Working Paper No. 1105

OPENSIMPLEST: The Smallest SFC Open Economy Model

by

Francesco Zezza
Sapienza University of Rome and Levy Economics Institute

January 2026

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Levy Economics Institute
P.O. Box 5000
Annandale-on-Hudson, NY 12504-5000
http://www.levyinstitute.org

ISSN 1547-366X

ABSTRACT

This article introduces OPENSIMPLEST, a highly parsimonious stock-flow consistent (SFC) model of an open economy. The model is designed as a pedagogical and analytical benchmark that preserves the core mechanisms of more complex open-economy SFC frameworks while remaining complete, transparent, and empirically tractable. Unlike standard two-country models, which are often incomplete representations of the rest of the world, difficult to interpret as analytical "toy models," and hard to validate empirically due to the lack of bilateral financial data, OPENSIMPLEST adopts a one-country structure with an explicitly modelled, aggregate rest of the world.

Despite its simplicity, the model retains the defining features of the SFC approach: coherent accounting across stocks and flows, endogenous money, portfolio allocation based on relative rates of return, current-account dynamics, and valuation effects arising from exchange-rate movements. The key modelling difference concerns the exchange-rate closure. Rather than being determined by contemporaneous asset-market equilibrium or balance-of-payments clearing, the exchange rate adjusts gradually in response to lagged current-account imbalances, shifting the focus from short-run financial arbitrage to the interaction between flow imbalances, stock positions, and valuation effects.

Simulation exercises show that, for a wide range of fiscal, monetary, and external-demand shocks, the model reproduces the same qualitative dynamics obtained in more articulated open-economy SFC models. Differences arise only in the very short run following purely financial shocks, where the exchange-rate closure affects the impact response but not the medium-run adjustment path. The results suggest that many key insights of open-economy SFC analysis can be obtained within a small, complete, and empirically implementable framework, making OPENSIMPLEST a useful tool for teaching, sensitivity analysis, and comparative empirical applications.

JEL CODES: E12; E44; E51; F32

KEYWORDS: Open Economy; Portfolio choice; Balance of Payments; Exchange Rate; Stock-Flow Consistent model

1. INTRODUCTION

The use of open-economy stock–flow consistent (SFC) modelling has grown rapidly over the past two decades, building on the pioneering work of Wynne Godley and James Tobin. The SFC approach brings together rigorous sectoral accounting, the integration of real and financial markets, and dynamic adjustment driven by the evolution of balance sheets (Caverzasi and Godin 2015; Nikiforos and Zezza 2017; Carnevali, Deleidi and Veronese Passarella 2019). Its core principles—horizontal, vertical, and stock–flow consistency—impose structural discipline on model design, reducing degrees of freedom while ensuring that all real and financial stocks and flows are explicitly tracked (Zezza and Zezza 2019; Zezza 2025). This has made the SFC framework uniquely suited to analyzing open-economy topics such as external imbalances, exchange-rate dynamics, and the accumulation of foreign assets and liabilities.

The benchmark for open-economy SFC modelling remains the flexible-exchange-rate, two-country OPENFLEX system of Godley and Lavoie (2007, chap. 12, "G&L" hereafter). Their framework challenged the Mundell-Fleming paradigm by emphasizing that medium- and long-run dynamics are anchored not by interest-rate arbitrage but by the evolution of the current account and net foreign asset positions. Subsequent extensions have explored multi-country structures, global imbalances, behavioral finance, and income and wealth inequality. However, with extension complexity increased, for every sector, transaction, or asset one includes, a new set of behavioral equations or accounting identities arise from the model's structure.

A more recent methodological development is the push toward simplification and tractability, in response to the recognition that full two-country SFC systems are often too large for empirical work and are difficult to teach. Carnevali (2021), with his OPENSIME model, demonstrates that the core qualitative results of OPENFLEX can be reproduced with approximately one third of its equations, showing that the essential open-economy SFC mechanisms—i.e., portfolio allocation, interest-rate differentials, exchange-rate adjustment, and external constraints—do not require such a complex model. Similarly, newer open-economy ecological SFC models (Carnevali et al. 2020) show that reduced-form external closures can preserve key macrofinancial channels while

enabling richer environmental interactions, including cross-border carbon dynamics and financial spillovers.

Parallel to these theoretical contributions, empirical SFC modelling has developed into a distinct research program. Empirical SFC models must be built directly from national and financial accounts data, beginning from observed balance sheets and deriving behavioral equations consistent with their structure (Zezza and Zezza, 2019; Pierros, 2024). This empirical strand differs markedly from theoretical two-country systems: where theoretical models prioritize conceptual completeness, empirical models require parsimony (though they are often quite complex), transparency, and to be directly calibrated. The recent growth of large-scale SFC policy models underscores the practical value of leaner, data-driven structures.[1] In this context, a one-country open-economy design with an exogenous Rest of the World (RoW) offers a natural compromise, enabling the modeller to directly link national accounts data in the model and incorporate external constraints without constructing a full global system.

Yet despite these developments, a gap remains in the literature. On the one hand, existing simplified open-economy SFC models, such as OPENSIME or the ecological two-country frameworks, still require multiple countries or blocs and therefore retain some of the partial-closure limitations highlighted by Carnevali (2021) and by Nikiforos and Zezza (2017). On the other hand, the empirical literature increasingly emphasizes the need for SFC models that can be calibrated directly to national sectoral accounts data, particularly for small open economies where bilateral financial positions are unavailable or incomplete, and notes explicitly that model structure must follow the research question, given data constraints (Zezza and Zezza 2019; Pierros 2024). Yet, data-driven large-scale SFC policy models required a team of researchers to be developed and updated, making it difficult for a graduate or doctoral student to approach this literature independently.

The aim of this article is to fill this methodological and pedagogical gap. I present the smallest SFC open economy model, OPENSIMPLEST, a one-country SFC framework for a flexible-

[1] See the special issue on "Empirical stock-flow consistent models" (2025), which includes a collection of empirical models for Italy, Netherlands, France, Denmark, China, and UK, among others.

exchange-rate economy interacting with the RoW. The model retains all the defining features of open-economy SFC dynamics—trade elasticities, portfolio choice with interest-rate differentials, endogenous money, valuation effects, and the accumulation of net foreign assets—while drastically reducing the dimensionality relative to existing two-country systems. Its design follows the principles outlined by Zezza and Zezza (2019) for empirical SFC models: begin with the minimal viable balance-sheet structure, impose strict flow-stock consistency, and add complexity only where required by the research question.

This streamlined architecture serves three purposes. First, it provides a pedagogical tool that bridges the gap between mainstream open-economy models and the larger SFC frameworks used in research and policy institutions. In this sense, it can be seen as a "toy model," in the spirit of Blanchard, i.e., a model that serves to "*allow for a quick first pass at some question, and present the essence of the answer from a more complicated model or from a class of models*" (Blanchard 2018, 53). Second, it eliminates the partial-closure problem inherent in two-country systems, where the rest of the world is implicitly assumed not to exist. Third, it facilitates empirical calibration using national and financial accounts, enabling extensions to basic policy analysis—including fiscal and monetary interactions, external-debt sustainability, and exchange rate dynamics.

The remainder of the article is organized as follows. Section 2 provides a review of the recent literature of open economy models. Section 3 presents the accounting structure and modelling assumptions, while Section 4 introduces and discusses the models' equations, comparing OPENSIMPLEST to OPENFLEX and OPENSIME. Section 5 provides simulations, and show that the model retains all major transmission mechanisms at play in two-country structures. Section 6 concludes.

2. LITERATURE REVIEW

The SFC literature has come a long way since the publication of the (well-received) survey by Caverzasi and Godin (2015) in the *Cambridge Journal of Economics*, now a decade ago. More

recent surveys of the literature on the stock-flow consistent approach are Nikiforos and Zezza (2017) and Carnevali, Deleidi, and Passarella (2019). Pierros (2024), in turn, reviews the recent literature on empirical SFC models. In what follows I concentrate on the open economy literature, leaving the interested reader to the cited surveys for a more thorough review.

Theoretical models have seen a general increase in complexity over the years. While the benchmark for open-economy SFC modelling remains the flexible-exchange-rate two-country OPENFLEX system of G&L (2007, chap. 12), several extensions appeared.

First, the original two-country model has been expanded to account for more countries. Lavoie and Zhao (2010) model three countries—China, Europe, and the United States—in a system where the exchange rate between the US dollar and the euro is floating, and the Chinese renminbi is pegged to the US dollar. Along similar lines, Belabed et al. (2018) model three economies, China, US, and Germany, and study the effects of changes in both personal and functional income distribution on national current account balances. In the same spirit, four-country systems have been introduced, extending the three-country model to study global imbalances in more detail (Mazier and Tiou-Tagba Aliti 2012; Mazier and Valdecantos 2015, 2019; Valdecantos and Zezza 2015). Second, the original two-country model has been applied to study expectations formation (Lavoie and Daigle 2011), inflation targeting monetary and fiscal policies (Greenwood-Nimmo 2014), income and wealth inequality (Detzer 2018; Ruggeri, Pariboni and Yajima 2025), reassess the Marshall-Lerner conditions (Carnevali, Fontana and Veronese Passarella 2020), and to study Latin American economies (Nalin and Yajima 2020, 2021; Nalin et al. 2025)

Finally, the SFC approach bridged to other disciplines—notably ecological economics (Dafermos, Nikolaidi and Galanis 2017, 2018; Carnevali et al. 2020)—and methodologies—notably agent-based models (Caiani et al. 2016; Caiani, Catullo and Gallegati 2018) and input-output models (Berg, Hartley and Richters 2015; Jackson and Victor 2015; Thomsen, Raza and Byrialsen 2025). As highlighted in Carnevali et al. (2019), this “second generation” of models broadened the SFC toolkit, enabling analyses of international monetary architectures, multi-polar exchange-rate regimes, and the interaction between real, financial, and the ecosystem.

The rush toward complexity has been seen for empirical SFC models too. A discussion on how to design empirical SFC models, depending on data quality and research question, is included in Zezza and Zezza (2019), while Zezza (2025, 395–99) places empirical SFC models along the suite of policy models in use at major institutions (DSGE, CGE, IO, SEM), discussing the main pros and cons of adopting the SFC approach over others.

In his review of the literature, Pierros (2024) distinguishes between (first-generation) New Cambridge data-driven, three sector models (NC; as the earlier works from Godley and coauthors at the CEPG, e.g., Cripps and Godley [1976] or the models in use at the Levy Institute, e.g., ; Godley [1999]; Papadimitriou, Nikiforos and Zezza [2013]), Godley-Lavoie theory-driven models (Canelli *et al.*, 2021, 2022, 2024), and High-Complexity data-driven models, which are nowadays the main *game in town* (see, for example, Mazier and Reyes-Ortiz, 2022; Zezza and Zezza, 2022; Byrialsen, Raza and Valdecantos, 2024), and have made their way into policy institutions (Burgess et al. 2016; Barbieri Hermitte et al. 2023).

Taken together, these developments testify to the vitality and maturity of the SFC research program. At the same time, they reveal a growing tension between analytical richness and accessibility. As both theoretical and empirical SFC models have expanded in size, scope, and institutional detail, the entry cost for new researchers has increased substantially. Even at the PhD level, students are often confronted with systems comprising dozens of equations (if not hundreds), multiple countries, and highly articulated financial structures, making it difficult to isolate mechanisms and to develop intuition about model dynamics. A similar issue arises for applied users and policymakers, for whom the transparency and tractability of the modelling framework are often as important as its realism. This paper responds to this tension by revisiting the open-economy SFC framework from the opposite direction: rather than adding layers of complexity, it asks how much can be learned from a deliberately small, complete, and coherent one-country model. By doing so, it aims to complement the existing literature with a pedagogical and analytical benchmark that preserves the core insights of more complex systems while remaining easy to interpret, replicate, and, crucially, apply to the data.

3. MODEL ASSUMPTIONS AND ACCOUNTING STRUCTURE

Before introducing behavioral relations, it is necessary to establish the accounting foundations on which stock–flow consistent (SFC) dynamics rest. As emphasized in Nikiforos and Zezza (2017) and Zezza and Zezza (2019), the SFC approach requires a complete description of institutional sectors, their assets and liabilities, and the monetary flows that connect them. These accounting structures ensure horizontal and vertical consistency and impose the quadruple-entry principle: every payment must simultaneously appear as a receipt elsewhere, and to every asset must correspond a liability. This section presents the institutional structure of the model, together with the balance-sheet and transaction-flow matrices that form its backbone.

3.1 Institutional Structure and Modelling Assumptions

The model describes a small open economy—call it the United Kingdom, as in the original contribution by G&L—as composed of three institutional sectors, the domestic private sector (P), the government (GVT), and the central bank (CB), which interact with the Rest of the World (W). For analytical simplicity, the private sector consolidates households and firms. This consolidation is appropriate in a highly parsimonious SFC setting where the production block is implicit, there is no capital stock, and profits are not modelled.[2] Output is determined entirely by aggregate demand, and intra-sectoral flows such as dividends take place within the private sector and thus do not appear in the transaction matrix.

The private sector holds all domestic and foreign financial assets in the domestic economy and allocates its net financial wealth across three instruments: high-powered money (H), domestic government bills (B), and foreign-currency–denominated bills (BF). Portfolio behavior follows the Tobinesque tradition of the SFC literature, with desired asset shares depending on total wealth and on relative interest rates. Because the model intentionally excludes equities, loans, and private intermediaries, the asset menu is minimal but sufficient to reproduce the key mechanisms of open-economy SFC macro.

[2] In this way, the model resembles a New Cambridge three-sector model, with the difference that here the Central Bank is not consolidated with the public sector. Introducing firms as in the OPENSIME/OPENFLEX model does not alter the results.

The government issues one-period, domestic-currency bills, collects taxes at a fixed average rate, and pays interest on the outstanding stock of public debt. It does not issue money directly. Monetary liabilities belong exclusively to the central bank, which sets the short-term interest rate and supplies high-powered money by adjusting its holdings of government bills. This balance-sheet mechanism implies that the money supply is endogenous: the central bank accommodates the private sector's demand for liquidity, and its profits—defined as interest earned on its holdings of government securities—are transferred to the government.

The Rest of the World (RoW) is represented in a stylized but consistent manner. It supplies foreign bills, holds part of the domestic public debt, and trades goods and services with the domestic economy. Foreign income, the foreign interest rate, and all behavioral parameters linked to external agents are exogenous. The RoW affects domestic dynamics through export demand, import expenditure, interest payments on cross-border assets, and valuation effects generated by exchange-rate movements. Net foreign assets of the domestic economy (NETFA) evolve as the cumulative sum of the current account and valuation effects, while foreign holdings of domestic government debt are determined residually through the identities implied by vertical consistency.

Prices are fixed, and the nominal exchange rate is the only relative price. The nominal exchange rate depends on a simple current-account adjustment rule, which captures the essential channels through which the external constraint, wealth accumulation, and portfolio behaviour interact in more complex open-economy SFC systems.

