

M or bonds *B*), which includes the risk of loss and is calculated as $R^Q = (1 + i^Q)(1 + p^Q)(1 - p)(1 - l^Q)$, where i^Q is the nominal own rate of return on asset *Q*; p^Q is the rate of change of asset *Q* price, P^Q;[21] p is the rate of world price inflation, which also reflects the exchange rate variation between the currency of denomination of asset *Q* and the currency chosen as benchmark; and l^Q is the risk of loss from default on asset *Q*, as perceived by Global investors, which reflects the credibility that investors attribute to the issuer of the asset (i.e., it increases as credibility factor β declines), and while any functional form could be assumed to link the two variables, the simplest possible form used here for convenience and without loss of generality is $l_j^Q = 1 - \beta_j$, with maximum loss (i.e.,$l_j^Q = 1$) for $\beta_j = 0$ and no loss (i.e., $l_j^Q = 0$) for $\beta_j = 1$.[22]

Eq. (11) is the investor's instantaneous budget constraint, where only wealth inherited from the previous period and any new net investment can be allocated to domestic and foreign assets; notice that the term $\Delta W_{H,t-1}$ also incorporates any losses that may have materialized on past investments. According to conditions (12), the investor may hold non-negative quantities of each asset and net changes to the investor's wealth portfolio can be positive (due to investments), negative (due to divestments or losses from defaults), or zero (due to offsetting investments and divestments or to no investment and divestment activities taking place). Eq. (13) requires that the aggregate demand of government bonds by investors and the central bank equal supply under the impending government IBC; this determines the policy space available to the central bank: given an expansionary monetary policy stance, if Global investors deem it consistent with the stability of the external value of the debt they hold (based on the world price deflator *P*, defined in Eq.(3)), they will allow for the policy to run its course, thus making it effective; otherwise, they will penalize it by bidding down the price of the

[21] If P^Q is the price of a bond or a given stock, changes in P^Q correspond to capital gains or losses on asset *Q*.

[22] The introduction of the risk of loss is an shock on my original assets-in-the-utility function approach.

debt and neutralizing the policy impact on real output (see below).[23] Finally, Eq. (14) is the transversality condition consistent with the role of the Global investor discussed at the outset of this section.

In this model, where assets are vehicles to future consumption, each characterized by its own "speed" (readiness and cost to be liquidated) and "power" (capacity to store value and to accumulate wealth over time), the utility of any asset *Q*, as shown in Appendix C, is given by:

$$(15) \quad u(Q_t) = E_t\left\{\delta^T \sum_{T=t+1}^{\infty} u\left(\frac{P_T^Q Q_t}{P_T}\right) \prod_{n=1}^{t-1} R_n^Q \, \vartheta_T (1-\vartheta_{T-1})\left(1-\xi_T^Q\right)\right\},$$

where ϑ_{t+1} is the probability of *Q*'s holder having to converting the asset into consumption at the next date *t+1*, and $\xi^Q$is the variable liquidation cost of asset *Q*.

6. EFFECTS OF MONETARY AND FISCAL POLICIES

A. MODEL'S SOLUTION

Using Bellman's equation to solve plan (10)-(15),

$$(16) \quad U\left(\boldsymbol{W}_{H,t}\right) = Max_W \, E_t\left[\sum_{t=\tau}^{\infty} \delta_H^t u\left(\boldsymbol{W}_{H,t}\right)\right] = V(\boldsymbol{W}_{H,t}) = Max\left[u(\boldsymbol{W}_{H,t}) + \delta V(\boldsymbol{W}_{H,t+1})\boldsymbol{R}_{t+1}^{'}\right],$$

[23] Eq. (13) contains a degree of indetermination, which can only be resolved within each specific country context once investor expectations are formed based on investor perceptions of country policy credibility. This reflects the non-mechanistic nature of the PTI, in that it derives the nominal and real output consequences of specific policy actions according to country circumstances: the very same policy actions would have different impacts depending on the different levels of country policy credibility (as perceived by global investors). Here, the adjustment mechanism is implicit in the ongoing revision of the information available to investors at each date, ω_t. While there is no guarantee that the arrival of new information would *per se* be enough to correct eventual bias factors, the detection ex post of systematic errors (and losses thereof) due to bias factors would generate incentives for investors to correct any bias factor.

where $\boldsymbol{R'}$is the vector of the real returns (net of the risk of losses) on the assets held in portfolio $\boldsymbol{W}$, leads to the Euler equation:

$$(17) \quad u'(\boldsymbol{W}_{H,t}) = \delta^n E_t[u'(\boldsymbol{W}_{H,t+n})\boldsymbol{R}'_{t+n}],$$

which determines the optimal intertemporal path for wealth *W* managed by Global investor *H*, and where, using Eq. (15), the LHS of Eq. (17) can be expressed as:

$$u'(\boldsymbol{W}_{H,t}) = E_{H,t}\left\{\delta^T \sum_{T=t+1}^{\infty} u'\left(\frac{\boldsymbol{Q}_{H,t}\boldsymbol{P}^{Q}_{H,T}{}'}{P_T}\right)\prod_{n=1}^{t-1} R_n^Q\,\vartheta_T(1-\vartheta_{T-1})(1-\xi_T^Q)|\omega_t\right\} = u'\left(\boldsymbol{Q}_{H,t}\right),$$

With vector $\boldsymbol{Q} = M, B$. Given the optimal time path of managed wealth *W*, as determined by Eq. (17), the optimal portfolio composition of Global investor *H* at each date of the relevant time horizon must reflect optimal intra-date allocations of the wealth portfolio across the range of available assets. These allocations are derived by fulfilling the following two f.o.c.'s:

$$(18) \quad u'(M_{H,D,t})R_t^{M_D} = \frac{1}{e_t}u'(M_{H,F,t})R_t^{M_F} = \frac{1}{P_{D,t}^B}u'(B_{H,D,t})R_t^{B_D} = \frac{1}{e_t P_{F,t}^B}u'(B_{H,F,t})R_t^{B_F} = \lambda_t,$$

which requires equating the marginal utilities of *M* and *B* holdings, each weighted with its own price, and

$$(19) \quad \lambda_t/\lambda_{t+1} = \delta E_{H,t}R_{t+1}^{M_D} = \delta E_{H,t}R_{t+1}^{B_F} = \delta E_{H,t}R_{t+1}^{B_D} = \delta E_{H,t}R_{t+1}^{B_F},$$

which requires equalizing all real rates of return on assets, in present (discounted) value and net of (default) risk, both at each date and intertemporally.[24]

Incidentally, but not irrelevantly, Eq. (18) embodies John Maynard Keynes's liquidity preference theory, whereby the rate of interest is not determined by the supply of and demand for (flows

[24] For completion, since the global investor acts on behalf of its client wealth holders, optimality requires that the periodical divestments from its portfolio to finance consumption activities (discussed earlier) generate, at the margin, the same utility that is generated by the assets held or acquired by the global investor.

of) saving, but by the supply of and demand for assets into which holdings of (stocks of) wealth can be placed (Tily, 2021).[25]

Solving the model simultaneously for all demand and supply relations, under well-behaved investor preferences and optimal fiscal and monetary policies (that is, policies that are consistent with the government IBC), as well as with complete ERPT, and a given world price deflator *P*, optimal portfolio allocations $\left(M^*_{H,D,t}, M^*_{H,F,t}B^*_{H,F,t}, B^*_{H,F,t}\right)$ attain at equilibrium asset prices $P^{B*}_{D,t}$ and $P^{B*}_{F,t}$, neutral interest rates $R_t^{M^*_D}$ and $R_t^{M^*_F}$,[26] and nominal exchange rate e^*_t consistent with a balanced (zero) real output gap. Critical to the existence of such general equilibrium position of the economy is that the stocks of money and debt required to ensure zero output gap are consistent with the government IBC. This reveals the relevance of the credibility factor β_j and its central role in linking the macro and micro sides of economies where capital resource allocations are determined by Global investors. For simplicity, but without loss of generality, assume utility to be $u(W) = \ln(W)$. Then, dropping subscript *H* and solving Eq. (18) for the equilibrium nominal exchange rate at date *t* obtain:

$$(20) \quad e^*_t = \frac{\frac{1}{M^*_{F,t}R_t^{M^*_F}} + \frac{1}{P^{B*}_{F,t}B^*_{F,t}R_t^{B^*_F}}}{\frac{1}{M^*_{D,t}R_t^{M^*_D}} + \frac{1}{P^{B*}_{D,t}B^*_{D,t}R_t^{B^*_D}}}.$$

This solution allows us to determine and evaluate the nominal and real effects of macro-policy shocks.

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[25] To quote from Keynes's (1936) *General Theory*, "The current rate of interest depends…not on the strength of the desire to hold wealth, but on the strengths of the desire to hold it in liquid and illiquid forms respectively, coupled with the amount of the supply of wealth in the one form relatively to the supply of it in the other." (p.213).

[26] In force of the inverse relationship between bond prices and the interest rate on bonds, equilibrium bond returns $R_t^{B^*_D}$ and $R_t^{B^*_F}$ are simultaneously determined with bond prices $P^{B*}_{D,t}$ and $P^{B*}_{F,t}$.

