Current Account and Trade Balance Dynamics in a Schumpeterian Small Open Economy*

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Abstract

This paper studies current-account and trade-balance dynamics in a small open economy with Schumpeterian innovation, firm entry, and finite-horizon households under two alternative views of the world, while maintaining an exogenous world interest rate. In the canonical intertemporal approach, where exports are treated as residual, net foreign assets and the trade balance are entirely demand-driven and insulated from innovation and growth dynamics. When exports are modeled as an autonomous source of demand, foreign assets become a forward-looking valuation variable jointly determined by export demand and the allocation of output among consumption, innovation, and firm entry. Through the valuation channel, external shocks, such as export-demand shocks and world interest rate shocks, affect firm size and, through Schumpeterian mechanisms, feed back into the economy's net foreign asset position and trade balance.

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1 Introduction

This paper develops a Schumpeterian small open economy (SOE) model of endogenous growth and uses it to revisit the determination of the net foreign asset (NFA) position and the trade balance as mechanisms of external adjustment. The framework combines an overlapping-generations structure in the tradition of Blanchard (1985) and Yaari (1965) with Schumpeterian innovation, firm dynamics, and market structure. Firms invest in in-house R&D to improve product quality and drive growth, while entry expands the range of differentiated goods. By allocating resources among consumption, innovation, and firm creation, the model provides a natural setting for analyzing how supply-side dynamics interact with international financial markets and external balances.

Two complementary approaches organize the analysis of the current account. The traditional framework, best described as the intertemporal or flow approach, originates in Lucas (1982) and is synthesized in Obstfeld and Rogoff (1995, 1996). In that view, the current account reflects optimal forward-looking saving and investment decisions, with countries borrowing and lending internationally to smooth consumption in response to temporary income fluctuations. The NFA position evolves through flows, while the trade balance appears largely as an accounting residual rather than the outcome of explicitly modeled goods-market interactions.

More recent work emphasizes the valuation channel, shifting attention from net flows to changes in the value of existing gross external positions. Lane and Milesi-Ferretti (2001, 2007) document the growing size and composition of countries' international balance sheets, while Gourinchas and Rey (2007) show that exchange-rate movements, asset-price fluctuations, and return differentials can dominate current-account flows in driving NFA dynamics. In this perspective, external adjustment occurs through both the flow channel and the valuation channel, with the latter playing an increasingly central role in financially integrated economies.

That distinction is especially relevant in an economy where growth is driven by firm

dynamics. When firms devote resources to product creation and quality upgrading, the economy's supply side is not a passive background for intertemporal trade. Households allocate expenditure across domestic goods and imports, while final output is allocated across consumption, incumbent investment, entry, and exports. In such an environment, the meaning of the external position cannot be settled by accounting alone. One must also specify whether the economy's export capacity is an unconstrained residual or a finite object tied to foreign demand and domestic resource use.

We solve the model under two alternative interpretations of the external position that correspond to these two approaches. In the first interpretation, the foreign asset position is a predetermined state variable that evolves gradually through the accumulation of current-account balances. In the second interpretation, the external position is the market value of a portfolio that adjusts instantaneously through price changes. These alternative interpretations correspond to different implicit assumptions about the determination of the trade balance and the role of financial markets in reallocating wealth across countries.

Solving the model under both interpretations clarifies how the underlying assumptions shape the dynamics of the economy. In particular, when imports and exports are modeled explicitly instead of being relegated to a residual, the external position behaves like a financial variable that adjusts instantaneously through portfolio rebalancing rather than solely through the gradual accumulation of trade balances. The Schumpeterian structure of the model therefore serves not only to study how innovation shapes the growth of a small open economy, but also as a laboratory in which one can examine how international macroeconomics and growth theory interact.