These modelling assumptions lead to a compact but fully consistent structure. All assets and liabilities appear in sectoral balance sheets; all monetary flows between sectors are captured in the transaction matrix; and all stock variables adjust through accumulation identities that incorporate flows and valuation effects. This provides the necessary foundation for the behavioral equations introduced in Section 3.

3.2 Balance Sheet Matrix

The balance-sheet matrix in Table 1 records the financial stocks held by each sector at the end of the period. Since the model abstracts from physical capital, inventories, private loans, and equities, all wealth is financial. The private sector holds high-powered money issued by the Central Bank, domestic government bills issued by the Government, and foreign bills supplied by the RoW.

Domestic government bills appear as a liability of the government and as assets of the private sector, the central bank, and the RoW. Foreign bills are liabilities of the RoW and assets of the private sector, and are valued in domestic currency at the prevailing exchange rate. High-powered money is a liability of the central bank and an asset of the private sector. The RoW's net worth is the negative of the domestic economy's net foreign assets (i.e., the domestic economy's *net international investment position, NIIP*), ensuring a consistent treatment of external balance-sheet positions. This requires that valuation effects generated by exchange-rate movements are recorded symmetrically in domestic wealth and in the evolution of NETFA.

All rows sum to zero, reflecting the horizontal consistency condition that every financial asset corresponds to a liability. Column sums equal zero when net worth is included, revealing each sector's net position. Together, these balances constitute the minimal structure required to analyze interactions between domestic wealth, public debt, and the external position.

Table 1. Balance Sheet Matrix

Assets / Liabilities	**Private Sector**	**Government**	**Central Bank**	**Rest of World**	**Sum**
High-powered money	$+H^P$		$-H^s$		0
Domestic bills	$+B^P$	$-B^s$	$+B^{CB}$	$+B^W$	0
Foreign bills	$+BF^P xr$			$-BF^P xr$	0
Balance	$-v$	$+B^s$		$+NETFA$	0
Sum	0	0	0	0	0

Notes: Entries with + (-) denote assets (liabilities or net worth).

3.3 Transaction-flow Matrix

The transaction-flow matrix (Table 2) records all monetary flows between sectors during the period and ensures that each flow is simultaneously a source for one sector and a use for another. It includes expenditures and fiscal flows (government spending, taxes), external flows (exports, imports), interest payments, valuation changes arising from exchange-rate movements, central bank profits, sectoral balances, and the net acquisition of financial assets.

The first column represents the production block, and the vertical sum is the national income identity. The private sector collects interest income on domestic and foreign bills and capital gains, pays taxes and spends for goods and services. The government's expenditure appears as payment to the private sector, while taxes are payments from the private sector to the government. Interest on domestic bills is paid by the government to each sector holding these assets. The RoW pays interest on foreign bills and receives interest on its holdings of domestic government debt.

Central bank profits are included explicitly. The central bank earns interest on its holdings of government bills and transfers this amount in full to the government, as reflected in the model's government deficit definition.[3] This transfer is essential for the central bank column to sum to zero, ensuring full consistency.

External trade flows appear via exports and imports, which determine the trade balance and contribute to the current account, together with interest payments on external assets and liabilities. The "sectoral balances" row records the fundamental identity:

$$NAFA - PSBR - CA = 0$$

which holds identically as a consequence of the accounting structure.

[3] Throughout the paper, we retain the Godley and Lavoie (2007) notation for consistency with the SFC literature. In National Accounts, the Net Acquisition of Financial Assets (NAFA) of the private sector is typically referred to as domestic private net lending, while the Public Sector Borrowing Requirement (PSBR) corresponds to domestic public net borrowing, i.e., the Government deficit/surplus. Similarly, the current account balance (CA) may appear under different labels depending on accounting conventions.

Flows of funds record the changes in the stocks of money, domestic bills, and foreign bills. Finally, the "sum" row records the change in the net worth of each sector, ensuring that each column sums to zero.

Table 2. Transaction Flow Matrix

Flow	**Production**	**Private Sector**	**Government**	**Central Bank**	**RoW**	**Sum**
Government spending	$+g$		$-g$			0
Private expenditure	$+pe$	$-pe$				0
Taxes		$-t$	$+t$			0
Exports	$+x$				$-x$	0
Imports	$-im$				$+im$	0
GDP/income	$-y$	$+y$				0
Interest on domestic bills		$+(rB^P)$	$-(rBs)$	$+(rB^{CB})$	$+(rB^W)$	0
Interest on foreign bills		$+(r^W BF^P xr)$			$-(r^W BW^P xr)$	0
Valuation gains		$+(\Delta(xr)BF^P)$			$-(\Delta(xr)BF^P)$	0
CB profits			$+f\_cb$	$-f\_cb$	0	0
Sectoral Balances		***+nafa***	***-psbr***		***-ca***	***0***
Flow of Funds						
Δ money		$+\Delta(H^P)$		$-\Delta(Hs)$		0
Δ domestic bills		$+\Delta(B^P)$	$-\Delta(Bs)$	$+\Delta(B^{CB})$	$+\Delta(B^W)$	0
Δ foreign bills		$+\Delta(BF^P xr)$			$-\Delta(BF^P xr)$	0
Sum (change in net worth)		$\Delta(v)$	$-\Delta(Bs)$		$-\Delta(NETFA)$	***0***

Notes: Entries with + (-) denote receipts (uses) of funds.

A final but important note: a distinctive advantage of the one-country structure presented above is that it lends itself naturally to empirical calibration using standard national accounts and financial accounts data. Unlike two-country SFC models—which require bilateral information on cross-border asset holdings and flows that is largely unavailable in official statistics—OPENSIMPLEST relies exclusively on aggregate positions vis-à-vis the RoW. This mirrors the structure of the System of National Accounts and the Financial Accounts of Institutional Sectors, where external assets and liabilities are recorded only at the aggregate level. As a result, all stocks and flows appearing in the model—sectoral net lending, public debt, money holdings, foreign assets, interest flows, and the current account—can be mapped directly onto observed data without imposing arbitrary bilateral decompositions.

4. THE MODEL: BEHAVIORAL EQUATIONS AND STEADY-STATE STRUCTURE

This section presents the equations of the model. The behavioral structure is deliberately parsimonious. Each block—i.e., income, consumption, trade, portfolio allocation, and exchange-rate adjustment—is specified with the minimum number of parameters needed to reproduce the essential mechanisms of open-economy, two-country SFC dynamics. Many of the complex interactions of the two-country models are handled through the accounting system rather than through behavioral elaboration. The result is a compact but internally consistent macrofinancial structure built on post-Keynesian theory, in which the adjustment of stocks and flows is driven primarily by aggregate demand, and the current account dynamic and private sector portfolio decisions drive the exchange rate. There is no tendency toward full-employment, and money is endogenous. We are in a "*pure exchange rate regime*," meaning that the Central Bank does not intervene to stabilize the price of the currency on international markets. Neither foreign nor gold reserves are modelled.

4.1 Income and Wealth

The first block of equations relates to British income and wealth.[4] The private sector receives labour income (implicitly represented by *y*), interest income on its (opening, or *end-of-previous period*) holdings of domestic government bills, interest income on foreign-currency bills,[5] and pays taxes at a fixed average rate, θ. Regular disposable income in the domestic economy is therefore as in eq (1). Because the value of foreign assets varies with the nominal exchange rate, Haig–Simons disposable income, equation (2), incorporates valuation effects (i.e., capital gains). Private wealth accumulates according to the canonical SFC identity, as saving out of HS disposable income, equation (3, with *pe* standing for private expenditures). Taxes depend on an average tax rate and on total income including interest receipts, equation (4).

[4] To make the notation easy, variables in capital letters refer to stocks, and lowercase variables to flows or coefficients. Superscripts denote the sectors holding the stock (P for private, W for foreign) or its supply (s).

[5] Notice that that interest on foreign holdings is computed, as usual, on the opening stock and the respective interest rate at t-1, but is converted to British pounds at the *current* exchange rate.

$$yd_r = y + [(r_{-1}B^P_{-1}) + (r^W_{-1}BW^P_{-1}xr)] - t \quad (1)$$

$$yd_{hs} = yd_r + \Delta(xr) \cdot BW^P_{-1} \quad (2)$$

$$v = v_{-1} + yd_{hs} - pe \quad (3)$$

$$t = \theta[y + (r_{-1}B_{-1}) + (r^W_{-1}BW^P_{-1}xr)] \quad (4)$$

Output is determined by demand in the first column of the TFM, as the sum of private expenditures (*pe*), government spending (*g*) and export (*x*), and net of import (*m*), equation (5). As in most SFC models in the literature, private expenditures depend on the Haig-Simons disposable income and accumulated wealth, equation (6). Finally, the private sector's net acquisition of financial assets (*nafa*, eq.7) is defined by the fundamental identity. Notice that valuation effects arising from exchange-rate movements on existing foreign asset stocks are excluded from *nafa* by construction and instead enter disposable income and the accumulation of wealth, preserving the distinction between transactions and revaluations. Together, these relations define the domestic demand block. They preserve the core SFC principle that private expenditure is driven jointly by current income and accumulated wealth, while ensuring stock-flow consistency through valuation effects.

$$y = pe + g + x - m \quad (5)$$

$$pe = \alpha_1 yd_{hs} + \alpha_2 v_{-1} \quad (6)$$

$$nafa = psbr + ca \quad (7)$$

4.2 External Sector: Trade, Current Account, and Net Foreign Assets

Whereas OPENFLEX uses a much more complex trade structures—modelling domestic and foreign prices—OPENSIMPLEST adopts a minimal structure where domestic prices are

assumed fixed in domestic currency, as in the Mundell-Fleming model (or Carnevali's OPENSIME).

The structure of the external sector follows the textbook open-economy specification: exports depend on the exchange rate and foreign income, equation (8); imports depend on domestic income and the exchange rate, equation (9).[6] Whenever foreign income grows, a portion is spent in imports, i.e., UK's export. Given that the exchange rate is quoted in pound-per-dollar, when the pound appreciates/depreciates, British goods become more/less expensive for RoW consumers, hindering/boosting UK's export. Same goes for UK imports from RoW: when the pound is strong or their incomes rise, British consumers import more. The exchange rate enters the import and export equations with a time lag to capture the delayed response of trade flows to changes in relative prices. In practice, import and export contracts are often agreed upon in advance, and quantities adjust only gradually following exchange-rate movements. This intertemporal structure of international trade underlies the J-curve mechanism, whereby a currency depreciation may initially worsen the trade balance before improving it as quantities respond over time.

The trade balance follows, equation (10).

$$x = \varepsilon_0 + \varepsilon_1 xr_{-1} + \varepsilon_2 y^W \quad (8)$$

$$m = \mu_0 - \mu_1 xr_{-1} + \mu_2 y \quad (9)$$

$$tb_t = x_t - m_t \quad (10)$$

The current account is determined by the trade balance and cross-border interest flows, equation (11). Following Carnevali's OPENSIME specification, interest receipts on foreign bills are computed on the opening stock at the current exchange rate, while interest payments on foreign holdings of domestic bills are computed on the opening stock. Net foreign assets accumulate through the current account, while exchange-rate movements generate valuation effects that may

[6] Bold variables are in natural logarithm.

amplify or offset flow-based adjustments, equation (12). Foreign holdings of domestic assets arise as a residual from the BSM, ensuring vertical consistency, equation (13).

$$ca = tb + [(r^W_{-1} BW^P_{-1} xr) - (r_{-1} B^W_{-1})] \quad (11)$$

$$NETFA = NETFA_{-1} + ca + \Delta(xr) BW^P_{-1} \quad (12)$$

$$B^W = BF^P xr - NETFA \quad (13)$$

4.3 Portfolio Allocation and Money Demand

As customary in the SFC literature, portfolio allocation follows a Tobinesque approach (Tobin 1969). In this simple setting, desired holdings of domestic- and foreign-currency government bills are a function of the respective rates of return (i.e., their interest rates, eqs. 14–15). Demand for high-powered money, equation (16) is determined residually from the balance sheet, i.e., it closes the column for the private sector. This closure for the private sector is common in the literature, including empirical SFC models. It implies that households first allocate their wealth across interest-bearing financial assets and then hold the residual in money.

$$B^P = v(\lambda_{10} + \lambda_{11} r - \lambda_{12} r^W) \quad (14)$$

$$BW^P = \frac{v}{xr}(\lambda_{20} - \lambda_{21} r + \lambda_{22} r^W) \quad (15)$$

$$H^P = v - B^P - BW^P xr \quad (16)$$

Equations (14)–(16) share the common features of asset demand functions in the SFC literature. First, domestic bill demand, equation (14), is expressed directly in monetary terms, as a function of nominal wealth. Second, in the demand for foreign assets, equation (15), wealth is divided by the exchange rate, reflecting the fact that households choose a share of wealth in domestic currency to be invested in foreign bills, while BW^P itself is measured in foreign-currency units. Third, the parameters related to interest rates in the asset demand functions (the $\lambda x1$ and $\lambda x2$) ensure Godley's horizontal consistency requirement, warranting that demand for assets respond

to changes in relative rate of returns. In particular, horizontal consistency implies that the sensitivity of domestic bill demand to the foreign interest rate equals the sensitivity of foreign bill demand to the domestic interest rate, i.e. $\lambda_{12} = \lambda_{21}$, so that a change in one interest rate induces a symmetric portfolio reallocation across assets. Finally, Tobin's vertical constraint is respected as well, as one asset, in this case the demand for money, is determined residually. Recall for example that foreign holdings of domestic government debt in eq. (13) follows the same logic: this residual determination removes the need for a full behavioral specification for the RoW and drastically reduces model dimensionality.

4.4 Government, Central Bank, and Endogenous Money

In this model, as in all other open economy SFC models in the spirit of G&L, the Central Bank is assumed to be "the residual purchaser of bills. Any outstanding bill not purchased by households of both [countries] will be purchased by the central bank" and that this "allow us to assume that the central bank set the rate of interest on bills of its choice" (Godley and Lavoie 2007, 176). This seems highly plausible, especially after a decade in which central banks have been influencing the entire yield curve via quantitative easing and other balance sheet policies.

The central bank earns interest on its holdings of government bills and transfers profits to the government, equation (17), while its holdings of domestic bills is determined residually, equation (18). High-powered money is a liability of the central bank, determined entirely by its bill holdings, equation (19), as in the classic "horizontalist" money supply mechanism. Finally, the public sector is intentionally kept simple. The Government issuance of domestic bills follows directly from the public-sector borrowing requirement, given by the difference between expenditures (on goods and services and interest payments on public debt) and revenues (taxes and seignorage), in equations (20) and (21).

$$f^{CB} = r_{-1} B^{CB}_{-1} \tag{17}$$

$$B^{CB} = B^{s} - B^{P} - B^{W} \tag{18}$$

$$H^{s} = B^{CB} \tag{19}$$

$$psbr = g + r_{-1}B^{s}_{-1} - t - f^{CB} \quad (20)$$

$$B^{s} = B^{s}_{-1} + psbr \quad (21)$$

4.5 Exchange-Rate Adjustment

The three models considered in this paper adopt distinct exchange-rate closures, reflecting different assumptions about how external imbalances are resolved.