B. NOMINAL AND REAL EFFECTS OF MACRO POLICIES

Transforming Eq. (20) using natural logarithms, assuming $R_t^{M_j^*} = 0$, and noting that $\ln R_t^{B_j} = \ln\{(1 + i^{B_j})(1 - p)[1 + (1 - \beta_j)]\} \approx i^{B_j} - p + (1 - \beta_j)$,[27, 28] yield:

$$\varepsilon_t = (m_{D,t} - m_{F,t}) + (b_{D,t} - b_{F,t}) + (p_t^{B_D} - p_t^{B_F}) + (\beta_{F,t} - \beta_{D,t}). \quad (21)$$

Eq. (21) shows that, for a given demand for (domestic and foreign) money and bonds, the nominal exchange rate of domestic vs foreign assets, all else being equal, varies positively (i.e., depreciates) with:

i. The growth of domestic (relative to foreign) supply of money and bonds;

ii. The growth of domestic (relative to foreign) bond prices; and

iii. The risk of losses on domestic (relative to foreign) bonds as proxied by the credibility gap between the issuing countries.

Importantly, any persistent difference in country credibility has a persistent, and hence cumulative, effect on the exchange rate.

Log-linearizing around steady-states Eqs. (6), (8), (9), and (21) and replacing them into the log-linearized form of Eq. (4), assuming a fully accommodating monetary policy stance (i.e., $i_t^{B_j} = i_N^{B_j}$, from Eq. (7)), and solving for domestic inflation yield:

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[27] Applying Taylor's expansion, $\ln(1 + \chi) = \chi - \frac{\chi^2}{2} + \frac{\chi^3}{3} - \frac{\chi^4}{4} + \frac{\chi^5}{5} - \cdots = \sum_{n=1}^{\infty}(-1)^{n+1}\frac{\chi^n}{n}$, $\forall \chi \in (-1, 1]$, and $\lim_{n\to\infty}(R_n) = -\frac{\chi^2}{2} + \frac{\chi^3}{3} - \frac{\chi^4}{4} + \frac{\chi^5}{5} - \cdots = \frac{(-1)^n}{(1+\zeta)^{n+1}}\frac{(\beta)^{n+1}}{(n+1)!} = 0$, $\forall \zeta \in (0, \chi)$. Thus, $\ln(1 + \chi) \approx \chi$.

[28] The rate of change of bond prices has been dropped from the calculation of the rate of return on the bonds since the inverse relationship between the price of a bond and the interest rate on the bond makes one of the two variables redundant.

$$(22)\quad p_{D,t} = \frac{1}{1+(1-\eta)\Pi_X\left(X_{\frac{e}{P_D}} - X_G\right)}\Big\{\eta\phi + (1-\eta)\Pi_X X_{\frac{e}{P_D}}\left[\left(m_{D,t} - m_{F,t}\right) + \left(b_{D,t} - b_{F,t}\right) + \left(p_t^{B_D} - p_t^{B_F}\right) + \left(\beta_{F,t} - \beta_{D,t}\right)\right] + \eta\phi p_{F,t} + (1-\eta)\,\Pi_X X_G \not{g}_{D,t}\Big\},^{29}$$

where small-case letters indicate logarithmic values. Notice that in Eq. (22), it is (realistically) assumed that $(1-\eta)\Pi_X\left(X_{\frac{e}{P_D}} - X_G\right) \geq -1$, where $\Pi_X X_{\frac{e}{P_D}} \leq 0$ and $\Pi_X X_G \geq 0$, and the ERPT term has negative sign, except when the pass-through is complete (see Eq. (5)) and, therefore, $\phi(\cdot) = ln1 = 0$). The equation shows that, all else being equal, domestic inflation varies:

a. Positively with changes in the domestic monetary and financial stocks relative to foreign benchmarks;

b. Positively with changes in domestic (relative to foreign) bond prices;

c. Negatively with country credibility;

d. Positively with foreign inflation; and

e. Positively with fiscal policy shocks.

Due to the persistent effect of credibility on the exchange rate, noted above, a lower level of country credibility (relative to a benchmark country) puts permanent pressure on inflation. In other words, less credible countries tend to have, om average, a higher rate of inflation (all else being equal).

Global investor choices and the country's macro-policies interact with each other, since changes in the budget and budget financing modalities bear changes in the stocks of *M* and *B* and trigger

[29] This version of Eq. (22) corrects its previous derivation in Bossone (2022).

allocative responses by Global investors, based on country credibility as perceived by the latter. Such responses may change as new information arrives.[30]

Regarding the effects of monetary and fiscal policy shocks on real output (Eqs. (6) and (9)), log-linearizing Eq. (8), and solving for output yield:

$$(23) \quad x_{D,t} = x^*_{D,t} + X_i \delta i_t^{B_D} + X_e \varepsilon_{D,t}(\cdot|\beta_D) - X_P p_{D,t}(\cdot|\beta_D) + X_g \delta g_{D,t} \, .$$

Equation (23) incorporates, inter alia, Eqs. (21) and (22) and is dual to them: it shows that, all else being equal, policy shocks that do not dissipate into higher inflation do add to real output (and vice versa) – the dissipation effect being a consequence of credibility factor β, as already discussed. As a result, lower (higher) credibility makes macro-policies less (more) effective. Also, there is a critical level of credibility factor β at which there is no real output effect, since currency depreciation and inflation dynamics are such as to induce an interest rate adjustment, which depresses output through the $X_i \delta i_t^{B_D}$ term. This follows from the market pressure on the value of government debt (Eq. (1)) and the concomitant action of the central bank that raises the target interest rate consistent with the Taylor rule (Eq. (7)). At high rates of depreciation and inflation, it is also likely that the weight γ attributed by the central bank to the inflation objective (that is, the sensitivity of the central bank to mitigating inflation as a policy objective) moves closer to 1, at the expense of the output gap weight, $1 - \gamma$, which

[30] As an application of Eq. (22), take the case of highly credible reserve currencies, like the US, the Eurozone, and Japan, following such critical events as the global financial crisis of 2007-9 and the Covid19 pandemic more recently. In all these cases, the demand for assets denominated in their currencies exceeded even their fast-growing supply, causing $m < 0$ and $b < 0$ and thus weakening domestic inflation. This, in turn, has caused inflation to be low also in other (smaller) countries via Eq. (3). Notice that, from the perspective of each reserve-issuing country the subscripts *D* and *F* in Eq. (22) would be inverted, with the reserve-currency country being domestic (*D*) and the other countries being foreign (*F*).

becomes relatively less important. Appendix D describes narratively how macro policy shocks reverberate through the economy under the PTI model.

Integrating and correcting, but also strengthening, the results derived in Bossone (2022), the term $\frac{1}{1+(1-\eta)\Pi_X\left(X_{\frac{e}{P_D}}-X_G\right)}$ of Eq. (22), which is implicit in Eq. (23), suggests two considerations. First, the higher is the sensitivity of aggregate demand-drive output to fiscal shocks (Eq. (8)), the larger is its dampening effect on the inflation response to shocks from the variable on the RHS of Eq. (22), and hence the larger is the real output effect (Eq. (23)), and vice versa. Second, even with no dampening effect and a large negative output gap, such that $\Pi_X X_{\frac{e}{P_D}} = \Pi_X X_G = 0$, demand policy shocks would still impact inflation through capital re-allocations by Global investors and their effect on the exchange rate: under a large country credibility gap and a high ERPT effect (i.e., ϕ close to zero), the occurrence of positive and fully accommodated fiscal shocks would cause the nominal exchange rate to depreciate and to feed fully into domestic inflation even at less than full employment output, and would thus weaken the real effect of the shocks. Recalling that less credible economies (especially the more open ones) feature higher ERPT effects, it follows that in the case of similar policy shocks occurring in such countries, the impact on domestic inflation would be larger and the impact on output would correspondingly be weakened. The more so as the country credibility gap grows larger.

Related to credibility is an important additional factor, which specifically affect the terms $m_{D,t} - m_{F,t}$ and $b_{D,t} - b_{F,t}$ and their impact on Eqs. (22) and (23). The policy space that more credible countries (especially those issuing international reserve currencies) can leverage is larger also because the demand for their currencies is much more elastic than in the case of less credible countries. Analytically, as Appendix A shows, if a country were to expand its money supply either to accommodate a fiscal stimulus or to lower interest rates and stimulate demand-driven output, a higher level of credibility would give it more space before the money supply exceeds its demand, since both supply and demand grow in tandem and the demand absorbs the supply, thereby averting inflationary

pressures.[31] Conversely, a lower level of credibility would lead the country soon to run into excess money supply issues: in terms of Eq. (22), if $b_{D,t} > b_{F,t}$, as the country expands its money supply it would soon be the case that $m_{D,t} > m_{F,t} \cong 0$, with inflationary consequences and lower (or no) output gains as a result. Following Appendix A, the term "soon" used above means that, all else being equal, the money stock in country *D* would start exceeding its own optimal level at a smaller ratio to output than country *F*. Low-credibility countries would therefore have less space available for expansionary fiscal and monetary policies than high-credibility countries.

Similarly, if the money supply did not accommodate the fiscal expansion, the country's low credibility would require government bonds to pay relatively higher (equilibrium) interest rates, limiting the real output effect of the expansion. On the other hand, things would not work better even in the absence of the interest rate adjustment since the supply of bonds would then exceed the demand. This would cause the nominal exchange rate to depreciate, followed by higher inflation (Eqs. (21-22)), and the output response to be smaller (Eq. (23)).