The contrast between the two solutions is not semantic. In the canonical interpretation, the foreign asset position is effectively the quantity of net claims carried over from the past. In the valuation interpretation, it is the market value of a portfolio pinned down by no-arbitrage and by the economy's physical resource allocation. The same accounting identity therefore supports two very different dynamic objects. Making that distinction

explicit is useful because many discussions of current-account dynamics move back and forth between these interpretations without isolating the economic assumptions that justify them.

The analysis delivers three main results. First, the Schumpeterian structure of the model provides a transparent way to link the supply side of the economy to the determination of external balances. If exports are an unconstrained residual, there is complete separation between the demand side and the supply side of the model: the dynamics of the current account and the dynamics of innovation and growth are independent. Once exports are an explicit variable rather than a residual, that separation no longer applies. Production of intermediates, creation of new firms, and in-house innovation determine domestic use of final output and therefore help determine the trade balance and the evolution of the foreign asset position.

Second, solving the model under alternative interpretations of the NFA position reveals that the dynamic properties of the SOE depend critically on how we conceptualize the external position. When the foreign asset position is a predetermined stock that evolves through the accumulation of current-account balances, the dynamics resemble those of the textbook intertemporal SOE model (Uribe and Schmitt-Grohé, 2017). When it is instead the market value of a portfolio that can adjust through valuation effects, the external position behaves as a jumping variable that responds immediately to changes in the economic environment.

This distinction also matters for tariff policy. In the canonical approach, a higher tariff works through the import wedge, lowers expenditure, and shifts the transition path of external assets while leaving firm size, innovation, and growth unchanged. In the valuation approach, a higher tariff changes the valuation of external wealth and strengthens the trade balance, but under the maintained small-open-economy assumptions it still leaves the Schumpeterian growth block unchanged.

Third, innovation-driven changes in the productive structure of the economy affect

the current account and the evolution of external wealth in ways that are absent from conventional SOE frameworks. Aggregate investment in entry and innovation constrains households' ability to spend on consumption given export demand. Exports therefore determine the economy's ability and willingness to engage in external borrowing or lending, implying that changes in industrial structure play a central role in shaping external balances.

The paper's main contribution is to take a first step toward bridging endogenous growth theory and international macroeconomics by integrating a Schumpeterian growth block into a SOE framework. By linking innovation, entry, market structure, and asset values, the model connects external balances, trade dynamics, production, and endogenous growth within a unified equilibrium framework.

The paper is also related to recent work on tariffs and valuation effects. Itskhoki and Mukhin (2025) argue that tariffs can affect long-run trade deficits through valuation effects on the international financial position, while related work studies how tariffs revalue inherited external claims (Aguiar, Amador and Fitzgerald, 2025) or interact with liquidity provision and permanent deficits (Bayas-Erazo and Lorenzoni, 2025). This raises the question of which real margins shape valuation effects. The issue dates back at least to Ghironi, Lee and Rebucci (2015), who model goods trade, international equity portfolios, and production, with labor as the only input and no entry or innovation. More recent work by Kleinman et al. (2023) introduces dynamic production through neoclassical capital accumulation in an aggregate multi-country environment. Our treatment of exports as an explicit variable also links the paper to the heterogeneous-firm trade literature of Ghironi and Melitz (2005, 2007), but with the focus shifted from firm export participation to the interpretation of the external position itself.

2 Framework

We embed the Schumpeterian framework of innovation and firm dynamics, as articulated in Peretto (2026) and Chu and Peretto (2026), in a SOE populated by finite-horizon households. The full household and firm problems are presented in the Online Appendix.