In OPENSIMPLEST, the nominal exchange rate follows a reduced form adjustment rule based on lagged current account imbalances, equation (22). Under this closure, persistent current-account deficits generate depreciation pressures, while surpluses lead to appreciation. The exchange rate is therefore treated as a state variable that adjusts gradually in response to accumulated flow imbalances, with no requirement that financial markets clear within the period.

$$xr = xr_{-1} + \phi(-ca_{-1}) \quad (22)$$

In OPENSIME, the exchange rate is instead determined directly from the balance-of-payments identity. The UK exchange rate (expressed as the inverse of the US rate) is obtained by imposing contemporaneous external balance, equation (35). In this case, the exchange rate adjusts within the period to ensure that the balance of payments is satisfied, given trade flows, interest payments, and changes in cross-border asset positions. Although OPENSIME abandons uncovered interest parity and exchange-rate expectations, it retains a financial-account–based determination of the exchange rate, grounded in contemporaneous external clearing.

$$xr^{\$} = \frac{(-x+m+r_{-1}B_{\$s-1}-\Delta B_{\$s})}{(r_{-1}B^{\$}_{£s-1}-\Delta B^{\$}_{£s})}, \quad xr = \frac{1}{xr^{\$}}$$

Finally, in OPENFLEX, the exchange rate is determined as an asset-market clearing price. The UK exchange rate satisfies:

$$xr^{\$} = \frac{B^{\$}_{\pounds s}}{B^{\$}_{\pounds d}}, \qquad xr = \frac{1}{xr^{\$}}$$

so that the exchange rate adjusts instantaneously to equilibrate the supply and demand for foreign bills. This closure embeds the exchange rate firmly within the portfolio block: shifts in asset demand, including changes in liquidity preference or expected returns, generate immediate exchange-rate movements.

These three closures imply qualitatively different roles for the exchange rate. In OPENFLEX, the exchange rate is an asset price that clears financial markets within the period. In OPENSIME, it is a residual price that enforces balance-of-payments consistency contemporaneously. In OPENSIMPLEST, by contrast, the exchange rate does not clear either asset markets or the balance of payments within the period, but adjusts gradually in response to past external imbalances. This distinction is central for understanding the short-run dynamics generated by some financial shocks, which are examined in Section 5.

4.6 A Simple Model Comparison

Before digging into simulations, it is useful to check again how OPENSIMPLEST compares with its main predecessors: G&L's OPENFLEX and Carnevali's OPENSIME. Figures 1A–1C represent the three models visually, using the dependency graphs provided by Eviews. These shows the relationships among endogenous variables, along with the dynamic structure of the model.

First, since to any variable/node in the figure corresponds an equation or identity, the differences in dimensionality clearly emerge. The second difference that stems from a quick visualization is that the simplifications made do not affect the dynamic block: what disappears between OPENSIMPLEST and OPENFLEX are, mostly, identities and contemporaneous relations (black arrows). Third, notice that most of the south-west corner in Figure 1C represents the complex

trade block of the G&L model, where also prices are determined. This whole section is absent in both OPENSIMPLEST and OPENSIME but, as I will show shortly, this does not affect their ability to preserve its core results. Finally, the south-east corner of Figure 1B in OPENSIME, representing the US economy, is absent in OPENSIMPLEST, which treats the RoW as an aggregate.

The differences between the three models are further explored in Table 1, which reports all the equations of model OPENSIMPLEST and its counterparts, and reports the main missing mechanisms.

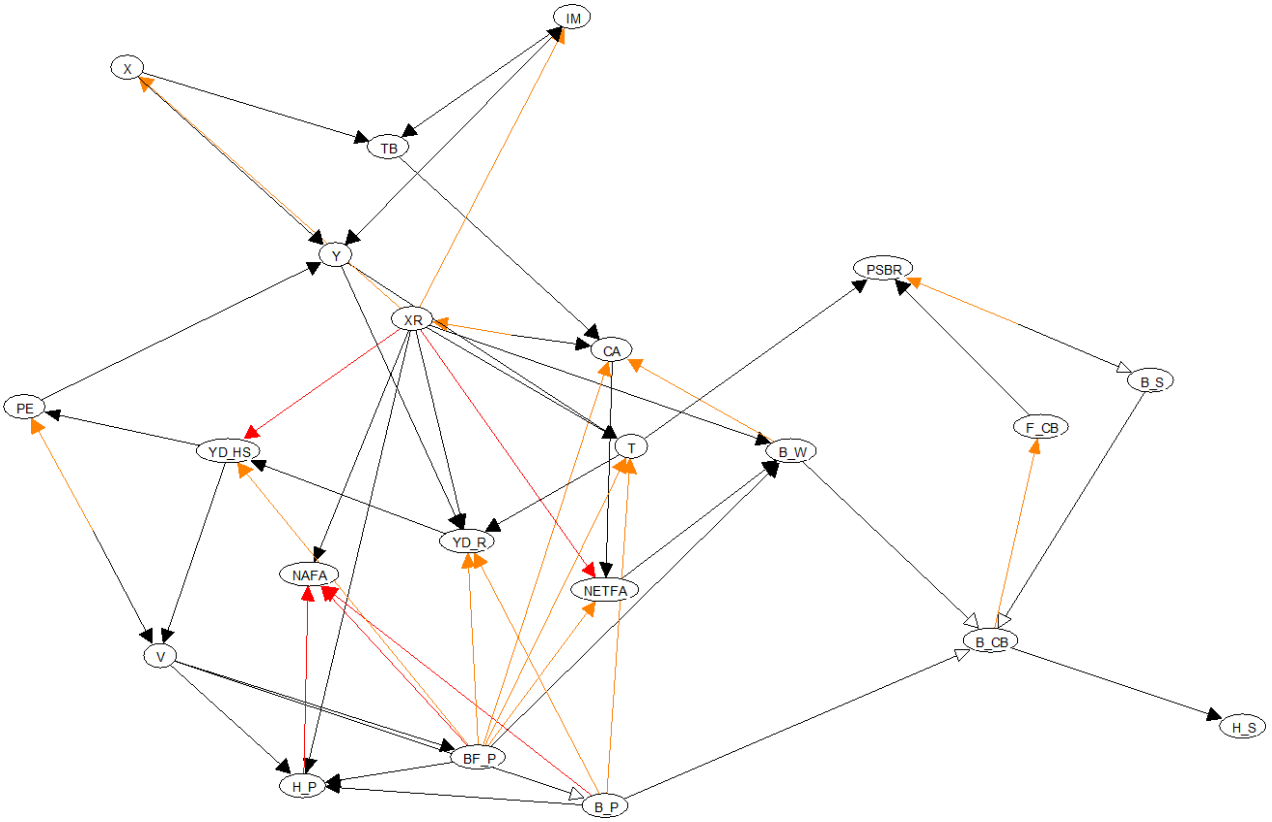
When inspecting model equations attentively, the first difference between the benchmark model of G&L and the simplified models is the absence, in both OPENSIMPLEST and OPENSIME, of (a) the price block in equations (8) and (9); (b) the expectations on exchange rate movements in the asset demand functions in equations (13)–(16); and (c) the simpler balance sheet structure of the Central Bank, which in OPENFLEX also holds foreign bonds and foreign reserves, which appear in equations (11), (17) and (18).

Second, OPENFLEX uses a different hidden equation (UK central bank acting as a lender of last resort), i.e., the equation that is already implied from the accounting structure and is thus dropped from the model to avoid overdetermination, whereas both OPENSIMPLEST and OPENSIME ensure equality between money demand and money supply through residual bill-market clearing by the central bank. As already discussed by Carnevali, this has little relevance, insofar as in both our models this closure also assures that the central bank acts as a lender of last resort. This is done explicitly in eq.18, where the central bank holding of domestic bills is determined residually from the BSM row, meaning that the central bank clears the market for domestic bills.

Finally, the main difference between OPENSIMPLEST and the more complex two-country models lies in the exchange rate equation, equation (22). The key modelling implication of the OPENSIMPLEST exchange rate closure is that its dynamics are subordinated to current account adjustment, with valuation effects influencing the pace and direction of external adjustment only

indirectly. In contrast with OPENFLEX—where the exchange rate is an asset-market relative price pinned down by portfolio equilibrium with exchange-rate expectations—equation (22) implies that the exchange rate does not react autonomously to shifts in liquidity preference or interest differentials unless these shocks translate into a current-account imbalance. This moves the model closer to the "Harrodian" tradition, in which the exchange rate keeps moving as long as the current account has not converged to its zero condition.

Figure 1A. OPENSIMPLEST. Dependency Graph



Legend: Orange = lags only; red = lags + contemporneous; black = contemporaneous only.

Table 3. Equations of Model OPENSIMPLEST, OPENSIME and OPENFLEX

Eq	Variable	OPENSIMPLEST	OPENSIME	OPENFLEX
1	Disp. Income (regular)	$yd_r = y + [(r_{-1}B^P_{-1}) + (r^W_{-1}BW^P_{-1}xr)] - t$	$yd_r = y + \left[(r_{-1}B_{£s-1}) + \left(r^{\$}_{-1}B^{\$}_{£s-1}xr^{\$}\right)\right] - t$	$yd_r = y + \left[(r_{-1}B_{£s-1}) + \left(r^{\$}_{-1}B^{\$}_{£s-1}xr^{\$}\right)\right] - t$
2	Disp. Income (Haig-Simmons)	$yd_{hs} = yd_r + \Delta(xr) \cdot BW^P_{-1}$	$yd_{hs} = yd_r + \Delta\left(xr^{\$}\right) \cdot B^{\$}_{£s-1}$	$yd_{hs} = yd_r + \Delta\left(xr^{\$}\right) \cdot B^{\$}_{£s-1}$
3	Private wealth	$v = v_{-1} + yd_{hs} - pe$	$\Delta v = yd_{hs} - c$	$\Delta v = yd_{hs} - c$
4	Taxes	$t = \theta[y + (r_{-1}B_{-1}) + (r^W_{-1}BW^P_{-1}xr)]$	$t = \theta\left[y + (r_{-1}B_{£s-1}) + \left(r^{\$}_{-1}B^{\$}_{£s-1}xr^{\$}\right)\right]$	$t = \theta\left[y + (r_{-1}B_{£s-1}) + \left(r^{\$}_{-1}B^{\$}_{£s-1}xr^{\$}\right)\right]$
5	Income	$y = pe + g + x - m$	$y = c + g + x - m$	$y = c + g + x - m$
6	Consumption/private exp.	$pe = \alpha_1 yd_{hs} + \alpha_2 v_{-1}$	$c = \alpha_1 yd_{hs} + \alpha_2 v_{-1}$	$c = \alpha_1 yd_{hs} + \alpha_2 v_{-1}$
7	NAFA	$nafa = psbr + ca$	$nafa = psbr + ca$	$nafa = psbr + ca$
8	Export	$x = \varepsilon_0 + \varepsilon_1 xr_{-1} + \varepsilon_2 y^W$	$x = \varepsilon_0 + \varepsilon_1\, xr_{-1} + \varepsilon_2 y^{\$}$	$x = \varepsilon_0 + \varepsilon_1\left(p^{\$}_{m-1} - p^{\$}_{y-1}\right) + \varepsilon_2 y^{\$}$
9	Import	$m = \mu_0 - \mu_1 xr_{-1} + \mu_2 y$	$m = \mu_0 - \mu_1\, xr_{-1} + \mu_2 y$	$m = \mu_0 - \mu_1\left(p_{m-1} - p_{y-1}\right) + \mu_2 y$
10	Trade Balance	$tb = x - m$	$tb = x - m$	$tb = x - m$
11	Current Account Balance	$ca = tb + r^W_{-1}BF^P_{-1}xr - r_{-1}B^W_{-1}$	$ca = x - m + r^{\$}_{-1}B^{\$}_{£s-1}xr^{\$} - r_{-1}B_{\$s-1}$	$ca = x - m + r^{\$}_{-1}B^{\$}_{£s-1}xr^{\$} - r_{-1}B_{\$s-1} + r^{\$}_{-1}B^{\$}_{cb£s-1}xr^{\$}$
12	External position	$NETFA = NETFA_{-1} + CA + \Delta(xr)BW^P_{-1}$	$bp = ca + \Delta B_{\$s} - \Delta B_{£s}xr^{\$}$	$bp = ca + \Delta B_{\$s} - \Delta B_{£s}xr^{\$}$
13	Foreign demand for bills	$B^W = BF^P xr - NETFA$	$B^{\$}_{\$d} = v^{\$}\left(\lambda_{50} + \lambda_{51}r^{\$} - \lambda_{52}r\right)$	$B^{\$}_{\$d} = v^{\$}\left(\lambda_{40} + \lambda_{41}r^{\$} - \lambda_{42}(r + dxr_e)\right)$
14	Demand for bills	$B^P = v(\lambda 10 + \lambda 11r - \lambda 12r^W)$	$B_{£d} = v\left(\lambda_{10} + \lambda_{11}r - \lambda_{12}r^{\$}\right)$	$B_{£d} = v\left(\lambda_{10} + \lambda_{11}r - \lambda_{12}\left(r^{\$} + dxr^{\$}_e\right)\right)$
15	Demand for foreign assets	$BW^P = \frac{v}{xr}(\lambda 20 - \lambda 21r + \lambda 22r^W)$	$B^{\$}_{£d} = v\left(\lambda_{20} - \lambda_{21}r + \lambda_{22}r^{\$}\right)$	$B^{\$}_{£d} = v\left(\lambda_{20} - \lambda_{21}r + \lambda_{22}\left(r^{\$} + dxr^{\$}_e\right)\right)$

16	Demand for money	$H^P = v - B^P - BF^P xr$	$H_h = v - B_{£s} - B^{\$}_{£s} xr^{\$}$	$H_d = v\left(\lambda_{30} - \lambda_{31} r - \lambda_{32}\left(r^{\$} + dxr^{\$}_e\right)\right)$
17	CB profits	$f^{CB} = r_{-1} B^{CB}_{-1}$	$f_{cb} = r_{-1} B_{cb£s-1}$	$f_{cb} = r_{-1} B_{cb£s-1} + r_{-1} B^{\$}_{cb£s-1} xr^{\$}$
18	CB holding of bills	$B^{CB} = B^s - B^P - B^W$	$B_{cb£s} = B_s - B_{£s} - B_{\$s}$	$\Delta B_{cb£d} = \Delta H_s - \Delta B^{\$}_{cb£s} xr^{\$} - \Delta or \cdot p_g$
19	Money supply	$H^s = B^{CB}$	$H_s = B_{cb£s}$	$H_s = H_h$
20	Gov. Deficit (PSBR)	$psbr = g + r_{-1} B^s_{-1} - t - f^{CB}$	$psbr = g + r_{-1} B_{s-1} - t - f_{cb}$	$psbr = g + r_{-1} B_{s-1} - t - f_{cb}$
21	Supply of bills	$B^s = B^s_{-1} + psbr$	$\Delta B_s = g + r_{-1} B_{£s-1} - t - f_{cb}$	$\Delta B_s = g + r_{-1} B_{£s-1} - t - f_{cb}$
22	Exchange rate	$xr = xr_{-1} + \phi(-ca_{-1})$	$xr^{\$} = (-x + m + r_{-1} B_{\$s-1} - \Delta B_{\$s}) / (r_{-1} B^{\$}_{£s-1} - \Delta B^{\$}_{£s})$	$xr = \frac{B^{\$}_{£s}}{B^{\$}_{£d}}$
	Hidden/redundant equation	$H^s = H^P$	$H_d = H_s$	$B_{cb£s} = B_s - B_{£s} - B_{\$s}$
	Endogenous	22	48	86
	Exogenous	20	28	44
	Main missing mechanisms vs OPENFLEX	Same as OPENSIME, plus - RoW domestic transactions and asset demand - Asset-market clearing in *xr*	- Import/export prices - Expectations on xr movements	

Notes: Assets/liabilities in capital letter, flows and parameters in lowercase. For OPENSIME and OPENFLEX, the superscript $ denotes variables related to US economy.