In summary, according to Eq. (20), expansionary policies that undermine a country's credibility, particularly by jeopardizing the sustainability of its public sector liabilities, lead to currency devaluation and increased inflation (Eq. (22)). Any positive impact of exchange rate depreciation on real output would be offset, or worse reversed, if interest rates were adjusted to a point where they reduce real output (Eq. (23)). Equation (1) determines how the weaker credibility affects the sustainability of public sector liabilities and necessitates policy reversals.

The effectiveness of the same policy program can thus range from being fully effective to being fully ineffective (in terms of output), depending on the perceived credibility of the country by Global investors and on the expected impact of the policy program on the country's credibility. Ineffectiveness

[31] This is another way to look at the "elasticity" of a country's IBC discussed earlier in this article.

leads to the dissipation of policy effects through currency depreciation, causing higher inflation and further credibility loss.

In this context, Global investors play a crucial role in determining the relative effectiveness of macro policies at the country level, which could be characterize as follows: ***A country with weaker credibility faces a narrower policy space, as determined by Global investors, and this space contracts further due to policy choices believed by Global investors to weaken the country's credibility.***

Turning to the exchange rate, the PTI suggests that in the presence of high international financial integration and Global investors as asset price setters, a persistently growing stock of public sector liabilities (money or debt) is expected to exceed its optimal level, sooner or later. This is especially true in countries with relatively weaker policy credibility, where the demand for assets denominated in foreign currencies dominates over assets denominated in domestic currency.

The PTI model predicts that the growth of excess liabilities is more likely to happen in countries with lower credibility, where the growth of money supply and debt cannot be easily absorbed by increasing demand. With expectations being incorporated in the PTI model, anticipations of future nominal exchange rate devaluation would accelerate actual devaluation, and, in the limit, rational expectations would fulfill themselves instantaneously.

Finally, the PTI model suggests that in countries with weak credibility, the nominal exchange rate depreciates even at less than full employment output. This depreciation is driven by the expected growth of public sector liabilities and is independent of their impact on inflation, as shown by the fact that inflation follows even if the negative output gap renders the economy's real resource constraint unbinding. In contrast to monetary theories of the exchange rate, the PTI shows that inflation follows, rather than cause, exchange rate depreciation due to the exchange rate pass-through (ERPT) effect, and that inflation is independent of resource employment levels.

7. POLICY IMPLICATIONS OF THE PTI

When the stocks of central bank money or public debts increase, it is essential that there is a willing holder for them to maintain their value stable over time. In the case of a highly credible country, especially one that issues an international reserve currency, the public generally desires to hold these assets. This results in an elastic government's IBC, and the value of debt or the money stock remains relatively unaffected.[32] Conversely, in poorly credible countries, where the public may not want to hold such assets, the IBC becomes more rigid, leading to a decline in the relative price of the debt and money stocks.

While a *temporary* surge in both money and debt can serve as a short-term solution, particularly in poorly credible countries facing recessions (as discussed in the earlier case of helicopter money), a *permanent* increase in debt to finance ongoing state deficit spending can eventually impact its value. In highly financially integrated economies, the prospect of indefinite or disorderly growth in money and debt stocks prompts portfolio adjustments away from these assets, causing their prices to drop and pushing the economy away from full employment. This critique is directed at theories neglecting stock variables in favor of flow variables, particularly in highly financialized economies.

In line with this critique, the PTI delves into the inflation generation process. If a government consistently runs permanent deficits and the created money is not loaned out, leading to no loan repayments and destruction of the originally created money (i.e., the "reflow" effect), there is a

[32] Under high international financial integration, the perspective of an indefinite or unorderly growth (and accumulation) of the money and debt stocks would induce portfolio re-compositions away from those stocks, depress their prices, and lead the economy away from full employment. This is a critique to all theories that neglect stock variables (as opposed to flow variables), especially in the context of highly financialized economies. In fact, in crisis situations, those stocks happen to be even in higher demand than under normal times, from both resident and non-resident agents, and their price would thus increase.

permanent net addition to the stock of money supply. Eventually, people may shift out of the money stock and into alternative assets, including foreign assets. Depending on various factors such as the level of the money stock, the issuing country's credibility, and their dynamics over time, this process could unfold either gradually or abruptly, yet leading in all cases to currency devaluation and higher inflation. Notice that the smaller and more open as well as financially integrated is the economy, the more rapid is the pace of devaluation and inflation, and likewise if the country were largely indebted (either in foreign or domestic currency). Here, not only are openness and financial integration relevant, but also, as noted, wealth inequality and the institutionalization of savings would matter. Under both, the impact would be felt, first, on asset prices and the nominal exchange rate, and then on domestic inflation via the ERPT effect.

No economy is immune to the outlined narrative, but highly credible countries, especially those issuing international reserve currencies, have more significant policy space than less credible ones. The elasticity of their IBC, as perceived by financial markets, allows these countries to confront sustainability issues much later than less credible counterparts with similar initial conditions, after it has been possible leveraging effective expansionary policies. The elasticity of the IBC is influenced not only by domestic circumstances but also by global developments. In the case of non-idiosyncratic shocks impacting the global economy, the world demand for assets denominated in international reserve currencies is likely to increase, providing even more policy space for these countries, while the opposite holds for less credible nations.

The PTI not only underscores the crucial role of public liabilities in resource allocation at the national level but also offers a rationale for understanding how global factors influence the value of a country's public liabilities in the context of high international financial integration. In essence, the PTI incorporates a global perspective into the analysis of a domestic economy, emphasizing that the factors affecting the value of the economy’s public liabilities cannot be fully assessed without considering global dynamics.

8. KEYNESIAN REFLECTIONS AND CONCLUDING REMARKS

The forces of globalization necessitate a realistic assessment by each country as to the effectiveness of its macro-policies, an issue that is particularly relevant for developing and emerging market economies. Current macroeconomic policy models often rely on domestic representative agents responding to state-driven policy impulses, neglecting the substantial influence Global investors wield in determining the market value of public sector liabilities (money and debt). This influence can alter policy impulses, affecting policy effectiveness.

My work on the Portfolio Theory of Inflation (PTI) addresses this gap, analyzing how financial globalization impacts the national policy space, sometimes constraining it to the point of rendering expansionary macro-policies ineffective or destabilizing. As illustrated in this article, the PTI shows that the higher (lower) is the *credibility* a country is reputed to have by Global investors, the larger (narrower) is its policy space, that is the space available to its policymakers for carrying out effective expansionary macroeconomic policies—what in this article has been referred to as "Keynesian policy space."

There are, indeed, only a few countries in the world that benefit from a high credibility status and, hence, from the large policy space that markets afford them thanks to their status. But credibility is costly to build and very easy to dispel, and no country that operates in the global financial arena can maintain a high credibility (and extract its attendant benefits) for much long by pushing inordinately and persistently on domestic indebtedness or money printing (even if abundant resources are out of employment and the output gap is significant), unless the economy is characterized by some very specific and rare factors. Examples are countries with exceptional geo-strategic, military, and/or economic prowess that make their currencies world reserve assets. As for other highly internationally financially integrated economies, weak (or weakening) credibility constrains the space available to

their governments for conducting effective macroeconomic policies and raises their cost of financial capital.

The question is, then, why should countries ever decide to integrate their economies in the global financial space? The analysis is complex and requires not just economic but political economy considerations, which will not be entered into here. Put simply, however, the dominant Neoliberal tenet is that removing barriers to financial market fragmentation improves on the allocation of scarce resources and risk management, ultimately providing the best price-quantity combinations that optimize the welfare of both investors and resource users in risky environments. In practice, according to this tenet, financial globalization allows investors, on one hand, to find the best investment opportunities around the world, in terms of risk and return, and allows resource users, on the other, to access the widest possible resource base at the cheapest possible prices and accessory conditions. In addition, and as a corollary to the same tenet, financial globalization, and the attendant role of Global investors as *vigilantes* (by virtue of their power to determine asset prices), are expected to induce discipline in the behavior of claim issuers, which should in principle promote financial stability worldwide.

Clearly, this is not the case in practice, as evidence abundantly shows: large movements of capital in and out of countries may alter dramatically and overnight the value of critical public and private sector assets; in global financial markets the choices of lead agents may cause herding behavior and thus unleash financial stampedes with economic consequences that veer very far from the path suggested by any reading of the economic fundamentals; and, finally, Global investors scanning the world for best prices cerate pressures for undue conformity across countries' macro policies, and countries that deviate from the "norm" – even for appropriate reasons – are punished by capital flight (Kirshner, 1999).

Conversely, by enabling agents to exercise the freedom of moving capital across markets and borders, one benefit of financial globalization is that governments of globalized economies are left with

limited room (if at all) for exerting financial repression as they can otherwise do when markets are closed or segmented. This implies that these governments cannot extract from domestic agents (especially less informed investors and small savers) the rents that financial repression empowers them to do (through, for instance, explicit or implicit taxation and subsidies, caps on interest rates, directed credit, captive lending, etc.). For the very same reason, financial globalization allows domestic agents (including small ones) to access a much broader set of investment options, and since the price of public sector claims is determined at the margin internationally by Global investors searching for best options, all other investors (including small domestic savers buying those claims) benefit indirectly from the conditions that only the former can obtain in force of their superior market power and knowledge.[33]

How should then countries approach financial globalization and deal with its consequences? Should they just accept its costs in exchange for the benefit of the economic freedom of capital movements for individuals and businesses, or should they reject it to preserve state sovereignty over the national economy?