2.1 Households and International Accounting

Individuals consume a domestically produced final good and an imported good. Preferences over these goods are represented by an additively separable logarithmic utility function. They face a constant probability of death, δ, and trade a riskless international asset at the world interest rate, r. The household side therefore generates a standard aggregate Euler equation for expenditure on the domestic good,

$$\frac{\dot{E}}{E} = r - \rho + \lambda - (\lambda + \delta)(\rho + \delta)\frac{A}{E}, \tag{1}$$

where E is aggregate expenditure on the domestic good, A is aggregate wealth, ρ is the time discount rate, and λ is population growth. Imports are microfounded by household demand. If τ is an ad valorem tariff and μ indexes the taste for the imported good, aggregate imports, M, are proportional to domestic expenditure and decreasing in the tariff, $M = \mu E/(1+\tau)$. The tariff revenue collected by the government is τM and it is rebated lump-sum to the households. The country's aggregate budget constraint can then be written as

$$\dot{A} = rA + (1-\theta)p_Y Y - \frac{1+\tau+\mu}{1+\tau}E, \tag{2}$$

where $p_Y Y$ is nominal output and θ is a parameter governing the share of intermediate goods in final-good production.

Wealth accumulation equals current income plus interest on wealth minus expenditure on domestic and imported goods. The tariff matters because it changes the household

demand for imports and therefore changes the mapping from domestic expenditure into aggregate absorption. Even before any supply-side feedback is introduced, the model preserves a fully microfounded link from trade policy to current-account dynamics.

Finite expected lifetimes and the arrival of new cohorts matter for this result. Because new cohorts enter with no accumulated financial wealth, while existing cohorts die with positive probability, the aggregate consumption Euler equation contains the wealth-to-expenditure ratio as a new term that reflects the role of heterogeneity by age. As is well-known, this term allows for a unique, endogenously determined path for the NFA position, providing a feedback through which changes in aggregate wealth, including changes in net foreign assets, affect expenditure decisions even when the world interest rate is taken as given (Obstfeld and Rogoff, 1996; Barro and Sala-i Martin, 2004; Ghironi, 2006).

A cornerstone of international macroeconomics is the accounting identity

$$CA = TB + rB, \tag{3}$$

where TB is the trade balance and B is the foreign asset position. The model is fully consistent with that textbook relationship. Decomposing wealth as $A = NV + B$, where NV is the value of domestic equity (the mass of firms, N, times the value of the firm in symmetric equilibrium, V), and using firms' profit and valuation equations yields the canonical law of motion

$$\dot{B} = rB + TB. \tag{4}$$

What remains to be specified is the economic interpretation of B: whether it should be treated as a predetermined stock that evolves through flows or as a forward-looking valuation object.

That distinction is central because domestic wealth is itself a combination of financial claims on home firms and net claims on the rest of the world. The home equity compo-

nent is created when new firms enter and when existing firms accumulate knowledge, so the composition of wealth is endogenous to the Schumpeterian side of the model. This observation is innocuous under the canonical interpretation, but it becomes decisive once the external position is treated as a priced portfolio rather than as a purely predetermined stock.

2.2 Production, Innovation, and Market Structure

The final good is produced competitively using a continuum of differentiated intermediate goods. As in Peretto (2015), the production technology combines product quality, average knowledge, and variety expansion in a way that delivers scale-invariant endogenous growth. Each monopolistic intermediate firm produces one variety, pays a fixed operating cost, and undertakes in-house research and development that raises product quality. Entry creates new product lines and expands the range of available intermediates.

This production structure matters because it creates a tight link between market structure and aggregate growth. Higher quality improves the productivity of a firm's variety, while entry changes the number of varieties over which labor and knowledge are spread. The final-good technology also embeds knowledge spillovers through average quality and congestion in the use of product variety through the parameter σ. As a result, the economy's growth rate depends not only on how much incumbents innovate, but also on how quickly new firms are created and how large incumbent firms are in quality-adjusted terms. The parameter α governs the firm-specific component of quality in production, $\eta > 1$ is the markup factor, ϕ is the fixed operating cost, and β indexes the entry cost of creating a new variety.