5. SIMULATIONS

There are several reasons to appreciate the model OPENSIMPLEST. The first is the same put forth by Carnevali (2021) with respect to the original OPENFLEX. As the present model replicates all major results of its predecessors with only half the equations, it seems again a successful application of the Occam's Razor. Its *parsimony* makes it a good candidate to become a benchmark toy model, suitable for undergraduate teaching. The second is that, differently from the two-country models, OPENSIMPLEST can be directly calibrated on National Accounts data. Finally, the model can be easily extended to tailor it to the researcher's needs, by increasing the number of sectors, transactions, and financial assets.

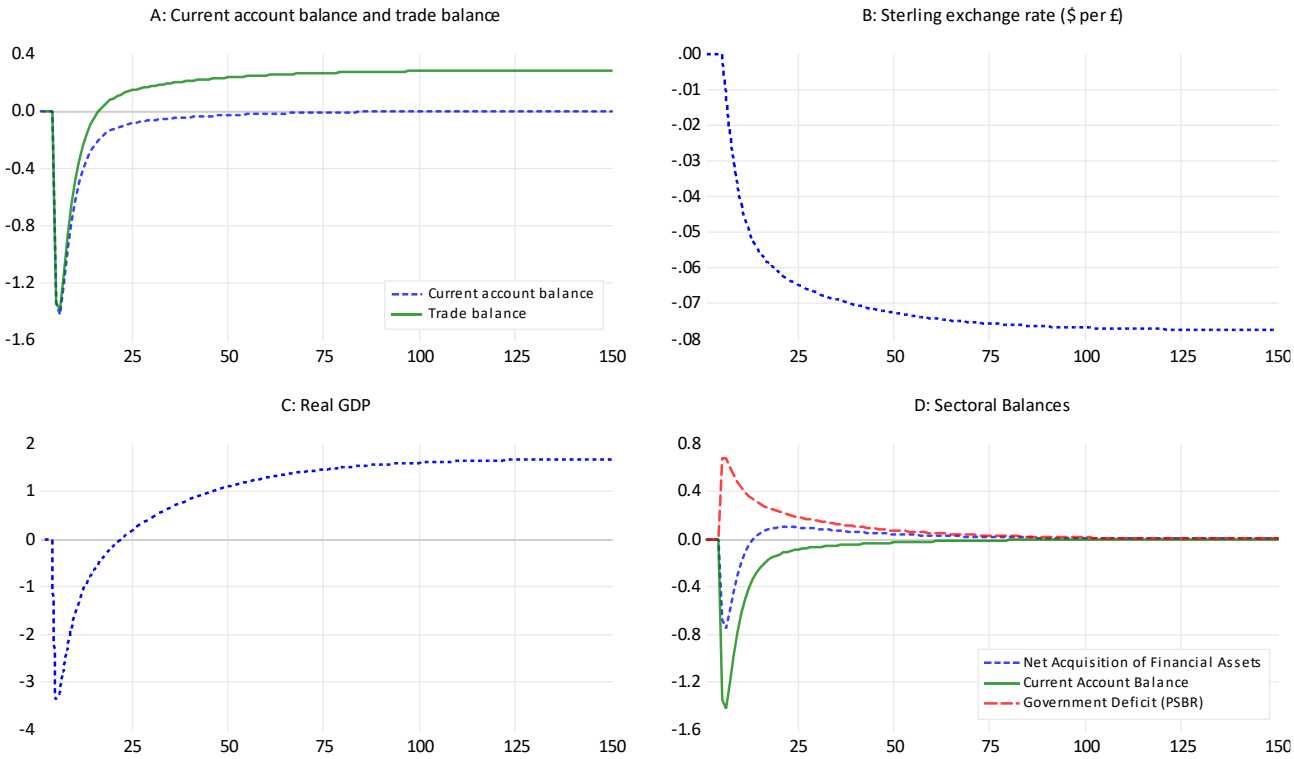
This section replicates several shocks appearing in G&L (2007, chapter 12) and Carnevali (2021). It will be shown that when the OPENSIMPLEST model is shocked, the behavior of its main variables in the medium run is qualitatively the same as the behavior of the equivalent variables after an identical shock in the OPENFLEX/OPENSIME models. The figures for OPENFLEX/OPENSIME responses to shocks are reported in Appendix 1.

5.1 A Step-fall in Exports

The first simulation exercise replicates both G&L book and Carnevali's article. In this experiment, the coefficient ε_0—which "can be considered a "residual indicator" of the international competitiveness of British productive system, capturing elements such as the reputation of its brands, the quality of its products, etc.)"—drops from -2.1 to -2.2.

The behavior is similar across the three models, though OPENSIMPLEST and OPENSIME stabilize earlier, due to the much more complex trade block of OPENFLEX, where import and export prices also have to adjust. GDP drops in the short run due to the deterioration of the current account (panels A and C), but rebounds after the depreciation of the pound (panel B), reaching a higher steady-state value than in the baseline. The government deficit increases, as the current account balance turns negative, reducing the private sector NAFA (panel D). As the CAB recovers, the private sector starts to accumulate assets again, until the model converges to a new steady state, where balances are stable (and nil).

Figure 2: Effect of a Step-Fall in UK Propensity to Export on Selected Variables



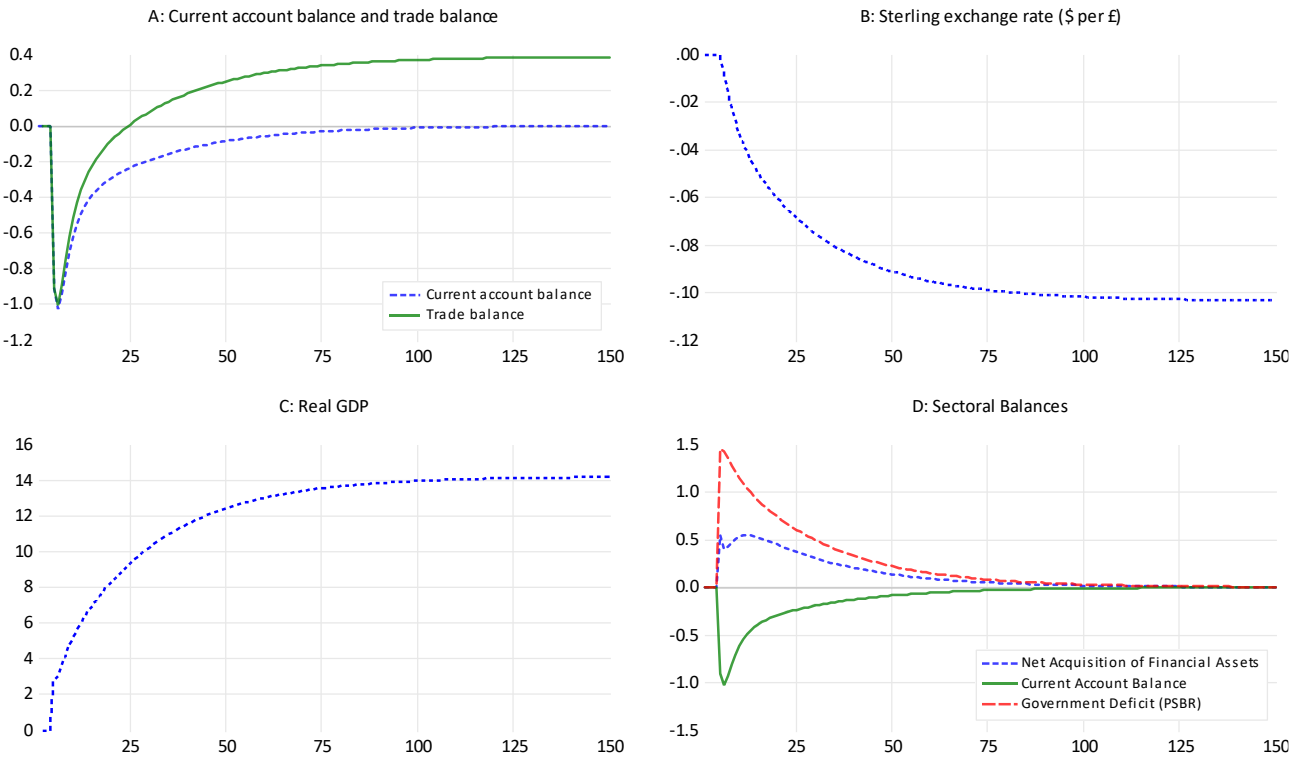
5.2 Expansionary Fiscal policy

An interesting feature of OPENFLEX was that it showed the existence of Keynesian effects of fiscal policy in an open economy framework with flexible exchange rates (Godley and Lavoie 2005). This contrasts with mainstream models, in which fiscal policy is typically predicted to be weak under floating exchange rates, as the expansionary effects of government spending are partly or fully offset by higher interest rates and the associated appreciation of the currency.

In this experiment, the real government expenditure in UK is permanently increased by two units. Inspection of Figure 2 and its counterparts in Appendix 1 shows again that the three models behave almost identically. In all cases, fiscal policy boosts the UK GDP. Most importantly, the mainstream concern about the possible appreciation of the currency is shown to be unfounded. Indeed, not only does public expenditure contribute to the increase in aggregate demand, but the exchange rate dynamics *reinforce* the process. As the current account

deteriorates, the British pound depreciates. A weaker pound slows imports (which are increasing because of the rise in income due to the fiscal stimulus) and improves exports.

Figure 3: Effect of an Increase in UK Government Spending



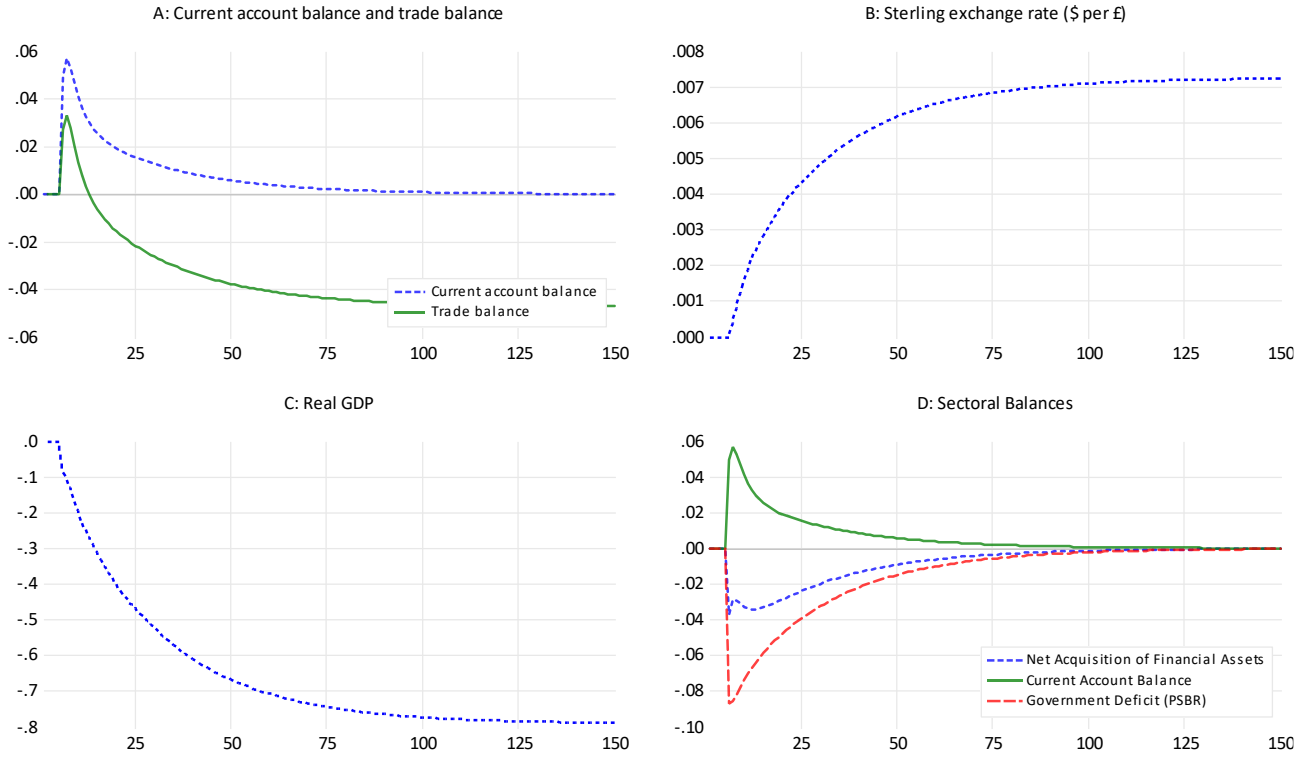
5.3 Expansionary (?) Monetary Policy

In a third experiment, we check what happens if the central bank tries to stimulate the economy by reducing the interest rate on domestic government bills.

Following the reduction in the domestic interest rate, the exchange rate appreciates and then converges smoothly to a new level. At first sight, this may appear counterintuitive, as in multi-country SFC models such as OPENFLEX and OPENSIME the impact response is typically a depreciation associated with an immediate portfolio reallocation towards foreign assets. In OPENSIMPLEST, however, the exchange rate is not determined by within-period asset-market clearing or by contemporaneous balance-of-payments closures. Instead, it follows a reduced-form current-account adjustment rule based on lagged imbalances, equation (22).

On impact, the dominant channel operates through the income component of the current account: a lower domestic interest rate reduces interest payments on domestically issued bills held by the RoW, thereby improving the current account. Given the exchange-rate closure, this improvement translates into an appreciation, which then stabilizes as the external account converges. Overall, the policy is contractionary in this parsimonious setup: the appreciation weakens net exports, and the associated changes in sectoral balances imply a deterioration in the private sector's financial position.