While this question would per se deserve a fully dedicated work on its own, two options can be considered. They both rest on my entirely subjective view that gravitating toward a globalized economy (that is, a world where people move toward the open trade of everything) is ultimately an irresistible human tendency. Thus, both options follow the same logic that countries are better off if they prepare to deal with financial globalization, adapt to it, and manage its consequences, rather than succumbing to it unprepared and in a hopeless attempt to protect national sovereignty at all costs for ever. The two options are the following.

[33] Yet they are exposed to much greater risk if they are not able to match global investor choices.

A. GO FOR FINANCIAL GLOBALIZATION, BUT PLAY SMART WITH IT

The first option is to accept globalization but using Keynes's *financial conservativeness*, as I discussed in a PKES contribution (Bossone, 2021). In a nutshell, countries that decided to go global should try as much as possible to remain in balance independently of the global financial markets, adopting policies to ensure internal and external stability of their economy without relying on entities – global financial investors – that are eager to take advantage of them and condition their destiny for the sole purpose of extracting wealth from them. Countries should keep their public debt levels low and sustainable, limiting them solely to financing investment programs that can repay themselves over time and/or to supporting the economy in recessions or crises but with the commitment to reducing debt during recovery and the high cycle phases, in the context of a high socialization of investment that would sustain a high level of (public and private) capital accumulation on an ongoing basis for stable employment and steady output growth. Keynes's recipe would protect countries from the risk of surrendering their economic sovereignty in the hands of agents who have no interest whatsoever in their fate, other than their ability to honor their debts (at whatever social cost required to do so…). Such recipe would amount to a country keeping minimal exposure to financial globalization, along lines of prudence and self-restraint that would limit recourse to domestic and foreign debt and would require monetary policy to maintain investor confidence in the national economy. Here, fiscal-monetary coordination can expand the space available for an active policy stance, provided markets believe the authorities' commitment to price stability and public debt sustainability is credible (Bartsch et al., 2020). This option would be no easy job, but it would be less daunting and certainly less ambitious than the second one.

B. RETARD FINANCIAL GLOBALIZATION, INVEST FOR THE FUTURE, AND GET READY FOR IT IN THE MEANTIME

The second option is to retard financial market integration, if a country has the chance to do so, and use (wisely) *financial repression* in the meantime as part of a medium-term national economic plan

that gradually prepares the economy eventually to navigate the open world by supporting economic activities that are good for economic development ("Schumpeterian activities", to use Reinert's language[34]): a mix of directed finance and industrial policy. Once this is done, and integration is accomplished, the government then proceeds along the financially conservative path recalled under the first option.

Since financial repression is a form of rent extraction by the state from the economy, the state can apply it strategically and in the public interest by offering a social compact to its citizens. The compact consists of the State committing to using financial repression for the purpose of financing an industrial policy strategy in the context of a long-term national economic development plan. In other words, citizens accept to relinquish current resources to the state (through financial repression) in exchange for the state committing to mobilizing these resources to speed up economic growth and build greater national resource creation capacity in due time, by allocating resources to (physical and digital) infrastructure and productive uses and by facilitating the adoption of new technologies, processes, and know-how by the local industries.

Defining and implementing such a compact, however, would not be an easy task as it would require effective and transparent concertation between business, labor and government, significant trust by the citizens in their government, government's strong planning skills, and time-consistent action from the political leadership and policymakers. Also, designing a compact and sticking it without abusing it (for example, through time inconsistent policies that extract rents only for political expediency) would be critical for the economy to build sufficient credibility and thus navigate the open world from a position of relative strength.

[34] See the contributions collected in *The Other Canon* website, available at http://othercanon.org.

The idea of using financial repression wisely is not inconsistent with Keynes's support of the use of capital controls (especially over short-term capital movements), and more broadly with the idea of "embedded liberalism" that he pursued, where market forces are managed and contained as an alternative to unregulated capitalism (Kirshner, cit.).[35] Similarly, the idea of using rents from financial repression to mobilize capital for development through an industrial policy and according to a national economic plan is not inconsistent with Keynes's vision of central controls as necessary to ensure full employment and as necessarily involving a large extension of traditional functions of government (Sicsù, 2020).

Where the idea of an economic development plan exceeds Keynes's vision is that a plan that should prepare a country eventually to navigate the global arena, steadily and at no risk of becoming hostage to global actors, would have to go beyond demand-side aspects (such as to guarantee full employment) and should as well encompass supply-side aspects that would strengthen the country's capacity to compete globally. Issues like industrial strategy and policy, technology transfers and R&D investment, attraction of foreign direct investment, and building skills should thus receive, within the plan, at least as much attention as Keynesian demand-management policies and tools.

In short, with a view for a country to building or recovering enough policy space, while the first option *("go for financial globalization, but play smart with it"*) aims at preventing and controlling the limitations that financial globalization can bring to it, and it is relatively easy to implement, the second option *("retard financial globalization, invest for the future, and get ready for it in the meantime"*) aims at preparing the country to compete in the global world economy and requires a much more demanding planning and implementation process.

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[35] Kirshner, cit., argues that the idea of "embedded liberalism" should be attributed to Keynes, and not to Karl Polany as it is commonly done.

POSTSCRIPT

In pursuing the line of the research that is the subject of this article I have been criticized that it extols the criteria by which Global investors operate and glorifies their role as guardians of financial stability. I have also been criticized that it is unclear whether my line of research is intended to contribute to the Post-Keynesian or the New Keynesian literature.

Nothing of the sort. The first criticism confuses my attempt to understand the realm of globalized economies with my deeming that realm as good and desirable. The second confuses that same attempt with my desire to be "classified" as one type of scholar or another. In fact, none of those views belong to me. Besides, that's not the point.

My point is that Global investors have criteria for judging the credibility of a country, and, right or wrong as these criteria may be, those who rely on them (such as governments placing significant stocks of debt in their hands) are judged by those criteria and must measure themselves against them, whether they like the criteria or not and whether the criteria are valid or not. Those criteria may be false or may be applied incorrectly, but this does not take away from the fact that Global investors have the power (indeed, the dominance) to impose them. The independence of the central bank, for example, falls within these criteria, and its validity as a tool for guiding economic agents' expectations in an anti-inflationary direction, may be called into question (Palley, 2019). For all practical purposes, however, this becomes irrelevant once the Global investors have made central bank independence one of the criteria on which to base their allocative choices. Those who work in financial markets know well how conditioning (if not determining) such choices are in defining the perimeter of the policy space available to governments that turn to the markets for borrowing resources. In the end, when one relies on the markets, one is forced to play by their rules, and discussing their merits becomes pretextual. Rather, it is the dominance of the Global investors that needs to be questioned, and the opportunity for

countries to surrender a significant portion of their destinies to them by issuing claims on themselves (debt and/or currency) recklessly to the point of losing sovereignty.

This was the whole point of this article.

APPENDIX A. THE OPTIMAL DEMAND FOR MONEY AND COUNTRY CREDIBILITY

By analyzing the dynamics of money demand with respect to (nominal) output as a scale variable, this appendix shows that countries with higher policy credibility enjoys larger policy space, using a modified version of the Allais-Baumol-Tobin (ABT) inventory model for transaction money demand. The original ABT model is here modified to include the convenience yield that money delivers to its holders and the effect of expected exchange rate changes on the demand for money. The ABT approach is here selected as a simple and yet effective method to incorporate an optimal demand-for-money framework in the economy's model used in this article.

Suppose households receive nominal income *PY* at the beginning of each period and spend it evenly during the period. Average wealth is $PY/2$ and, according to the model assumptions, it is held in the form of money balances, *M*, issued by the domestic country *d* and delivering convenience yield i_M, and domestic and foreign assets, B_j, and yielding return i_j, with *j = D,F*.