Under symmetry, the reduced-form production function is

$$Y = \left(\frac{\theta p_Y}{p_X}\right)^{\frac{\theta}{1-\theta}} N^{\sigma} Z L, \tag{5}$$

and the quality-adjusted size of an intermediate firm is

$$x \equiv \frac{X}{Z} = \left(\frac{p_Y \theta}{p_X}\right)^{\frac{1}{1-\theta}} \frac{L}{N^{1-\sigma}}. \tag{6}$$

This composite variable compresses labor, quality, and product variety into a single state variable. It is also the key sufficient statistic for the incentives to innovate and enter.

The usefulness of x is economic, not just algebraic. When quality-adjusted firm size is high, the revenue base over which incumbents can spread fixed operating costs is larger and the return to quality-improving investment is stronger. The same force also raises the profitability of entry because a prospective entrant expects to operate at a larger scale after paying the setup cost. Conversely, when x is low, the market is too thin to support rapid innovation or entry. This is why the entire Schumpeterian block can be organized around the motion of one composite object.

Let $z \equiv \dot{Z}/Z$ denote the innovation rate and $n \equiv \dot{N}/N$ the entry rate. In the active-innovation region, the return equations reduce to

$$r = \alpha\big[(\eta - 1)x - \phi\big] - g, \tag{7}$$

$$r = \frac{1}{\beta\theta}\left(\eta - 1 - \frac{\phi + z}{x}\right) - n, \tag{8}$$

with GDP growth given by

$$g = \sigma n + z. \tag{9}$$

The Online Appendix derives the piecewise entry schedule $n(x)$, the thresholds that govern whether entry and in-house innovation are active, and the corresponding global dynamics. For the present argument, the main object is the law of motion

$$\frac{\dot{x}}{x} = \lambda - (1 - \sigma)n(x), \tag{10}$$

which summarizes market-structure dynamics in terms of quality-adjusted firm size.

The piecewise nature of $n(x)$ has a transparent interpretation. For sufficiently small firm size, neither entry nor in-house innovation is worthwhile. Once firm size exceeds the first threshold, entry becomes profitable because expected revenues cover fixed operating and setup costs. Above a second threshold, in-house innovation also becomes active. The Schumpeterian economy therefore moves through regions in which the composition of growth changes, but in the empirically and analytically relevant region emphasized here, both entry and innovation are active and together determine the long-run pace of expansion.

The growth block has an economically important comparative-static property. The steady-state value of firm size satisfies

$$\frac{dx^*}{dr} \lesseqgtr 0 \qquad \text{for} \qquad \beta\theta\phi \gtreqless \eta - 1. \tag{11}$$

Hence higher world interest rates can either reduce or increase steady-state firm size depending on the interaction of entry costs and fixed operating costs. That property will later determine whether interest-rate shocks contract or expand the Schumpeterian growth margin.

3 The Canonical Intertemporal Approach

This section derives a useful benchmark by following the canonical approach of treating exports as an unconstrained residual that takes whatever value is needed to satisfy the national income identity once consumption, imports, production, investment, and the foreign asset position are determined. As discussed above, wealth is $A = NV + B$, where B is foreign assets. In free-entry equilibrium this becomes $A = \beta\theta p_Y Y + B$. We choose nominal output as the unit of account and set $p_Y Y = 1$.

3.1 The Dynamical System

In the canonical approach, the foreign asset position is a predetermined state variable. The underlying assumption is that if we break the position into quantity times price, the price component is taken as fixed. This suppresses the valuation effect and supports the interpretation of B as a slowly evolving stock. Using the household-side Euler equation and budget constraint, the model yields the self-contained system

$$\dot{E} = (r - \rho + \lambda)E - (\lambda + \delta)(\rho + \delta)(\beta\theta + B), \tag{12}$$

$$\dot{B} = rB + r\beta\theta + 1 - \theta - \frac{1 + \tau + \mu}{1 + \tau}E. \tag{13}$$

The tariff appears because households optimally choose imported-good expenditure, so the import wedge feeds directly into aggregate saving. The budget constraint shows that the right-hand side is the difference between total income of the SOE and total consumption expenditure. If that difference is positive, the country purchases foreign assets; if it is negative, the country decumulates foreign assets and eventually becomes a debtor if B crosses zero.