Figure 4: Effect of a Reduction in UK Interest Rate of 0.1%



5.4 A Change in Liquidity Preference

The final experiment considers a change in liquidity preference, implemented as a portfolio reallocation between domestic and foreign government bills. The exercise closely follows the benchmark simulations proposed in G&L (2007, ch. 12) and subsequently adopted in Carnevali

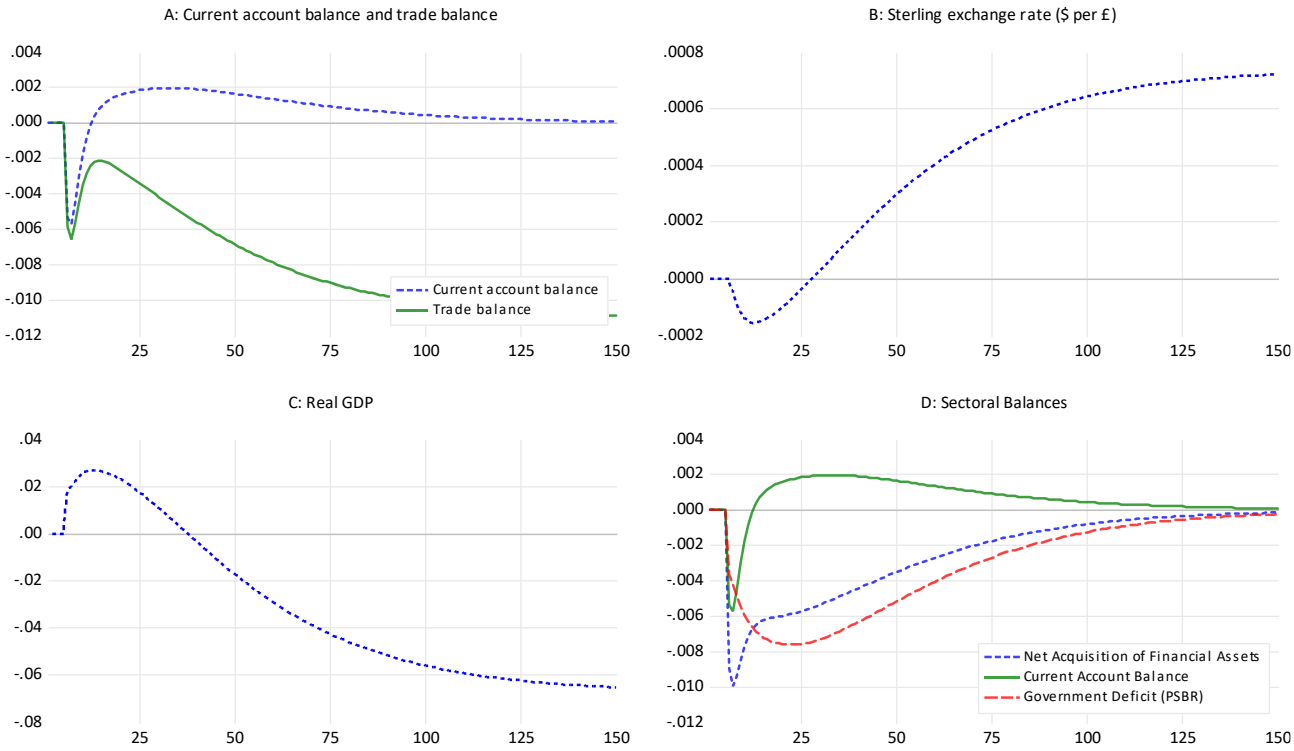
(2021), where an increase in the desirability of US bills is modelled by raising the corresponding portfolio parameters in both countries' asset-demand equations.

In OPENSIMPLEST, the experiment is implemented in a parsimonious one-country setting. From period $t = 5$ onwards, the baseline preference parameter for domestic bills is reduced while the preference parameter for foreign bills is increased ($\lambda_{10} \downarrow, \lambda_{20} \uparrow$). This *specular* change ensures that the shock represents a genuine substitution between interest-bearing assets—domestic versus foreign bills—rather than a shift out of money holdings, which are determined residually. In this respect, the experiment mirrors the logic of the two-country models, where portfolio shares add up and money acts as the residual asset.

The main difference relative to G&L (2007) and Carnevali (2021) concerns the scope of the parameter change. In multi-country models, the increase in the desirability of US bills is implemented symmetrically, by adjusting the relevant portfolio parameters in both the domestic and foreign private sectors. In OPENSIMPLEST, by construction, the shock is confined to the domestic private sector, as the rest of the world is not modelled explicitly. Consequently, the counterpart of the higher demand for foreign bills by domestic households is absorbed through balance-sheet consistency, via the residual determination of foreign holdings of domestic government debt and, in turn, central bank bill holdings.

Turning to the results, the portfolio shift initially generates a depreciation of the domestic currency, reflecting the reallocation of private wealth toward foreign assets and the associated pressure on the external account. As the simulation unfolds, however, exchange-rate dynamics are increasingly shaped by the current-account adjustment mechanism. Changes in net interest payments and valuation effects gradually improve the current account balance, leading to a subsequent appreciation of the currency and a smooth convergence towards a new steady state. Hence, as in the benchmark SFC models, the liquidity-preference shock gives rise to a two-phase adjustment process: an initial exchange-rate response driven by portfolio reallocation, followed by a rebalancing of the current account and external position consistent with stock-flow equilibrium.

Figure 5: Effect of a Change in UK Private Sector Preference for Foreign Bills



6. CONCLUSIONS

The purpose of this article has been both analytical and pedagogical. The starting point is a well-known tension in stock-flow consistent open-economy modelling. On the one hand, multi-country models are appealing because they explicitly represent international financial linkages. On the other hand, they are often incomplete (whenever a residual RoW column is absent in the accounting structure), highly complex, and difficult to confront with data. In practice, most two-country SFC models do not feature a fully specified RoW, but rather a mirror economy whose behavior is only partially modelled. At the same time, their dimensionality makes them hard to use as analytical "toy models": even trained readers, let alone students or policymakers, can easily lose track of the mechanisms at work when faced with dozens of equations. Finally, empirical validation is problematic, since national financial accounts do not provide bilateral information on asset holdings, but only aggregate positions vis-à-vis the rest of the world.

Against this background, the article has proposed a one-country, open-economy SFC model as a complementary modelling strategy. By explicitly modelling an aggregate rest of the world as a residual sector, the framework is complete from an accounting point of view. At the same time, the model remains intentionally small and transparent, in the spirit of a "toy model" in the sense of Blanchard: a device designed to clarify mechanisms rather than to replicate reality in all its details, useful for teaching at undergraduate level and pitching to policymakers. Finally, the one-country structure makes it possible to calibrate the model using standard national accounts and financial accounts data, which are consistently available for a wide range of countries and report aggregate positions vis-à-vis the rest of the world.

The model preserves the core building blocks shared by more articulated open-economy SFC systems. Income generation, portfolio allocation, endogenous money, current-account dynamics, and valuation effects are all embedded in a coherent stock–flow consistent structure. The equations governing real activity, external trade, wealth accumulation, and portfolio choice closely mirror those used in larger models. The main difference lies in the treatment of the exchange rate. In OPENSIMPLEST, the exchange rate is not determined by contemporaneous asset-market equilibrium or balance-of-payments clearing, but instead follows a reduced-form adjustment rule driven by lagged current-account imbalances. This modelling choice deliberately shifts attention away from short-run financial arbitrage and toward the cumulative interaction between flows, stocks, and valuation effects.

The simulation exercises highlight the implications of this modelling choice. In the first three scenarios—covering fiscal disturbances, changes in external demand, and portfolio shifts driven by liquidity preference—the dynamic responses of output, trade, sectoral balances, and the exchange rate closely mirror those obtained in more complex open-economy SFC models. In particular, the liquidity-preference experiment reproduces the standard adjustment pattern emphasized in the benchmark literature: an initial exchange-rate depreciation driven by portfolio reallocation toward foreign assets, followed by a medium-run appreciation as current-account dynamics and valuation effects rebalance the external position.

Differences across modelling strategies emerge only in the experiment involving a reduction in the domestic interest rate. In this case, OPENSIMPLEST delivers an initial appreciation of the exchange rate, reflecting the dominance of the income component of the current account and the lagged adjustment rule governing the exchange rate. This divergence is confined to the short run and reflects the different role assigned to the exchange rate in alternative closures, rather than deeper structural differences in portfolio behavior or external adjustment mechanisms.

The simplicity of the framework also points to several natural extensions. Future work may enrich the model by introducing additional sectors, such as firms or banks, or by expanding the menu of financial assets to include loans, equities, or government debt issued in foreign currency, as is common in many emerging and developing economies. A second line of research concerns empirical implementation. Because OPENSIMPLEST relies only on aggregate external positions and flows, it lends itself to calibration using comparable national accounts and financial accounts data across countries, opening the way to systematic cross-country applications within a fully stock–flow consistent setting.

Overall, the contribution of the article is not to replace more elaborate open-economy SFC models, but to complement them. By showing how many of their key results can be reproduced within a small, complete, and empirically tractable framework, OPENSIMPLEST helps clarify the essential mechanisms of open-economy dynamics and provides a useful benchmark for both teaching and applied research.

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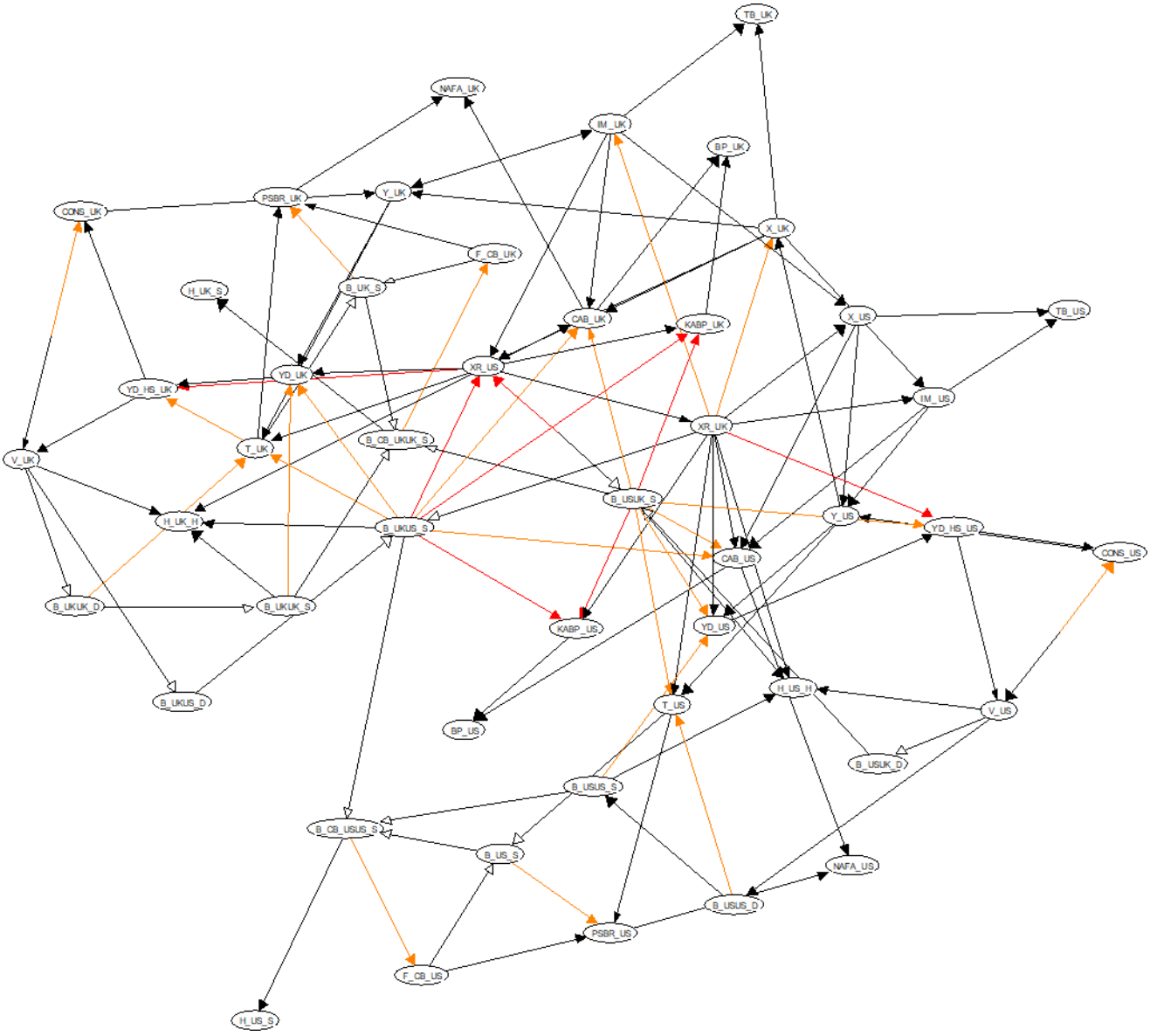
APPENDIX 1. COMPARING MODELS

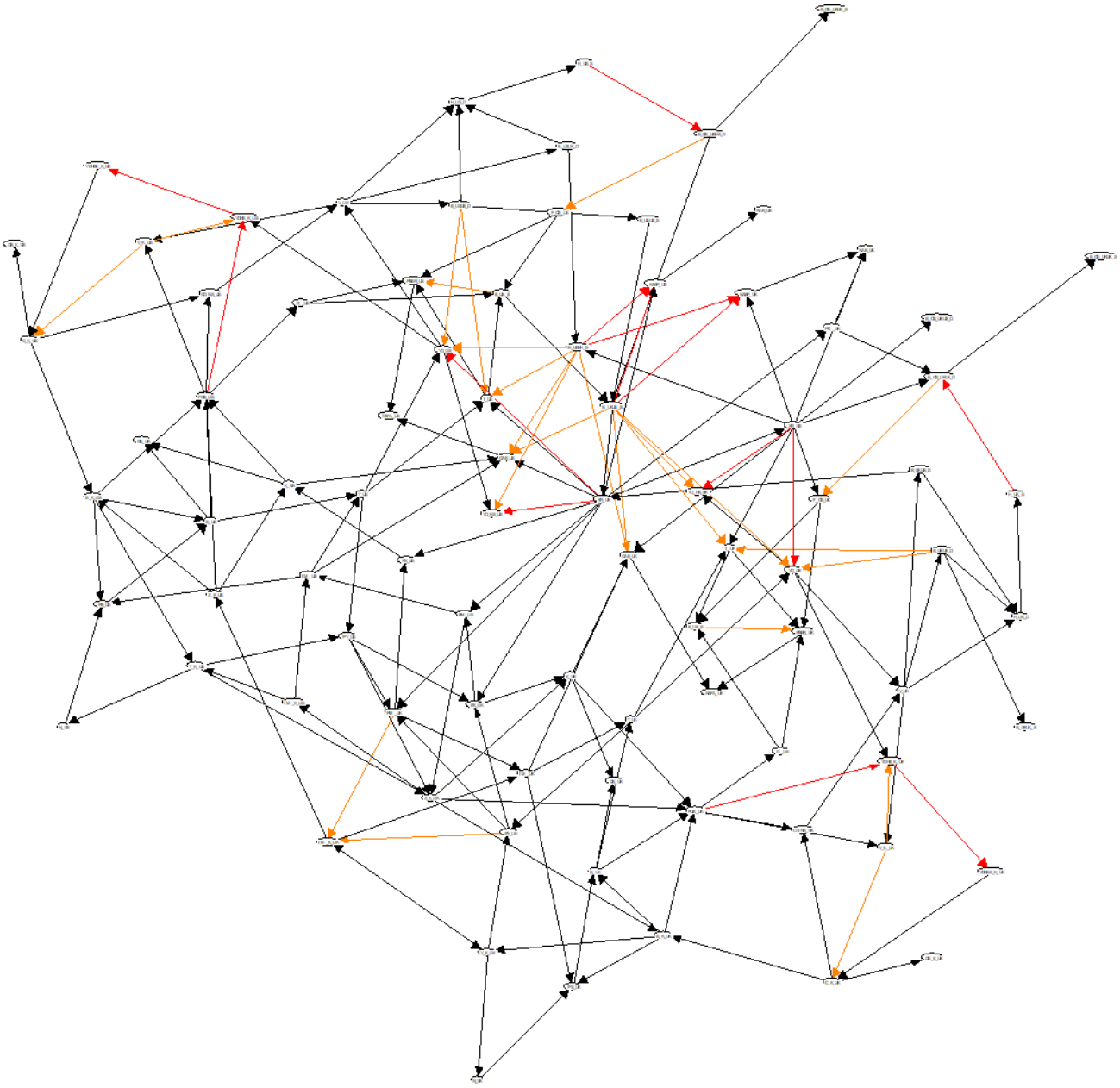
1. Dependency Graphs

Figure A1.B. OPENSIME. Dependency Graph



Legend: Orange = lags only; red = lags + contemporneous; black contemporaneous only.