To finance transactions, households must first hold *M* balances. To spend wealth that is not in the form of *M* balances, it must first be converted into *M* at transaction costs c_j. Suppose each household divides the period into *n* subperiods initially placing PY/n in money balances and the rest in bonds. Suppose also that the share of balances kept in foreign assets increases if the household expects the domestic currency to depreciate, so that money balances for each subperiod are $PY[1 - E(\varepsilon)]/n$, where $E(\varepsilon) = \varepsilon$ is the expected rate of currency depreciation. At the end of each subperiod, bonds and *FX* balances are converted into *M* balances in $n - 1$ transactions of equal size $PY(1 - \varepsilon)/n$. Thus, average money holdings over *n* subperiods will be $M = \frac{1}{n}\frac{PY(1-\varepsilon)}{2}$ and average holdings of bonds and *FX* balances will be $B_d + B_f = \frac{n-1}{n}\left(s_d + s_f\right)\frac{PY}{2}$, where $s_j = \frac{B_j}{PY}$, is the share of bond *j* over nominal income The net gain, Γ, from holding wealth in all asset forms available, considering the need to finance transactions, is given by:

$$\Gamma = \frac{1}{n}\frac{PY(1-\varepsilon)i_M}{2} + \frac{n-1}{n}\sum_j s_j \frac{PYi_j}{2} - (n-1)\sum_j s_j\, c_j, \qquad \text{with } j=d, f.$$

Maximizing Γ with respect to *n* requires:

$$\frac{\partial \Gamma}{\partial n} = \frac{-2n^2\sum_j s_j c_j + \sum_j s_j PYi_j}{2n^2} - \sum_j s_j \frac{PY(1-\varepsilon)i_M}{2n^2} = 0.$$

Therefore, the optimal choice for *n* is

$$\text{(D1)} \qquad n^* = \sqrt{\frac{PY\sum_j s_j\left[i_j - i_M(1-\varepsilon)\right]}{2\sum_j s_j c_j}}.$$

and the optimal demand-for-money equation is

$$\frac{M^*}{P} \equiv m^* = Y\frac{1}{n^*} = Y\sqrt{\frac{2\sum_j s_j c_j}{PY\sum_j s_j\left[i_j - i_M(1-\varepsilon)\right]}},$$

which shows that the demand for money varies positively with real income, asset transaction costs, and the convenience yield on money balances, and varies negatively with the rate of return on alternative assets,

nominal income, and the nominal exchange rate (currency depreciation). Notice that, because of the square root factor, the overall (net) effect of real income on money demand is positive.

Consider now that country *D* has lower policy credibility than country *F*, as proxied by a lower credibility factor β (see Appendix B) and analyze the consequences of monetary positive mismanagement (although the same arguments would hold for fiscal policy mismanagement). Expectations that the government mismanages the money supply over the relevant future time horizon induce wealth holders, all else equal, to hold larger shares of their wealth held in foreign bonds, as they factor into their portfolio choices the future expected (internal and external) value of money. They may fear the risk of excess money supply creation and government's inadequacy or unwillingness to react to threats of currency depreciation and inflation through appropriate policy action. This implies that $n_D^* > D$and, hence, $m_F^* < m_F^*$. Thus, in order to induce wealth holders in the country *d* and *f*, respectively, to hold the same level of excess real money $m - m_D^* = e(m - m_F^*)$, all else equal, it must be that $i_D(\cdot)|\beta_D > i_F(\cdot)|\beta_F$, that is, the required (equilibrium) convenience yield on county *d*'s money must be greater than its equivalent on country *f*'s money. Similarly, the change in the convenience rate required by a given rise of excess money balances will be larger in country *d* than in country *f*, and the difference will grow larger with the rise of excess money balances, that is, $i_D'(\cdot)|\beta_D > i_F'(\cdot)|\beta_F$. These relative differences in the yield adjustment will vary inversely with the difference in the level of policy credibility of the economies being compared, that is, the policy space available would be higher, the higher the level of policy credibility of the economy concerned). Formally, all these features are formally captured by the following equation for the convenience yield on money:

(D3) $i = i(m_j - m_j^*; \beta_j)$, with $j = D, F$ and $i_D|\beta_D > i_F|\beta_F > 0; i_D''|\beta_D > i_F''|\beta_F > 0; i_D'''|\beta_D > i_F'''|\beta_F > 0,$

where $m_j - m_j^*$ measures "excess" money in country *j*. Eq. (D3) defines the position and shape of the optimal demand-for-money function and indicates that i) the required yield on money rises with excess money balances and ii) the height and steepness of the demand schedule in the $(i, m; \beta)$ space is conditional on the economy's level of policy credibility, all else being equal (Chart 1).

Considering Eq. (D3), the optimal demand-for-money function can be written in implicit form as:

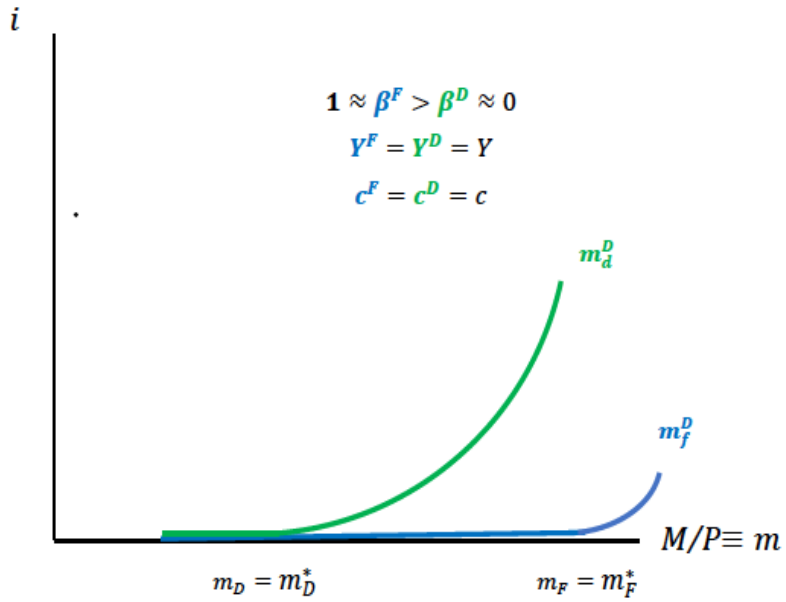
(D4) $$\frac{M_D}{P_D} = m(Y, i_M|\beta_D, c, i_F, \varepsilon_D|\beta_d),$$

where the exchange rate term within the parentheses is explained below. With c and i_f being set exogenously and assumed to be constant (for reasons of simplicity but at no loss of generality), Eq. (D4) reduces to:

$$\frac{M_D}{P_D} = m(Y, i_M|\beta_D, \varepsilon_D|\beta_D), \qquad \text{with } m_Y', m_i' > 0; m_\varepsilon' < 0.$$

which says that for any given stock of *M*, and all else being equal, a higher transaction demand for *M* driven by an increase in output *Y* requires a decrease in the convenience yield on *M* balances, *i*, and/or an increase in the expected rate of currency depreciation, ε, needed to keep the money market in equilibrium.

Chart 1. Stylized Demand-for-Money Schedules in Economies with Different Policy Credibility



APPENDIX B. THE CREDIBILITY FACTOR "β"

Credibility factor "β" condenses Global investor views on the policy credibility of individual country economies. This factor can indifferently be thought of as an index that investors apply to the government IBC, which scales its value up or down correspondingly, or as a probability measure that generates an expected value of the IBC, or else as a risk factor that adjusts the value of the IBC. All else equal, a lower β_j reflects larger expected losses on government debt (either via higher inflation or default) and translates into a tighter IBC for *j*'s government, thus requiring larger (and possibly more frontloaded) fiscal efforts to sustain a given debt stock.

The information set ω_t, at any time *t*, comprises all relevant information that Global investors deem relevant to their decision-making process, including to assess the policy credibility of a country government (e.g., economic, political, and social factors, both internal and external to the country, which influence the achievability and sustainability of government's specific policy commitments). New factors or events that raised the investors' concerns that country *j*'s government might face future economic, political and social challenges (which would eventually induce the government to take such actions as defaulting on its future obligations, inflating its debt away, or even repudiating it) would be incorporated in a new information set ω_t^1 and cause β_j to fall ($\beta_{j,t}|_{\omega_t^{'}} < \beta_{j,t}|_{\omega_t}$), thus reducing the IBC elasticity accordingly. A fall of credibility might result in such a tightening of the IBC elasticity that investors would doubt the sustainability of the future primary surpluses and/or debt monetization required by the tightened IBC, until such a point where they might even stop buying and holding the country's debt altogether. This would cause the price of debt to collapse and, correspondingly, domestic interest rates to rise abnormally to levels where fiscal dominance would put pressure on the monetary authorities to monetize and inflate the debt away.

The relevant information set would also capture those developments (including, for instance, the evolution of local and/or global risks) that may induce investors to shift capital from lower-credible to higher-credible countries considered to be safer places for investment or issuers of safer liability instruments. In such instances, the credibility gap between countries (as perceived by the markets) may change and cause different dynamics of credibility factors β_j and, hence, different IBC elasticities in different countries over time. All else equal, different IBC elasticities across countries are sufficient to make otherwise identical bonds imperfect substitutes of one another.

APPENDIX C. THE UTILITY OF MONEY AND OTHER FINANCIAL ASSETS

Drawing on Bossone (2014), this appendix derives the utility function of money and financial assets. At each point in time and across its life, any asset *Q* delivers to its holder a level of utility that reflects the opportunity for the holder to liquidate the asset and to use the proceeds from liquidation to finance consumption needs *C* occurring with probability ϑ at any future date. The utility of asset *Q* at date *t* is calculated by summing over two terms: (i) the utility directly derived from converting the asset into consumption at the next date *t+1* with probability ϑ_{t+1}, and (ii) the utility indirectly derived from holding the asset further on with residual probability $(1-\vartheta_{t+1})$, which in turn can be further decomposed as above at each future date. Notice that probabilities $\vartheta_\tau, \tau \in (1,\infty)$ are based on subjective judgments of asset holders and can change over time, also based on new information and changes in market sentiment.