This representation delivers the standard saddle-path logic of the intertemporal SOE model. Expenditure jumps to the stable arm, while the foreign asset position adjusts gradually through current-account balances. Because imports are microfounded on the household side, a tariff affects both the current account and the external position even in this stripped-down setting.

The appeal of this setup is that it isolates the textbook flow mechanism in its cleanest form. Given the exogenous world interest rate, households choose expenditure and saving, and the foreign asset position records the cumulative outcome of those decisions. The trade balance matters because it is one component of the current account, but it does not have an independent role in pinning down the external position. That role belongs to the intertemporal budget constraint.

3.2 Interpreting the NFA Position

This subsection discusses the determination of the net foreign asset position. Despite its limitations, the canonical approach is the natural benchmark when one wants to isolate the expenditure-smoothing logic of international borrowing and lending. It also clarifies what is being assumed away when the external position is modeled as a predetermined stock. The simplification is that financial markets matter only through the accumulation of net claims and not through the revaluation of existing positions. In many standard settings that abstraction is harmless. In the present environment, however, it becomes restrictive because firm dynamics continuously reshape the allocation of output and the composition of aggregate wealth.

NFA as Predetermined State Variable. The system characterizing the model's dynamics is linear and, under saddle-path stability, admits a closed-form solution. Denoting the stable eigenvalue by $k_1 < 0$, the path of NFA is

$$B(t) = B^* + \big(B_0 - B^*\big)e^{k_1 t}. \tag{14}$$

This closed-form solution clarifies that NFA changes smoothly because it is governed by a stable differential equation driven by saving flows. It does not jump because nothing in the model allows the valuation of the position to change on impact. This is exactly the premise that will be relaxed in the next section.

Proposition 1. *In the canonical intertemporal approach, with exports determined residually and the world interest rate taken as exogenous, the international financial block is independent of the Schumpeterian block. The net foreign asset position evolves as a predetermined state variable driven by intertemporal expenditure dynamics, whereas firm size, innovation, and economic growth are independent of external balances.*

A Demand-Side View of NFA. The solution (14) also articulates the view in which macroeconomic demand forces determine the net foreign asset position and the current account, which in turn determine the trade balance. The analysis is fully microfounded, but those microfoundations operate entirely through the demand side of the economy. The reason the Schumpeterian block and the international trade and financial positions are orthogonal to each other is that the adjustment in exports ensures market clearing without requiring any further adjustment through general equilibrium effects. Any change in domestic expenditure on the domestically produced good does not affect incentives to produce or invest because foreign demand offsets this change by construction. That is analytically convenient, but it is also conceptually restrictive: it rules out the possibility that the domestic allocation of output across consumption, innovation, and firm creation contributes to the external adjustment. In a model whose purpose is to study external adjustment in a growing economy, this treatment of exports is a strong assumption.

3.3 Tariffs and External Adjustment

In the canonical intertemporal approach, tariffs continue to determine the trade balance, albeit indirectly through their impact on the net foreign asset position. The reason is that the import function is derived from the household's optimization problem and enters the wealth-accumulation equation governing current-account dynamics. Therefore, even in the simplest version of the intertemporal approach, one cannot generally conclude that trade policy is irrelevant for the trade balance.