Figure A1.C. OPENFLEX. Dependency graph

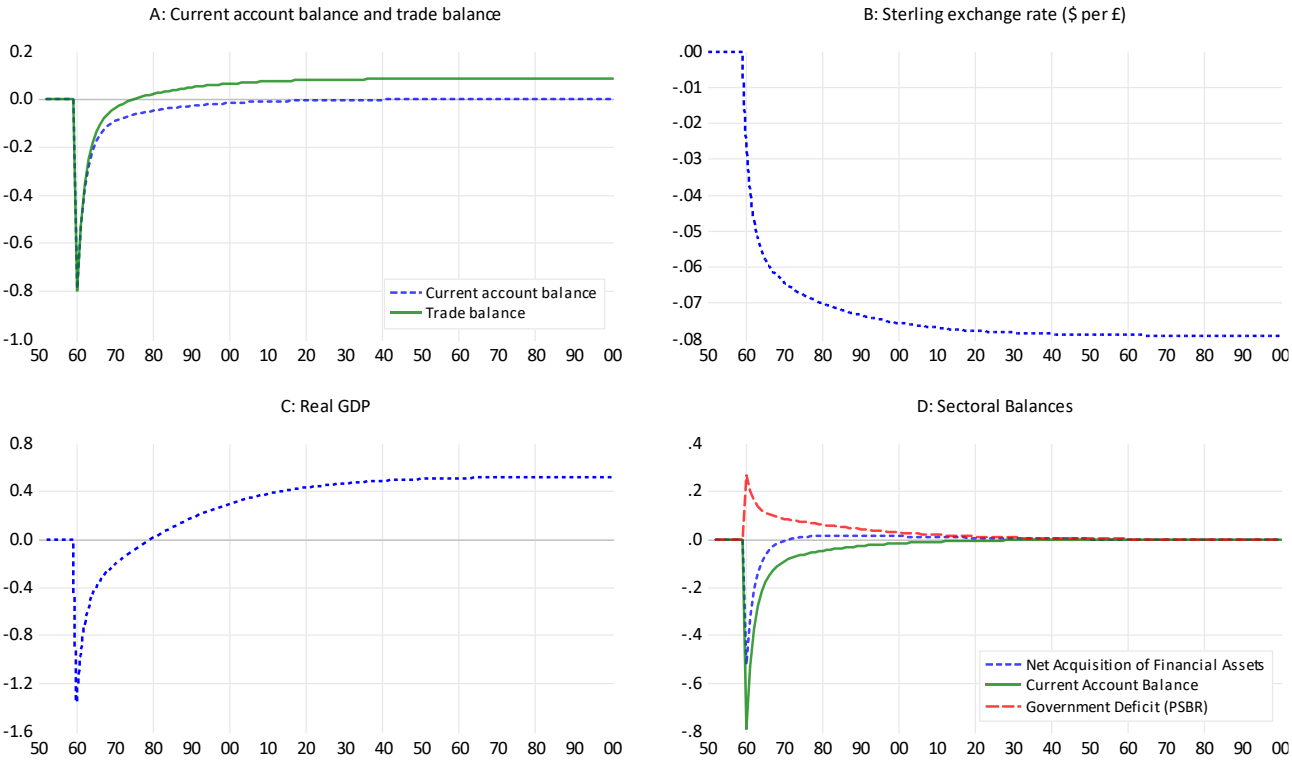


Legend: Orange = lags only; red = lags + contemporaneous; black contemporaneous only.

1. MODEL RESPONSES TO SHOCKS

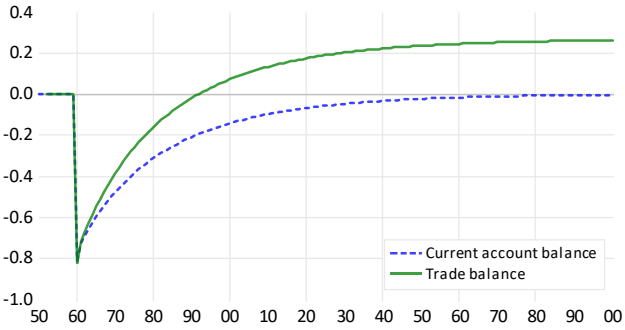
1.1 A Step-fall in UK Exports

OPENSIME

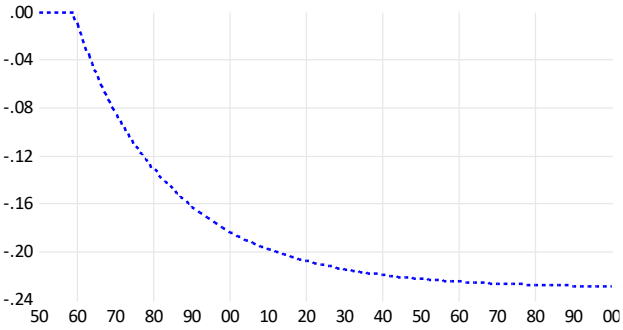


OPENFLEX

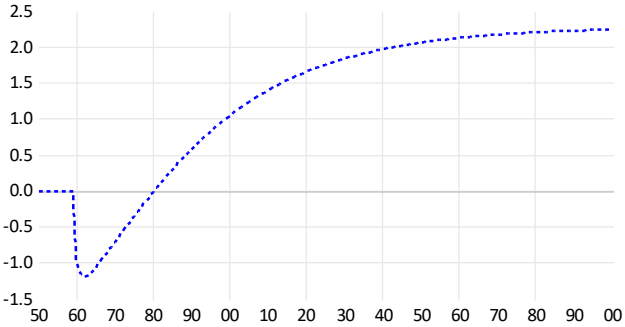
A: Current account balance and trade balance



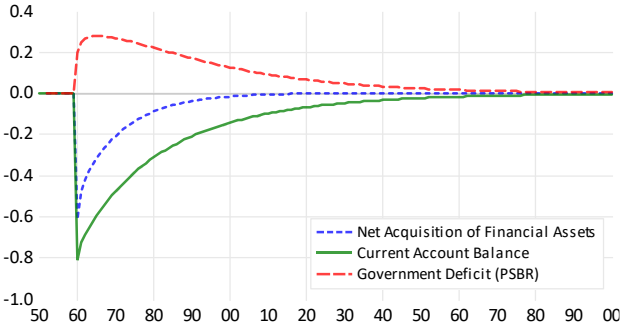
B: Sterling exchange rate ($ per £)



C: Real GDP

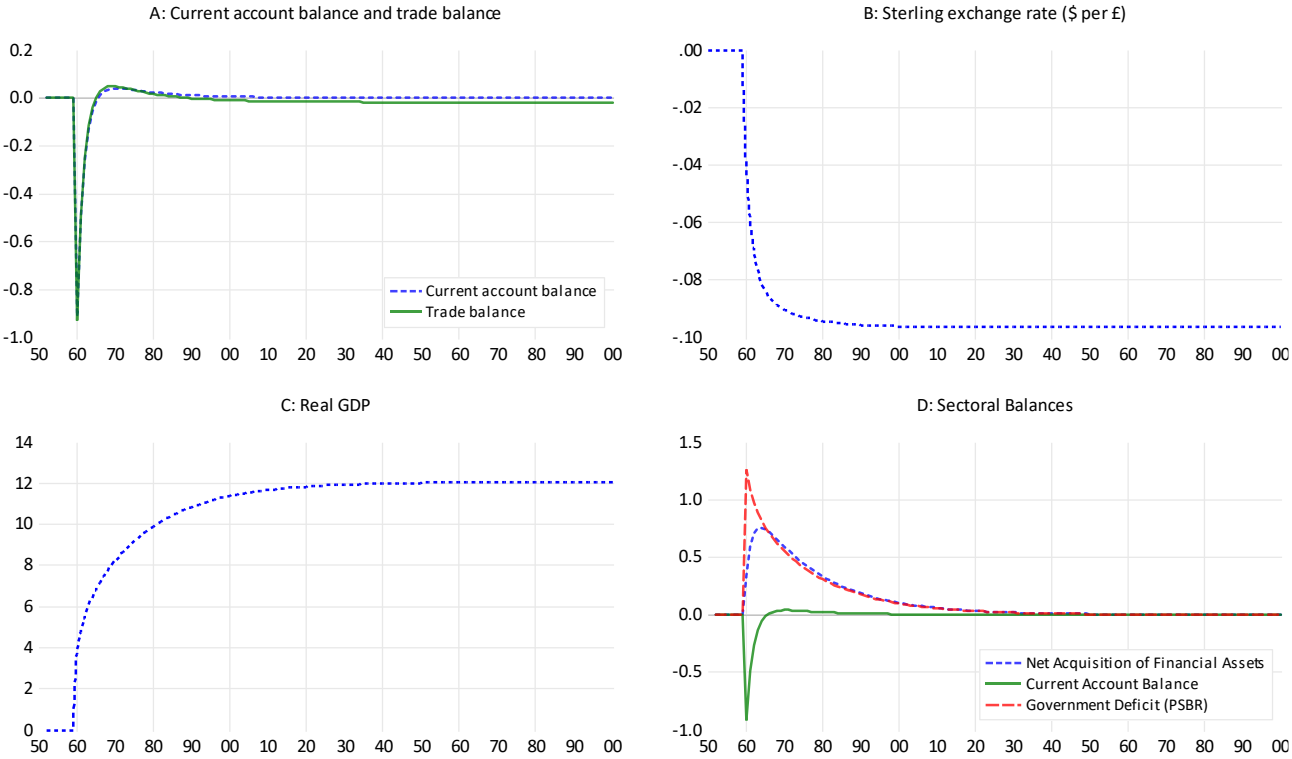


D: Sectoral Balances



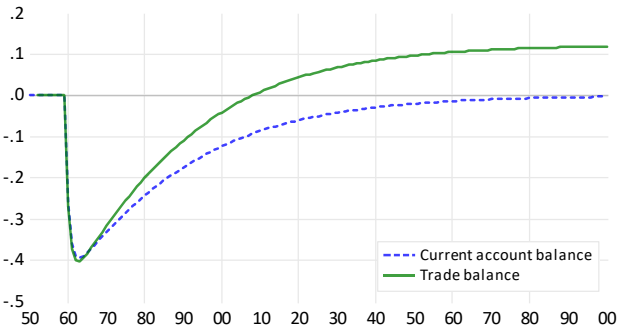
1.2 Expansionary Fiscal policy

OPENSIME

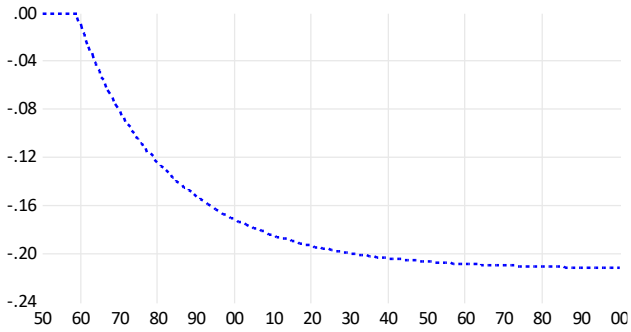


OPENFLEX

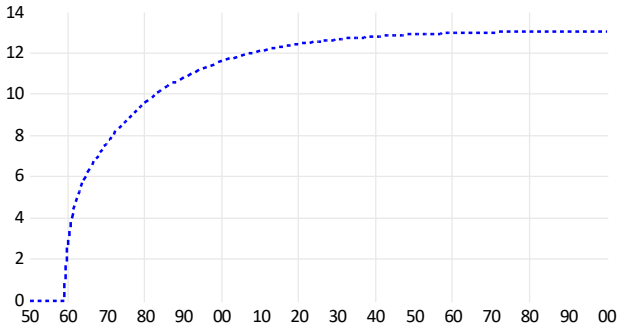
A: Current account balance and trade balance



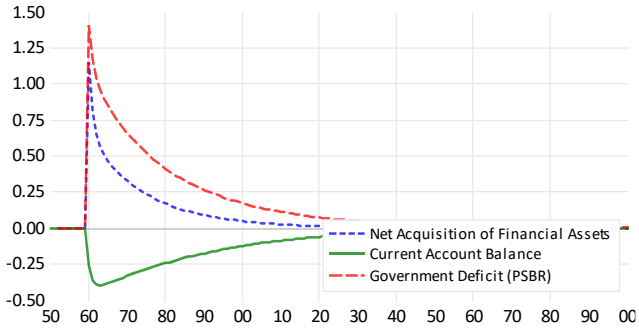
B: Sterling exchange rate ($ per £)



C: Real GDP



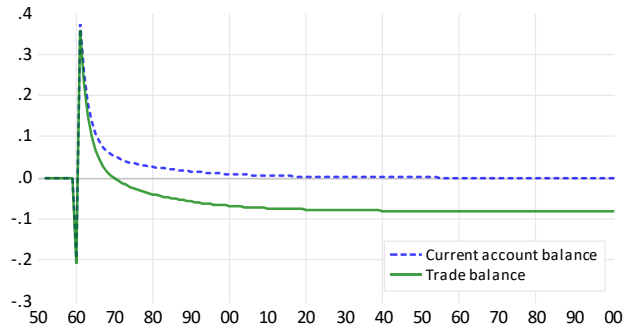
D: Sectoral Balances



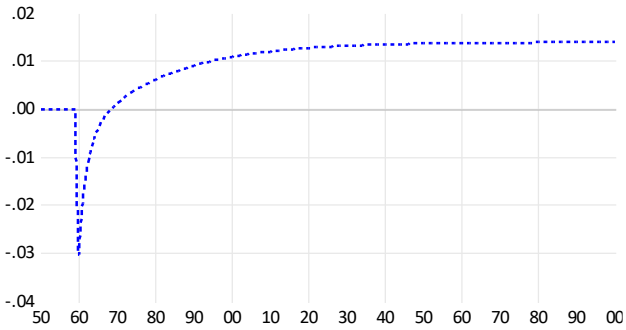
1.3 Expansionary (?) Monetary Policy

OPENSIME

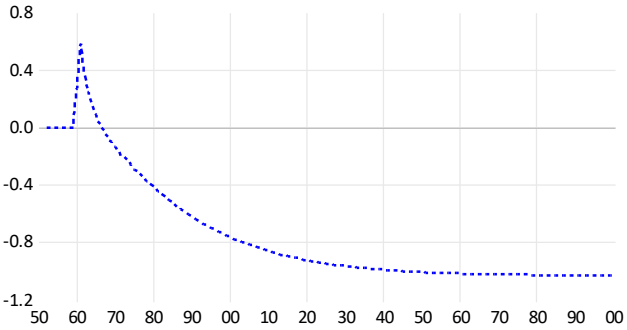
A: Current account balance and trade balance