Substituting iteratively for $u(Q)$ at each forward date yields across the time horizon, the process generates the following series of expressions:

(B1) $$u(Q_t) = \delta E_t\left[u\left(\frac{P^Q_{t+1}Q_t}{P_{t+1}}\right)R^Q_{t+1}\vartheta_{t+1} + u(Q_t)(1-\vartheta_{t+1})\right]$$

$$= E_t\left\{u\left(\frac{P^Q_{t+1}Q_t}{P_{t+1}}\right)\delta R^Q_{t+1}\vartheta_{t+1} + \left[u\left(\frac{P^Q_{t+2}Q_t}{P_{t+2}}\right)\delta^2 R^Q_{t+1}R^Q_{t+2}\vartheta_{t+2} + u(Q_t)(1-\vartheta_{t+2})\right](1-\vartheta_{t+1})\right\}$$

$$= E_t\left\{\left(\frac{P^Q_{t+1}Q_t}{P_{t+1}}\right)\delta R^Q_{t+1}\vartheta_{t+1} + \left[u\left(\frac{P^Q_{t+2}Q_t}{P_{t+2}}\right)\delta^2 R^Q_{t+1}R^Q_{t+2}\vartheta_{t+2}(1-\vartheta_{t+1}) + \right.\right.$$

$$\left.\left.u\left(\frac{P^Q_{t+3}Q_t}{P_{t+3}}\right)\delta^3 R^Q_{t+1}R^Q_{t+2}R^Q_{t+3}\vartheta_{t+3}(1-\vartheta_{t+2})(1-\vartheta_{t+1}) + u(Q_t)(1-\vartheta_{t+3})(1-\vartheta_{t+2})(1-\vartheta_{t+1})\right]\right\}$$

[…]

$$= E_t\left\{\delta^T \sum_{T=t+1}^{\infty} u\left(\frac{P^Q_T Q_t}{P_T}\right)\prod_{n=t+1}^{T} R^Q_n\,\vartheta_T(1-\vartheta_{T-1}) + u(Q_t)\prod_{T=t+1}^{\infty}(1-\vartheta_T)\right\},$$

and so on for each subsequent substitution of $u(Q_t)$, for each date until the end of the time horizon. Notice that, as in the macro side of the model, expectations are based on information set ω_t available to the investors at each date *t*, which has been dropped for ease of exposition. Since wealth (and, therefore, every asset held in the portfolio) must be converted into consumption by the end of the time horizon, holdings of *Q* vanish in the limit as $\lim_{T\to\infty}(1-\vartheta_T) = 0$. Thus, summing over the agent's infinite time

horizon gives the utility of asset *Q* at date *t* as

(B2) $$u(Q_t) = E_t\left\{\delta^T \sum_{T=t+1}^{\infty} u\left(\frac{P^Q_T Q_t}{P_T}\right)\prod_{n=1}^{t-1} R^Q_n\,\vartheta_T(1-\vartheta_{T-1})\right\}$$

The cost of asset liquidation

Liquidating assets may involve resource costs such as for information acquisition, search, evaluation and verification, legal and administrative requirements, bargaining and negotiations, etc. Depending on the efficiency of the financial system where asset trading takes place, as well as on the state of market mood, each

asset Q requires its own minimum amount of time τ_Q^* (to be defined more precisely below) for its holder to be able to sell it at the ongoing market price P^Q, net of unit liquidation cost $q^* \in (0,1)$. If the agent is compelled to realize the asset within a time interval $\tau_Q < t_Q^*$, then she must be willing to accept a sale price lower than $(1 - q_Q^*)P^Q$, that is, the asset must sell at a price discount larger than the unit liquidation transaction cost under optimal timing ($q > q_Q^*$). The liquidity of asset Q is therefore variable and endogenously determined, and can be modeled in terms of the following structure for asset liquidation cost

$$q = q(t_Q^*/\tau),$$

where

a) if $0 < t_Q^* < \tau$, then, $q_Q = q_Q^* > 0$: the seller has enough time to liquidate Q and pays only q_Q^* for the transaction;

b) if $t_Q^* > \tau \geq 0$ then, $q_Q > q_Q^*$: the seller has not enough time and must sell Q at a discount larger than the optimal unit transaction cost;

c) $\lim_{\substack{t_Q^* > \tau \\ \tau \to 0}} q_Q = 1$: the discount increases with the time pressure on the seller to sell Q; and

d) if $t_Q^* = 0$, then, $q_Q^* = 0$: Q is perfectly liquid (cash),

and where

$$t_Q^* = \tau(\Psi^Q, s_Q), \qquad \text{with } \tau_\Psi < 0, \tau_s < 0,$$

that is, the minimum time interval required to sell Q optimally decreases with structural variable Ψ^Q, which reflects the level of financial system efficiency in the trading of asset Q (including such features as technology; market platform, legal, regulatory and supervisory infrastructure; etc.,), and increases with s_Q, which captures the prevailing market sentiment for trading Q, with a high (low) s_Q indicating the state of exuberance (pessimism) in the market for Q as perceived by the agents (which is not discussed in this appendix, but is illustrated at length in Bossone (2014)).Thus, greater (lower) efficiency of the financial infrastructure where Q is traded and a "seller" ("buyer") market would shorten (lengthen) t_Q^* and lower (raise) q.

Since, at any time $T > t$, the expected utility lost to the liquidation of asset Q, inherited from time t, is a fraction ξ^Q of the expected utility from the consumption financed through the proceeds of Q,

$$\xi_T^Q = E_t\left[u\left(q_{Q_T} P_T^Q Q_t / P_T^C\right)\right] / E_t\left[u\left(P_T^Q Q_t / P_T^C\right)\right],$$

where $\xi^Q = \xi(q_Q)$, $\xi' > 0$, $\xi(0) = 0$, $\xi(1) = 1$.

Then, Eq. (A2) can then be rewritten as

$$\text{(B3)} \qquad u(Q_t) = E_t\left\{\delta^T \sum_{T=t+1}^{\infty} u\left(\frac{P_T^Q Q_t}{P_T}\right) \prod_{n=1}^{t-1} R_n^Q \vartheta_T (1 - \vartheta_{T-1})\left(1 - \xi_T^Q\right)\right\},$$

which appears as Eq. (15) in the text.

Note that if asset *Q* is cash, or *M*, then $P^M = 1$, $i^M = 0$, $l^M = 0$, $\xi^M = 0$, and $R^M = -p$, although if cash were digital, this would allow for $i^M \gtreqless 0$ since the issuing central bank would be able to apply positive or negative interest rates on it.

The model above can be extended to show how asset utility changes with the variability of asset prices and with changes in market sentiment.

APPENDIX D. CREDIBILITY AND MACRO-POLICIES

The PTI model allows to evaluate the effects of active fiscal and monetary policies of a government by analyzing how policy stimuli are financed and how the government's financing strategy is judged by the financial markets. In this appendix, the transmission mechanisms are described in a narrative form.

Assume that a largely indebted government engineers a persistent fiscal stimulus through the issuance of new domestic debt for an indefinite period to keep the real output gap down at zero. If the government's credibility is low, investors determine an inelastic IBC and require government to commit to attaining larger primary surpluses over the immediate future to keep bond prices from falling. In fact, for economies that already suffer from low credibility, especially those already carrying large debt positions, the very intention of relaxing macro policies might be perceived by the markets as further weakening credibility, thus tightening the government IBC. A tight(er) IBC makes the effect of the stimulus small(er) and short-lived, if at all. Moreover, if the government does not (credibly) commit to attaining larger future primary surpluses, based on the new information set, bond prices fall as investors sell domestic bonds for foreign assets, leading to higher interest rates and a contraction in the supply of money supply engineered by the central bank to accommodate higher rates, which would stymie currency depreciation. Under such conditions, the country's credibility could drop to a critical level that neutralizes the positive effect on real output of both the fiscal stimulus and real exchange rate depreciation (Fig. 1a).

Consider now the central bank's decision to stimulate the economy by lowering the domestic policy rate and committing to keep it low for a protracted period by supplying more money through periodic purchases of government bonds. The share of domestic bonds held by the central bank increases (at an unchanged level of total outstanding government debt) and, correspondingly, Global investors reallocate their portfolio toward foreign bonds since the marginal utility of the money balances they have received in exchange for selling bonds to the central banks has declined. This is because they now hold domestic money balances in excess to optimal balances. Therefore, ceteris paribus, portfolio compositions would feature higher shares of foreign assets relative to domestic assets determine a higher nominal exchange rate. While nominal exchange rate depreciation may in principle amplify the stimulus, the intensity and duration of its effect ultimately depend on the amplitude and speed of the real exchange rate adjustment process (Fig. 1b).

The policy authorities should be mindful of the impact of credibility on the country's IBC. While high credibility raises the effectiveness of monetary policy, low credibility, or the erosion of credibility in the eyes of the markets, reduces it. A country's credibility might drop to such a critical level that neutralizes the effect of monetary stimulus on the nominal interest rate, and hence on real output, while the largest part of the effect would dissipate into nominal exchange rate depreciation and higher inflation.

If the central bank and government coordinate their acts and engineer a monetary financing of new debt issuance aimed to support fiscal stimulus large enough to stabilize the interest rate (a.k.a. "helicopter money"), no negative effects retrofit on real output. As a result, the fiscal-monetary impulse is unencumbered, and the policy

program can be calibrated to stabilize real output at full capacity without causing inflationary pressure. This result is consistent with Buiter's (2016) conclusion that "helicopter money always works."