Proposition 2. *An increase in tariffs reduces import demand, lowers steady-state expenditure, and raises the steady-state net foreign asset position. It initially generates a trade surplus, but as net foreign assets accumulate, the economy converges to a new steady state with higher foreign asset holdings and a trade deficit. The resulting transition is entirely demand-driven and has no effect on firm size, innovation, or economic growth.*

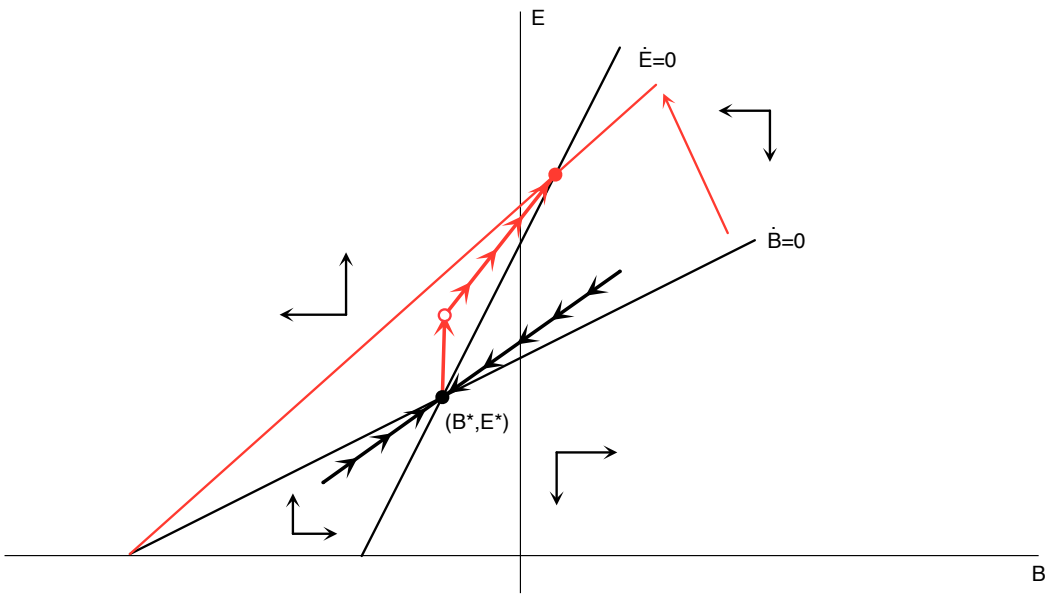


Figure 1: Canonical intertemporal approach: phase diagram in (B, E) space, with the tariff impulse response shown in red.

Figure 1 illustrates the phase diagram of the model economy's dynamic adjustment to a permanent tariff increase. A higher tariff increases the after-tax price paid by households for imported goods. While households respond to this price increase by raising their spending on domestically produced goods, aggregate consumption expenditure declines overall. The reduction in spending on foreign goods exceeds the increase in spending on domestic goods, leading to higher savings and, consequently, an accumulation of foreign assets. On impact, the economy records a trade surplus as exports decline less than imports. Over time, as the domestic economy accumulates foreign assets, the trade balance steadily deteriorates towards the new steady state associated with a trade deficit.

The interpretation of this dynamic adjustment to a permanent tariff increase remains entirely demand-driven. At this stage, nothing in the Schumpeterian supply side feeds back into the dynamics of the current account or the foreign asset position. The question is why domestic investment remains unaffected. For this to be the case, total demand for domestic goods—domestic and foreign combined—must remain unchanged. In this sense, exports act as a residual: the increase in domestic demand induced by the tariff is

exactly offset by a decline in foreign demand. The residual-export assumption therefore provides a degree of freedom that insulates the supply side from changes in domestic demand.

Since exports remain residual, one cannot say that the trade balance improves or deteriorates because firms redirect resources toward foreign markets or because a richer productive structure changes the country's export capacity. In the canonical framework, the improvement in the trade balance reflects the accounting implications of lower import demand and lower expenditure rather than a reallocation of resources toward exports. That distinction is exactly why the valuation interpretation is worth studying separately.

4 The Valuation Approach

We now solve the model in a way that articulates a different view of the world, namely the valuation approach to international macroeconomics. The valuation approach below does not treat exports as a residual and makes clear that once export demand is an explicitly modeled variable, the Schumpeterian allocation of domestic output becomes part of the determination of the current account and the foreign asset position.