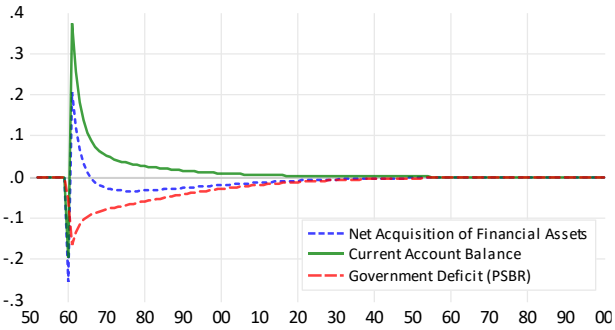
B: Sterling exchange rate ($ per £)



C: Real GDP

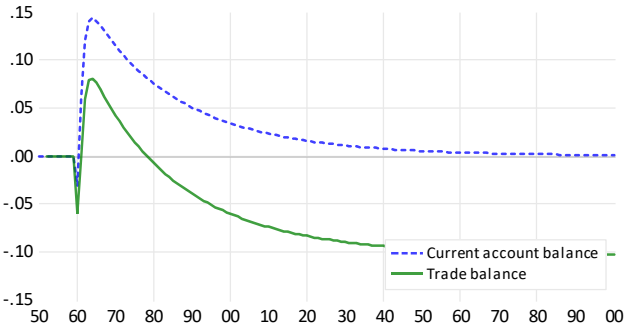


D: Sectoral Balances

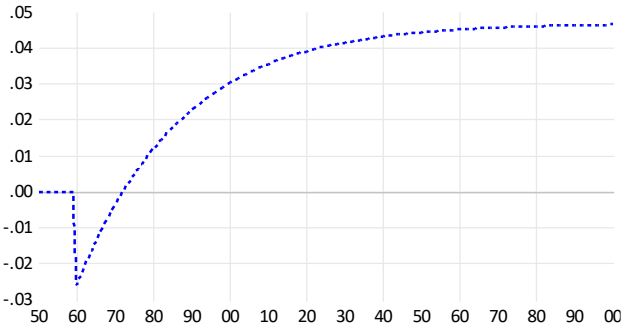


OPENFLEX

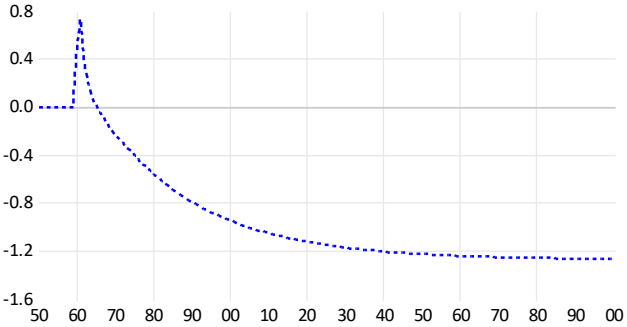
A: Current account balance and trade balance



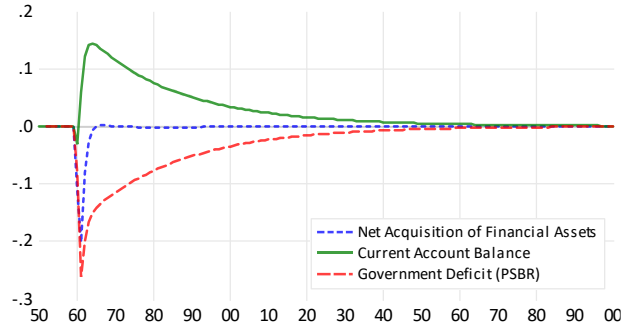
B: Sterling exchange rate ($ per £)



C: Real GDP



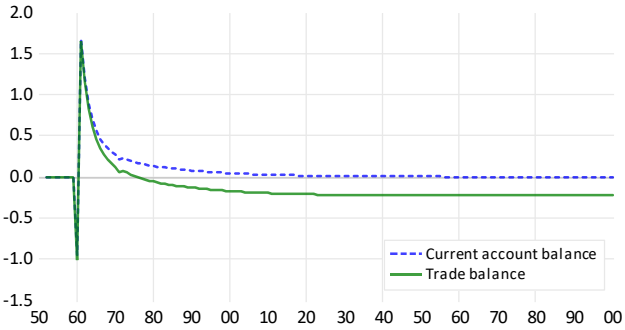
D: Sectoral Balances



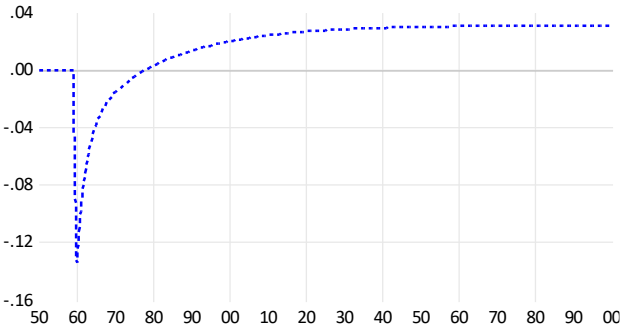
1.4 A Change in Liquidity Preference

OPENSIME

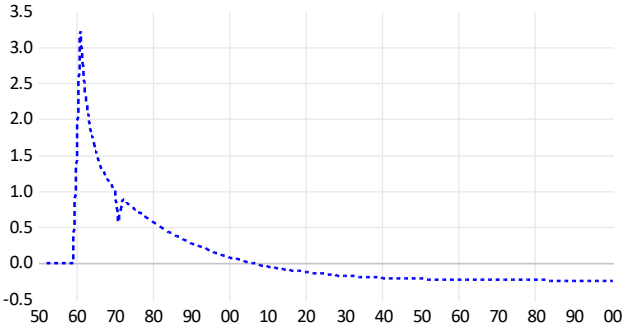
A: Current account balance and trade balance



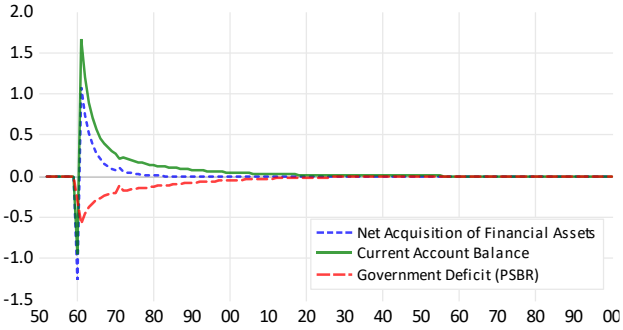
B: Sterling exchange rate ($ per £)



C: Real GDP

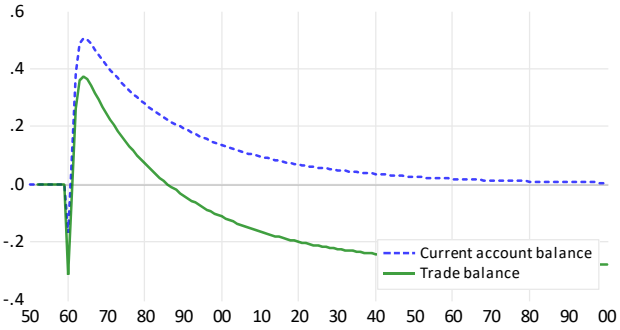


D: Sectoral Balances

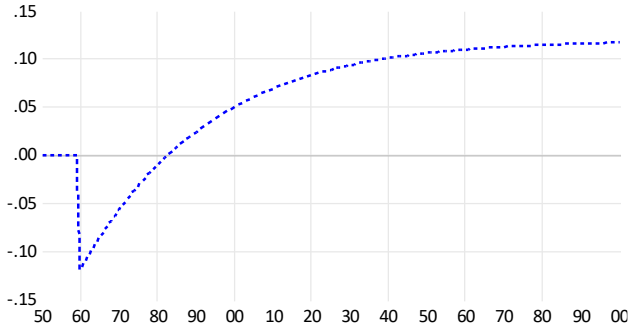


OPENFLEX

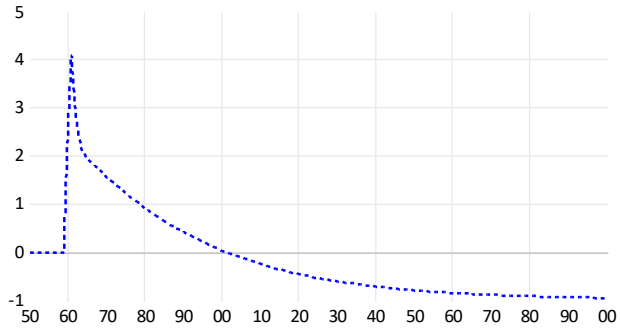
A: Current account balance and trade balance



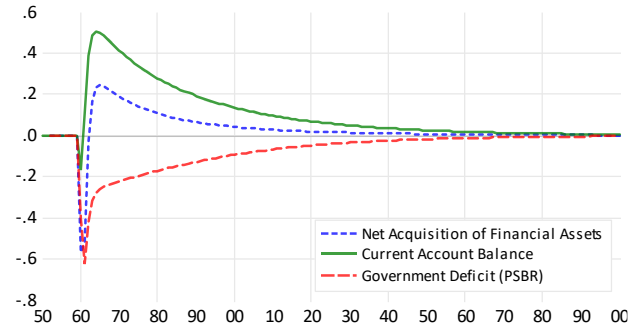
B: Sterling exchange rate ($ per £)



C: Real GDP



D: Sectoral Balances



REPLICATION CODE

The code below replicates the model and all figures in the article. Designed for Eviews14.

```
' ==================================================================
' OPENSIMPLEST: The Smallest SFC Open Economy model
' Francesco Zezza
' Sapienza University of Rome and Levy Economics Institute
' the code below replicates all figures in the article
' ==================================================================
close @all
wfcreate(wf = simplest, page = v1) u 1 150
' ==================================================================
' Version 1
' ==================================================================
pageselect v1
smpl @all
' ==================================================================
' ENDOGENOUS VARIABLES
' ==================================================================
series b_p
b_p.label(d) Domestic bills held by households
series b_cb
b_cb.label(d) Domestic bills held by the central bank
series b_s
b_s.label(d) Total stock of domestic government bills
series bw_p
bw_p.label(d) Foreign bills held by domestic households (in foreign currency)
series pe
pe.label(d) Household consumption
series f_cb
```

f_cb.label(d) Central bank profits

series h_p

h_p.label(d) Money balances held by households

series h_s

h_s.label(d) Money supply (high-powered money)

series im

im.label(d) Imports of goods and services

series t

t.label(d) Tax revenue

series v

v.label(d) Household net financial wealth

series x

x.label(d) Exports of goods and services

series yd_r

yd_r.label(d) Regular disposable income (excluding capital gains)

series yd_hs

yd_hs.label(d) Haig-Simons disposable income (including valuation effects)

series y

y.label(d) GDP / income (output)

series ca

ca.label(d) Current account balance (CA > 0 = surplus)

series tb

tb.label(d) Trade balance (exports - imports)

series psbr

psbr.label(d) Public Sector Borrowing Requirement (government deficit)

series nafa

nafa.label(d) Net acquisition of financial assets by domestic private sector (NAFA)