The monetary authorities should always consider the impact of their action on the exchange rate. If the stimulus is temporary, and the pass-through less than complete, the nominal exchange depreciation that follows the temporary excess supply of money amplifies the stimulus. However, under a persistent monetary financing of the fiscal deficits, the ongoing excess money creation affects the nominal exchange rate and the inflation rate, causing credibility to drop, the ERPT effect to increase, and the exchange rate and inflation to further rise. Thus, while policy coordination may achieve the best result possible, it is not by itself sufficient for the country to gain credibility in the eyes of the market.

Thus, as discussed in Section 8, there is no mechanical correspondence between changes in government liabilities (money and/or debt), the exchange rate, inflation, and real output. The correspondence is country-specific, it depends on the country's credibility as perceived by the markets (Fig. 2) and may change with government efforts (or lack thereof) to gain credibility.

Finally, consider situations where critical international developments (e.g., political turmoil, financial crises, major calamities) induce investors to shift capital to countries with high credibility, which are generally regarded as safe havens. In such situations, as the PTI suggests, the credibility gap may widen with the consequences that the IBC of the highest-credible countries becomes even more elastic, the policy space available to these countries for expansionary action increases further and, all else equal, their rate of inflation declines, while the opposite happens to the lowest-credible countries. In such cases, the credibility gap widens not because the authorities of the highest-credible countries have tightened their policy commitments, but because investors searching for asset protection value their credibility relatively more at times of stress.

FIGURE 1A. FISCAL IMPULSE

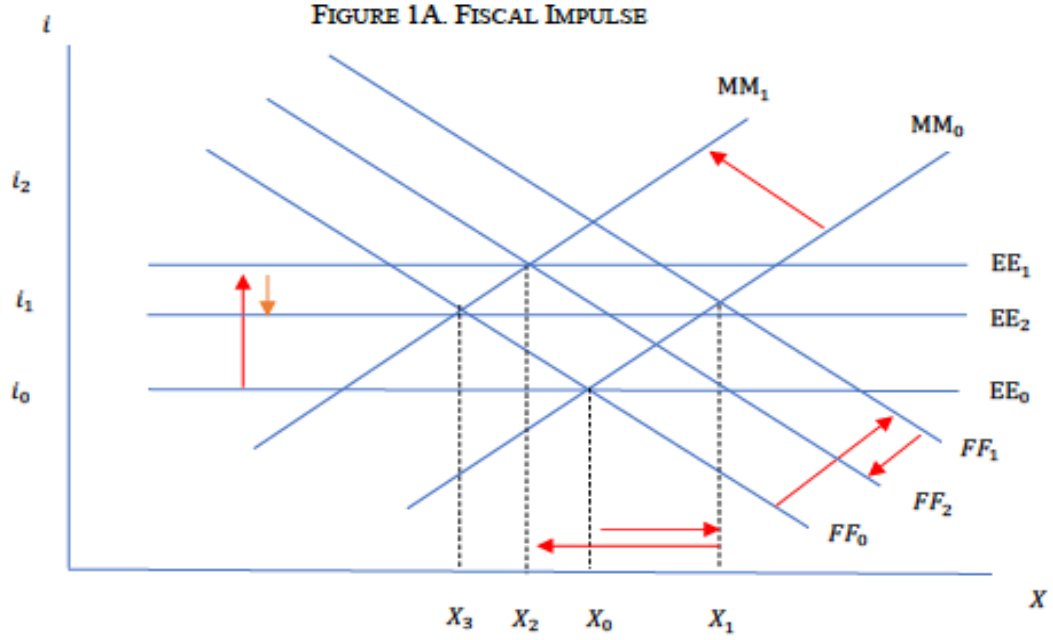
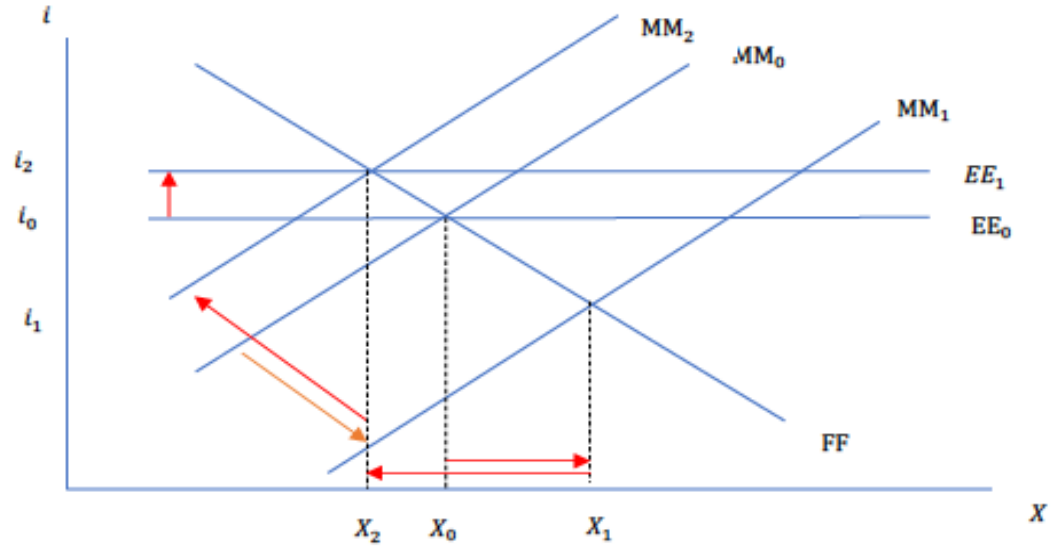
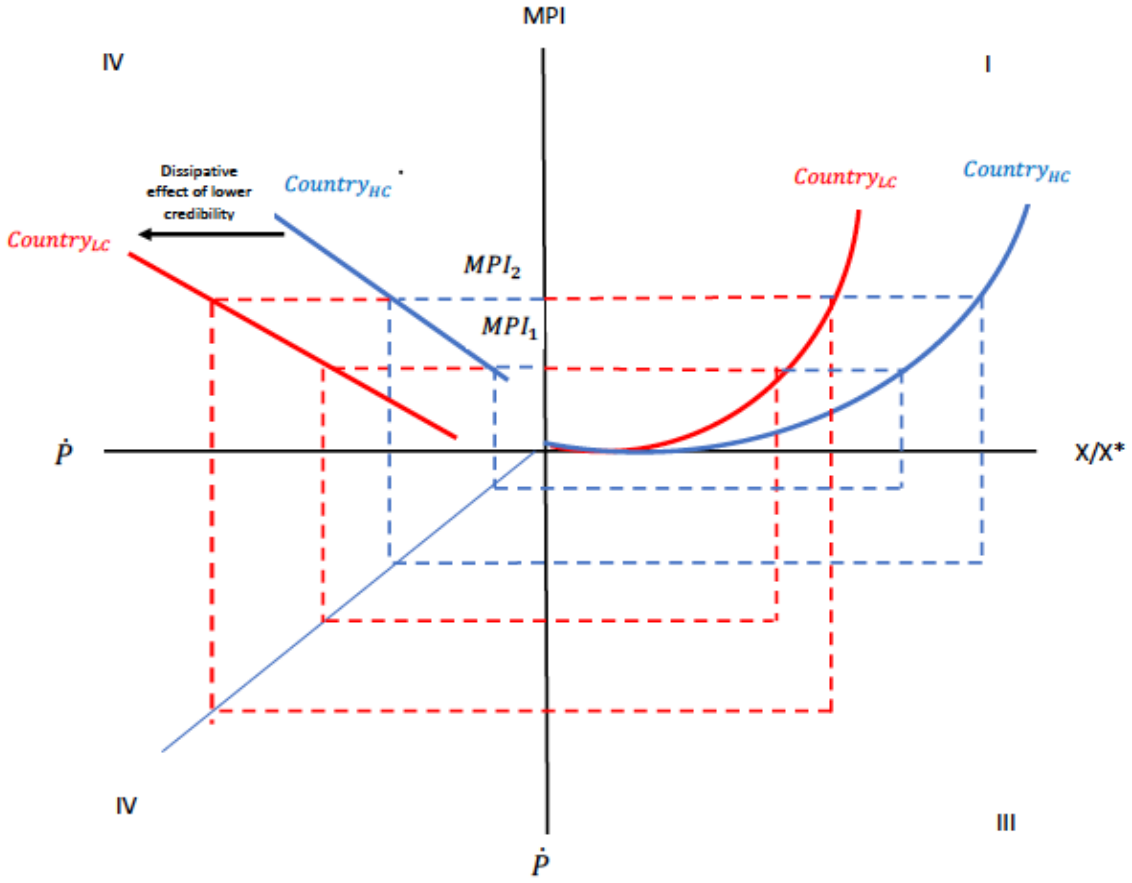