4.1 The Conceptual Setup

From the household side we still have the aggregate Euler equation and the aggregate budget constraint. The crucial change is that exports are no longer treated as a residual that passively clears the accounting identity. Instead, let Q denote foreign expenditure on the SOE's final good. This is closer in spirit to models in which export demand is an explicit object, even though our focus is not the microeconomics of export participation but the interpretation of the external position.

Recall the relationship

$$TB = Q - M = p_Y Y - \left[p_Y N(X + \phi Z + I) + \dot{N}V + E\right] - M, \tag{15}$$

which says that exports equal final output net of domestic absorption. The domestic use of output includes intermediate production costs, fixed operating costs, in-house R&D, entry, and household expenditure. Using the reduced-form Schumpeterian block, this relationship can be rewritten as

$$Q \equiv p_Y Y \left[1 - \frac{\theta}{\eta} - F(x)\right] - E, \tag{16}$$

where

$$F(x) \equiv \frac{\phi + z(x)}{x} + n(x). \tag{17}$$

Equivalently,

$$\frac{Q}{p_Y} + \frac{E}{p_Y} + F(x)Y = Y\left(1 - \frac{\theta}{\eta}\right). \tag{18}$$

This is the physical adding-up constraint on the SOE's final output. It is not the financial resource constraint, since the country can still borrow or lend internationally. What it does imply is that, once exports are finite, the domestic allocation of output must directly constrain household expenditure and the trade balance.

This distinction between physical and financial constraints is essential. International borrowing can relax the timing of expenditure, but it cannot eliminate the need to allocate current production across mutually exclusive domestic uses. A model with explicit exports must therefore keep track of how much output is absorbed by incumbent production, fixed costs, innovation, and entry before household expenditure is determined. The valuation approach does exactly that.

4.2 The Dynamical System

With the same normalization $p_Y Y = 1$, the physical resource constraint implies

$$E = 1 - \frac{\theta}{\eta} - F(x) - Q, \tag{19}$$

so expenditure is pinned down by export demand and by the share of output absorbed by fixed costs, innovation, and entry. Substituting this relation into the accounting block yields the block-triangular system

$$\dot{B} = rB + Q - \frac{\mu}{1+\tau}\left[1 - \frac{\theta}{\eta} - F(x)\right], \tag{20}$$

$$\dot{x} = \lambda - (1-\sigma)n(x). \tag{21}$$

The right-hand side of the first equation is decreasing in x. The associated locus is

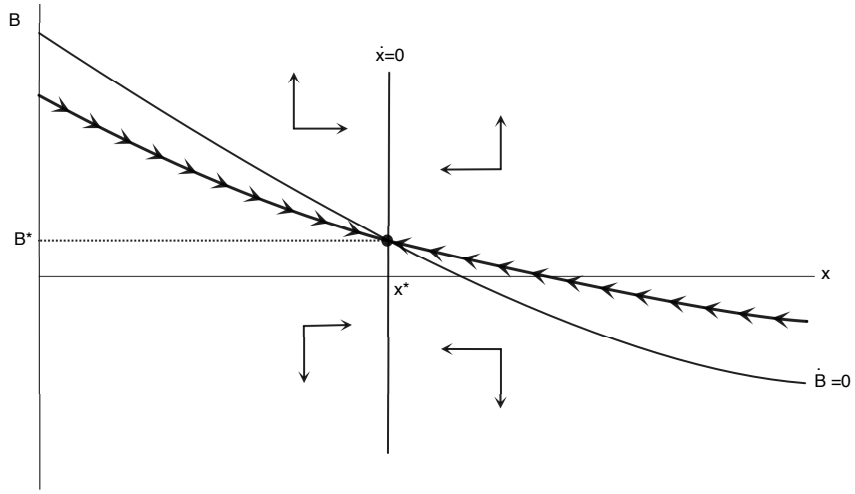
$$B \geq \frac{1}{r}\left[\frac{\mu}{1+\tau}\left(1 - \frac{\theta}{\eta} - F(x)\right) - Q\right]. \tag{22}$$

The dynamics are saddle-path stable because the eigenvalue associated with B is positive. In fact, the $\dot{B}$ equation shows that the behavior of B is explosive unless the foreign asset position is allowed to jump. The external position must therefore be interpreted as a forward-looking asset price.