series xr

xr.label(d) Nominal exchange rate (domestic currency per unit of foreign currency)

```
series b_w
b_w.label(d) Foreign holdings of domestic government bills (residual from NETFA identity)
series netfa
netfa.label(d) Net foreign assets (country external position, NETFA)
series sectoral_check
sectoral_check.label(d) Sectoral balance identity (NAFA - PSBR - CA, should equal zero)
' ================================================================
' EXOGENOUS VARIABLES
' ================================================================
series g
g.label(d) Government expenditure on goods and services
series g_f
g_f.label(d) Government expenditure growth rate (exogenous)
series r
r.label(d) Interest rate on domestic government bills
series r_f
r_f.label(d) Interest rate on foreign bills (exogenous)
series y_f
y_f.label(d) Foreign income (exogenous)
series gy_f
gy_f.label(d) Foreign income growth rate (exogenous)
' ================================================================
' BEHAVIORAL PARAMETERS
' ================================================================
series alpha1
alpha1.label(d) Propensity to consume out of disposable income
series alpha2
alpha2.label(d) Propensity to consume out of wealth
series theta
```

```
theta.label(d) Average tax rate on income
series eps0
eps0.label(d) Export equation constant term
series eps1
eps1.label(d) Export elasticity with respect to the exchange rate
series eps2
eps2.label(d) Export elasticity with respect to foreign income
series mu0
mu0.label(d) Import equation constant term
series mu1
mu1.label(d) Import elasticity with respect to the exchange rate
series mu2
mu2.label(d) Import elasticity with respect to domestic income
series lambda10
lambda10.label(d) Portfolio share parameter: domestic bills (baseline)
series lambda11
lambda11.label(d) Portfolio sensitivity to domestic interest rate (domestic bills)
series lambda12
lambda12.label(d) Portfolio sensitivity to foreign interest rate (domestic bills)
series lambda20
lambda20.label(d) Portfolio share parameter: foreign bills (baseline)
series lambda21
lambda21.label(d) Portfolio sensitivity to domestic interest rate (foreign bills)
series lambda22
lambda22.label(d) Portfolio sensitivity to foreign interest rate (foreign bills)
' ================================================================
' PARAMETER VALUES
' ================================================================
alpha1 = 0.75
```

```
alpha2 = 0.13333

theta  = 0.2

eps0 = -2.1

eps1 =  0.7

eps2 =  1.2

mu0 = -2.1

mu1 = 0.7

mu2 =  1.2

' NB: lambda10 and lambda20 DO NOT sum to one, because otherwise the CB holding would go negative.
In two-country models, lambdas do sum to one since all demand for asset are specified

lambda10 = 0.7

lambda11 = 5

lambda12 = 5

lambda20 = 0.25

lambda21 = 5

lambda22 = 5

' ================================================================

' EXCHANGE RATE ADJUSTMENT PARAMETERS

' ================================================================

' xr adjustment speed (0.00272 = no adjustment, 0.0401 = immediate)

series phi  = 0.01

' The model only converges to a steady state with values of phi [0.00272-0.401]

' the lower phi, the higher the exports relative to imports, and thus the higher CA surplus.

' values of phi above 1.11 determine a CA deficit

' ================================================================

' EXOGENOUS VALUES (BASELINE SCENARIO)

' ================================================================

smpl 1 1

xr = 1.141

smpl @all
```

```
g   = 16
r   = 0.03
r_f = 0.03
y_f = 80
' ================================================================
' INITIAL CONDITIONS (STEADY-STATE CALIBRATION)
' ================================================================
smpl 1 1
'y     = 80
' Choose initial asset stocks (household bills, foreign bills, gov bills, foreign holdings)
b_p  = 87.100
bw_p = 21.775
b_s  = 144.977
b_w  = 24.668
' Compute NETFA consistently from bw_p, b_w and xr
netfa = bw_p*xr - b_w
' Enforce consistency: v = b_s + netfa so that h_p = h_s
v = b_s + netfa
' Household money from portfolio identity
h_p = v - b_p - bw_p*xr
' Central bank holdings and money supply from its balance sheet
b_cb = b_s - b_p - b_w
h_s  = b_cb
' Set flows and checks at steady state
f_cb = 0
psbr = 0
ca   = 0
nafa = 0
sectoral_check = 0
```

```
series eps_log
series eps_xr
smpl @all
eps_log = 1e-6
eps_xr  = 1e-6
' ================================================================
' MODEL EQUATIONS
' ================================================================
model simplest
' Income and wealth
' 1. Disposable income
simplest.append yd_r  = y + ( r(-1)*b_p(-1) + r_f(-1)*bw_p(-1)*xr ) - t
' 2. Haig-Simons disposable income
simplest.append yd_hs = yd_r + d(xr)*bw_p(-1)
' 3. Wealth accumulation
simplest.append v = v(-1) + yd_hs – pe
' 4. Taxes
simplest.append t = theta*(y + r(-1)*b_p(-1) + r_f(-1)*bw_p(-1)*xr)
' 5. Income/output
simplest.append y = pe + g + x - im
' 6. Consumption
simplest.append pe = alpha1*yd_hs + alpha2*v(-1)
' 7. Private sector Net Acquisition of Financial Asset
'simplest.append nafa = d(b_p) + d(bw_p)*xr + d(h_p)
simplest.append nafa = psbr + ca
' Trade
' 8. Export
simplest.append x  = exp(eps0 + eps1*log( xr(-1) ) + eps2*log( y_f ) )
' 9. Import
```

```
simplest.append im = exp(mu0 - mu1*log( xr(-1) ) + mu2*log( y ) )
' 10. Trade balance
simplest.append tb   = x - im
' The following equations assure a smoother convergence to steady-steate
'simplest.append x  = exp(eps0 + eps1*log(@abs(xr(-1)) + eps_log) + eps2*log(@abs(y_f) + eps_log))
'simplest.append im = exp(mu0 - mu1*log(@abs(xr(-1)) + eps_log) + mu2*log(@abs(y) + eps_log))
' 11. Current Account Balance
simplest.append ca   = tb + ( r_f(-1)*bw_p(-1)*xr - r(-1)*b_w(-1) )
' 12. External position (i.e., Net Foreign Asset, NETFA, from CA + revaluations)
simplest.append netfa = netfa(-1) + ca + ( d(xr)*bw_p(-1) )
' 13. Foreign demand of domestic bills. From BSM
simplest.append b_w   = bw_p*xr - netfa
' Portfolio + money
' 14. Demand for domestic bills
simplest.append b_p  = v*(lambda10 + lambda11*r - lambda12*r_f)
' 15. Demand for foreign bills
simplest.append bw_p = v*(lambda20 - lambda21*r + lambda22*r_f)/xr
' 16. Demand for money => determined residually
simplest.append h_p  = v - b_p - bw_p*xr
' CB, money supply
' 17. CB profits
simplest.append f_cb = r(-1)*b_cb(-1)
' 18. CB holding of domestic bills
simplest.append b_cb = b_s - b_p - b_w
' 19. Money supply => NB: notice that h_s = h_p
simplest.append h_s  = b_cb
' Government
' 20. Public Sector Borrowing Requirement (PSBR, i.e., the government deficit)
simplest.append psbr = g + r(-1)*b_s(-1) - t - f_cb
```

```
' 21. Supply of domestic bills

simplest.append b_s  = b_s(-1) + psbr

' 22. Exchange rate closure: CA-adjustment rule

simplest.append xr = xr(-1) + phi*(-ca(-1))

'simplest.append xr = xr(-1) + phi*(-ca)

' Unnecessary equations, included for convenience

' Notice that equation 7, 10, 11, and 20 are only included in the model for convenience of exposition, and to speed software computation

' Accounting check

simplest.append sectoral_check = nafa - psbr - ca

' ================================================================

' SOLUTION AND BASIC OUTPUT

' ================================================================

smpl 2 @last

simplest.scenario Baseline

simplest.solve(i = p)

' Diagnostics

graph baseline_xr.line xr_0

graph baseline_sectoral_balance.line nafa_0 psbr_0 ca_0 sectoral_check_0

graph baseline_gdpgr.line y_0

graph baseline_pe.line pe_0

graph baseline_fiscal.line t_0 g

graph baseline_external.line ca_0 tb_0

graph baseline_trade.line x_0 im_0

graph baseline_stocks.line b_s_0 b_p_0 b_cb_0 bw_p_0 b_w_0 v_0

' Copy all objects from page v1

pageselect sensitivity

smpl @all

copy v1\*

' We decrease phi by 0.002 in each scenario, to check the upper and lower bound before the system explodes
```

```
pageselect sensitivity
delete *_1
delete *_2
delete *_3
delete *_4
delete *_5
' ========================================================================
' SIMULATIONS
' ========================================================================
pageselect v1
smpl @all
' A) STEP-FALL IN EXPORTS
' Store baseline EPS0 path for all t
smpl @all
genr eps0_0 = eps0
' Reset to baseline parameter path
smpl @all
eps0 = eps0_0
' Apply shock only from t = 5 onwards
smpl 5 @last
eps0 = -2.2
' Define and solve Scenario 1
simplest.scenario "Scenario 1"
smpl 2 @last
simplest.solve(i=p)
' Store scenario-1 parameter path
smpl @all
genr eps0_1 = eps0
' Restore baseline parameter path
```

```
eps0 = eps0_0
' Figures S1:
smpl 1 150
graph fig1_a.line ca_1-ca_0 tb_1-tb_0
fig1_a.options linepat
fig1_a.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig1_a.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig1_a.name(1) Current account balance
fig1_a.name(2) Trade balance
fig1_a.addtext(t,just(c)) A: Current account balance and trade balance
fig1_a.legend position(INSBOTRIGHT)
'show fig1_a
smpl 1 150
graph fig1_b.line (1/xr_1)-(1/xr_0)'xr_1-xr_0
fig1_b.options linepat
fig1_b.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig1_b.name(1) UK currency in dollars
fig1_b.addtext(t,just(c)) B: Sterling exchange rate ($ per £)
fig1_b.legend position(INSBOTRIGHT)
'show fig1_b
smpl 1 150
graph fig1_c.line y_1-y_0
fig1_c.options linepat
fig1_c.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig1_c.name(1) Real GDP
fig1_c.addtext(t,just(c)) C: Real GDP
fig1_c.legend position(INSBOTRIGHT)
'show fig1_c
smpl 1 150
```

```
graph fig1_d.line nafa_1-nafa_0 ca_1-ca_0 psbr_1-psbr_0
fig1_d.options linepat
fig1_d.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig1_d.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig1_d.setelem(3) lcolor(red) lwidth(2) lpat(3)
fig1_d.name(1) Net Acquisition of Financial Assets
fig1_d.name(2) Current Account Balance
fig1_d.name(3) Government Deficit (PSBR)
fig1_d.addtext(t,just(c)) D: Sectoral Balances
fig1_d.legend position(INSBOTRIGHT)
'show fig1_d
smpl 1 150
graph fig1_e.line x_1-x_0 im_1-im_0
fig1_e.options linepat
fig1_e.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig1_e.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig1_e.name(1) Export
fig1_e.name(2) Import
fig1_e.addtext(t,just(c)) E: Trade
fig1_e.legend position(INSBOTRIGHT)
'show fig1_d
smpl 1 150
graph fig1_f.line g t_1-t_0
fig1_f.options linepat
fig1_f.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig1_f.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig1_f.name(1) Gov. Expenditures
fig1_f.name(2) Taxes
fig1_f.addtext(t,just(c)) F: Fiscal variables
```

```
fig1_f.legend position(INSBOTRIGHT)
'show fig1_d
'-----------------------------------------------------------------
' C) CHANGE IN GOVERNMENT SPENDING
' Store baseline g path for all t
smpl @all
genr g_0 = g
' Reset to baseline parameter path
smpl @all
g = g_0
' Apply shock only from t = 5 onwards
smpl 5 @last
g = 18
' Define and solve Scenario 2
simplest.scenario(n) "Scenario 2"
smpl 2 @last
simplest.solve(i=p)
' Store scenario-1 parameter path
smpl @all
genr g_2 = g
' Restore baseline parameter path
g = g_0
' Figures S2
smpl 1 150
graph fig2_a.line ca_2-ca_0 tb_2-tb_0
fig2_a.options linepat
fig2_a.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig2_a.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig2_a.name(1) Current account balance
```

```
fig2_a.name(2) Trade balance
fig2_a.addtext(t,just(c)) A: Current account balance and trade balance
fig2_a.legend position(INSBOTRIGHT)
'show fig2_a
smpl 1 150
graph fig2_b.line  (1/xr_2)-(1/xr_0)'xr_2-xr_0
fig2_b.options linepat
fig2_b.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig2_b.name(1) UK currency in dollars
fig2_b.addtext(t,just(c)) B: Sterling exchange rate ($ per £)
fig2_b.legend position(INSBOTRIGHT)
'show fig2_b
smpl 1 150
graph fig2_c.line y_2-y_0
fig2_c.options linepat
fig2_c.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig2_c.name(1) Real GDP
fig2_c.addtext(t,just(c)) C: Real GDP
fig2_c.legend position(INSBOTRIGHT)
'show fig2_c
smpl 1 150
graph fig2_d.line nafa_2-nafa_0 ca_2-ca_0 psbr_2-psbr_0
fig2_d.options linepat
fig2_d.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig2_d.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig2_d.setelem(3) lcolor(red) lwidth(2) lpat(3)
fig2_d.name(1) Net Acquisition of Financial Assets
fig2_d.name(2) Current Account Balance
fig2_d.name(3) Government Deficit (PSBR)
```

```
fig2_d.addtext(t,just(c)) D: Sectoral Balances
fig2_d.legend position(INSBOTRIGHT)
'show fig2_d
'-----------------------------------------------------------------------
' C) CHANGE IN INTEREST RATE
' Store baseline r path for all t
smpl @all
genr r_0 = r
' Reset to baseline parameter path
smpl @all
r = r_0
' Apply shock only from t = 5 onwards
smpl 5 @last
r = 0.029
' Define and solve Scenario 3
simplest.scenario(n) "Scenario 3"
smpl 2 @last
simplest.solve(i=p)
' Store scenario-1 parameter path
smpl @all
genr r_3 = r
' Restore baseline parameter path
r = r_0
' Figures S3
smpl 1 150
graph fig3_a.line ca_3-ca_0 tb_3-tb_0
fig3_a.options linepat
fig3_a.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig3_a.setelem(2) lcolor(green) lwidth(2) lpat(1)
```

```
fig3_a.name(1) Current account balance
fig3_a.name(2) Trade balance
fig3_a.addtext(t,just(c)) A: Current account balance and trade balance
fig3_a.legend position(INSBOTRIGHT)
'show fig3_a
smpl 1 150
graph fig3_b.line (1/xr_3)-(1/xr_0)
fig3_b.options linepat
fig3_b.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig3_b.name(1) UK currency in dollars
fig3_b.addtext(t,just(c)) B: Sterling exchange rate ($ per £)
fig3_b.legend position(INSBOTRIGHT)
'show fig3_b
smpl 1 150
graph fig3_c.line y_3-y_0
fig3_c.options linepat
fig3_c.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig3_c.name(1) Real GDP
fig3_c.addtext(t,just(c)) C: Real GDP
fig3_c.legend position(INSBOTRIGHT)
'show fig3_c
smpl 1 150
graph fig3_d.line nafa_3-nafa_0 ca_3-ca_0 psbr_3-psbr_0
fig3_d.options linepat
fig3_d.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig3_d.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig3_d.setelem(3) lcolor(red) lwidth(2) lpat(3)
fig3_d.name(1) Net Acquisition of Financial Assets
fig3_d.name(2) Current Account Balance
```

```
fig3_d.name(3) Government Deficit (PSBR)
fig3_d.addtext(t,just(c)) D: Sectoral Balances
fig3_d.legend position(INSBOTRIGHT)
'show fig3_d
'------------------------------------------------------------------------
' E) CHANGE IN LIQUIDITY PREFERENCE
' Store baseline EPS0 path for all t
smpl @all
genr lambda10_0 = lambda10
genr lambda20_0 = lambda20
' Reset to baseline parameter path
smpl @all
lambda10 = lambda10_0
lambda20 = lambda20_0
' Apply shock only from t = 5 onwards
smpl 5 @last
lambda10 = 0.65
lambda20 = 0.3
' Define and solve Scenario 4
simplest.scenario(n) "Scenario 4"
smpl 2 @last
simplest.solve(i=p)
' Store scenario-1 parameter path
smpl @all
genr lambda10_4 = lambda10
genr lambda20_4 = lambda20
' Restore baseline parameter path
lambda10 = lambda10_0
lambda20 = lambda20_0
```

```
' Figures S3
smpl 1 150
graph fig4_a.line ca_4-ca_0 tb_4-tb_0
fig4_a.options linepat
fig4_a.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig4_a.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig4_a.name(1) Current account balance
fig4_a.name(2) Trade balance
fig4_a.addtext(t,just(c)) A: Current account balance and trade balance
fig4_a.legend position(INSBOTRIGHT)
'show fig4_a
smpl 1 150
graph fig4_b.line (1/xr_4)-(1/xr_0)
fig4_b.options linepat
fig4_b.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig4_b.name(1) UK currency in dollars
fig4_b.addtext(t,just(c)) B: Sterling exchange rate ($ per £)
fig4_b.legend position(INSBOTRIGHT)
'show fig4_b
smpl 1 150
graph fig4_c.line y_4-y_0
fig4_c.options linepat
fig4_c.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig4_c.name(1) Real GDP
fig4_c.addtext(t,just(c)) C: Real GDP
fig4_c.legend position(INSBOTRIGHT)
'show fig4_c
smpl 1 150
graph fig4_d.line nafa_4-nafa_0 ca_4-ca_0 psbr_4-psbr_0
```

```
fig4_d.options linepat
fig4_d.setelem(1) lcolor(blue) lwidth(2) lpat(2)
fig4_d.setelem(2) lcolor(green) lwidth(2) lpat(1)
fig4_d.setelem(3) lcolor(red) lwidth(2) lpat(3)
fig4_d.name(1) Net Acquisition of Financial Assets
fig4_d.name(2) Current Account Balance
fig4_d.name(3) Government Deficit (PSBR)
fig4_d.addtext(t,just(c)) D: Sectoral Balances
fig4_d.legend position(INSBOTRIGHT)
'show fig4_d
```