FIGURE 1B. MONETARY IMPULSE



Note: Figures 1a and 1b: the curve MM is the locus of (*i*, *X*) pairs at which $\Delta b = 0$; the curve FF is the locus of (*i*, *X*) pairs at which $\Delta m = 0$; and the schedule EE is the locus of (*i*, *X*) pairs at which the real exchange rate does not change $\Delta\left(\frac{e}{P}\right) = 0$. Fig. 1a portrays the case where the expansionary fiscal stimulus $\Delta b > 0$ is more than offset by the effects of the drop in the level of policy credibility as perceived by the market. The fiscal authorities initially shift the FF schedule rightward from FF_0 to FF_1 to a higher level of output, which is only partially dampened by a higher interest rate. However, the lack of credibility causes investors to sell off domestic bonds in exchange for foreign assets, and the monetary and fiscal authorities to adjust, respectively, the money and bond supply to keep balance in the bond and foreign exchange markets. As a result, the EE and MM schedules shift, respectively, from EE_0 up to EE_1 and from MM_0 backward to MM_1, and the FF schedule moves somewhat backward to FF_2, all crossing each other at an interest rate that more than offsets the initial stimulus. As noted in the text, the adjustment process might be such as to eventually lead to an appreciation of the exchange rate, lower output, and lower inflation, with the schedule EE shifting backward to EE_2. Fig. 1b represents the case where the expansionary output effect of the monetary impulse $\Delta m > 0$ is more than offset by the effects of the drop in the level of policy credibility as perceived by the market. The monetary policy authorities initially shift the MM schedule from MM_0 to MM_1 to a lower interest and exchange rate levels. The lack of credibility, however, causes investors to sell domestic bonds for foreign assets, causing the interest rate to rise and the currency to weaken. The EE schedule shifts upward from EE_0 to EE_1 and the monetary authorities must shrink the money supply as necessary to restore equilibrium in the bond and foreign exchange markets. As a result, the adjustment might be such as to even more than offset the initial stimulus.

FIGURE 2. POLICY SHOCKS AND CREDIBILITY



Note: The responses of real output (as a proportion to potential output) X/X* to policy shocks MPI_1 and MPI_2 are represented by the two schedules charted in quadrant I of Figure 2 for high-credibility $Country_{HC}$ and low-credibility $Country_{LC}$, respectively. As discussed in Section 6, the variable MPI reflects the combined monetary and fiscal policy shocks to aggregate demand. The position of the two schedules indicates the higher effectiveness of policy shocks (in terms of output changes) in the high-credibility country. Symmetrically, policy shocks are relatively less effective (in terms of output changes) in the low-credibility country, where they dissipate instead into higher rates of inflation. The inflation response $\dot{P}$ to changes in MPI are represented by the two schedules charted in quadrant IV of Figure 2 for high-credibility $Country_{HC}$ and low-credibility $Country_{LC}$, respectively. The position of the two schedules indicates the higher dissipation of the policy shocks (in terms of higher inflation) in the low-credibility country. The different colors used for the two countries are used to track their respective output and inflation responses to policy shocks, through the quadrants.

REFERENCES

Agénor, P. R. (1994), "Credibility and exchange rate management in developing countries," Journal of Development Economics 45(1): 1–16.

Aleem, A., and A. Lahiani (2014), "Monetary policy credibility and exchange rate pass-through: Some evidence from emerging countries, " Economic Modelling 43(C): 21–29.

Bartholdy, J., and B. Kate (2004), "Testing for Multiple Types of Marginal Investor in Ex-Day Pricing," Multinational Finance Journal, Vol. 8, No. 3/4, 173-209.

Benigno, P., and E. Faia (2016), "Globalization, pass-through, and inflation dynamics," International Journal of Central Banking, International Journal of Central Banking 12(4): 263–306, December.

Bossone, B. (2014), "Liquidity and capital under uncertainty and changing market sentiment: A simple analysis," Review of Financial Economics 23, 98–105.

Bossone, B. (2019), "The portfolio theory of inflation and policy (in)effectiveness," Economics Journal Article No. 2019-33, 4 June, 1-25.

Bossone, B. (2020a), "Bringing Global Finance into Macro-Policy Analysis," World Economics, Vol. 21, No. 4, October–December, 89-110.

Bossone, B. (2020b), "Global Finance and the Effectiveness of Macro-Policies," World Economics, Vol. 21, No. 2, April–June 2020, 135-164.

Bossone, B. (2021), "The portfolio theory of inflation and policy (in)effectiveness: a revisitation," Macroeconomics and Finance in Emerging Market Economies, 14 September, 2-19.

Bossone, B. (2022), "The Portfolio Theory of Inflation and Policy (in)Effectiveness: Exploring it Further and Righting the Wrongs, Economics," vol. 16, no. 1, 257-275, 4 November.

Bossone, B (2023), "The Devils," World Economics, vol. 24(1), pages 71-86, January.

Branson, W. H. (1985), "The dynamic interaction of exchange rates and trade flows," NBER Working Paper Series, Working Paper No. 1780, National Bureau of Economic Research, Cambridge, Mass., December.

Buiter, W. H. (2016), "The Simple Analytics of Helicopter Money: Why It Works — Always," Economics, Vol. 8, 2014-28, 21 August, 1-51.

Calderón, C., R. Duncan, and K. Schmidt-Hebbel (2004), "The role of credibility in the cyclical properties of macroeconomic policies in emerging economies," Review of World Economics 140(4): 613–633.

Calvo, G., and C. M., Reinhart (2002), "Fear of floating," The Quarterly Journal of Economics 117, No. 2 (May), 379–408.

Calvo, C., and C. Végh (1991), "Exchange-rate-based stabilization under imperfect credibility," IMF Working Papers, WP 1991/77, International Monetary Fund, August.

Carrière-Swallow, Y., B. Gruss, N. E. Magud, and F. Valencia (2016), "Monetary policy credibility and exchange rate pass-through, " IMF Working Paper WP/16/240, International Monetary Fund.

Chen, Z., and L. Zhang (2018), "Back to the beginning: does investor diversification affect the firm's cost of equity?" 9 October.

Edwards, S. (2006), "The relationship between exchange rates and inflation targeting revisited," NBER Working Paper Series, Working Paper 12163, National Bureau of Economic Research.

Ferreira de Mendonça. H., and F. Tostes (2015), "The Effect of Monetary and Fiscal Credibility on Exchange Rate Pass-Through in an Emerging Economy," Open Economies Review 26(4), 787–816.

Ferreira de Mendonça, H., and B. Pires Tiberto (2017), "Effect of credibility and exchange rate pass-through on inflation: An assessment for developing countries," International Review of Economics and Finance 50(July): 196–244.

Fritz, B., L. F. de Paula, and D. Magalhães Prates (2018), "Global currency hierarchy and national policy space: a framework for peripheral economies," European Journal of Economics and Economic Policies: Intervention, Vol. 15 No. 2, 208–218.

Helmy, O., M. Fayed, and K. Hussien (2018). "Exchange rate pass-through to inflation in Egypt: A structural VAR approach," Review of Economics and Political Science 3(2): 2–19.

Jašová, M., R. Moessner, and E. Takáts (2016), "Exchange rate passthrough: What has changed since the crisis?, " BIS Working Papers No 583, Bank for International Settlements, September.

Kabundi, A. and M., Mlachila (2018), "Monetary policy credibility and exchange rate pass-through in South Africa, " South African Reserve Bank, WP/18/04, August.

Keynes, J. M. (1936), "The General Theory of Employment, Interest and Money." London: Macmillan.

Kirshner, J. (1999), "Keynes, Capital Mobility and the Crisis of Embedded Liberalism," Review of International Political Economy, Vol. 6, No. 3 (Autumn), 313-337.

Lopez-Villavicencio, A., and V. Mignon (2016), "Exchange rate pass-through in emerging countries: Do the inflation environment, monetary policy regime and institutional quality matter?," CEPII Working Paper No 2016-07, April.

Obstfeld, M., and K. Rogoff (1995). "Exchange rate dynamics redux, " Journal of Political Economy 103(June): 624–660.

Obstfeld, M., and K. Rogoff (1996), "Foundations of international macroeconomics." Cambridge, Mass.: MIT Press.

Palley, T. (2019), “Central Bank Independence: A Rigged Debate based on false Politics and Economics, Investigación Económica, 78(310), 67, October

Savoie-Chabot, L., and M. Khan (2015), "Exchange rate pass-through to consumer prices: Theory and recent evidence," Bank of Canada Discussion Paper 2015-9, October.

Sicsú, J. (2020), "Keynes’s state planning: from bolshevism to The General Theory," The European Journal of the History of Economic Thought, 1-23.

Sveriges Riksbank (2016), "The impact of the exchange rate on inflation." Monetary Policy Report, December.

Suleiman S., A. Alexander, and M. Olure-Bank (2018), "An econometric analysis of the nexus of exchange rate, inflation and budget deficit: Case of Nigeria 1981–2016," Journal of World Economic Research 7(1): 1–13.

Takhtamanova, Y. (2008), "Understanding changes in exchange rate pass-through," Journal of Macroeconomics 32(4): 1118–1130.

Wang, P. (2009), "The portfolio balance approach to exchange rate determination," in: The Economics of Foreign Exchange and Global Finance. Springer, Berlin, Heidelberg.

Winkelried, D. (2014), "Exchange rate pass-through and inflation targeting in Peru," Empirical Economics 46(4): 1181–1196.

Zelealem, Y., and J. Musila, (2018), "The dynamics of inflation, exchange rates and the trade balance in a small economy: The case of Uganda." International Journal of Development Issues 17(2): 246–264.