The block-triangular structure makes the economics transparent. The Schumpeterian state variable x evolves independently of B because it is pinned down by market structure, innovation, and the exogenous world interest rate. But the external position depends on x because the domestic uses of output determine how much of final production is left to support exports and therefore the trade balance. The direction of causality is thus the opposite of the one embedded in the residual-export view.

Panel A of Figure 2 collects the basic valuation logic: the economy exhibits a unique

Panel A. Equilibrium dynamics under the valuation approach.



Panel B. Effects of an increase in exports.

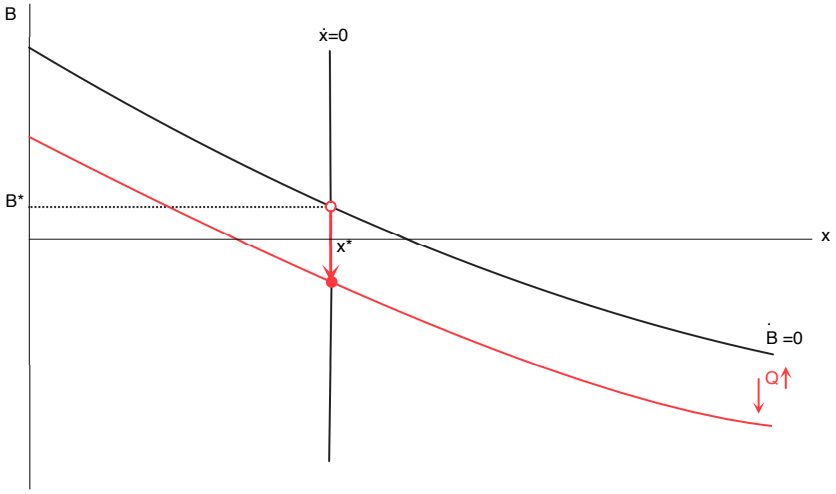


Figure 2: Valuation approach with explicit exports.

saddle path in (x, B) space, with B jumping on impact. Since the $\dot{x} = 0$ locus is the same as in the self-contained Schumpeterian system, the steady-state value x^* is unchanged. The steady-state foreign asset position becomes

$$B^* = \frac{1}{r}\left[\frac{\mu}{1+\tau}\left(1 - \frac{\theta}{\eta} - F(x^*)\right) - Q\right] = -\frac{TB^*}{r}, \tag{23}$$

which shows that external wealth is jointly determined by export demand and by the internal allocation of output across consumption, innovation, and entry.

4.3 The Valuation Channel of External Adjustment

The valuation approach leads naturally to a reinterpretation of the NFA position in small open economy models. In the conventional approach, the NFA position is treated as a predetermined state variable that evolves gradually through current-account balances. That corresponds to a representation in which the quantity of internationally traded securities changes over time while their valuation remains fixed.

The alternative developed here provides a different perspective. Once exports are an autonomous demand component rather than an unrestricted residual, the economy's resource constraint directly links foreign borrowing and lending to the allocation of output across consumption, intermediate production, innovation, and entry. In this environment, the NFA position represents the market value of a portfolio of claims rather than a slowly evolving stock of securities. As in other asset-pricing contexts, the equilibrium value of this portfolio adjusts instantaneously when economic conditions change.

Proposition 3. *Once exports are treated as an autonomous component of demand, the foreign asset position is no longer a predetermined stock. It is a forward-looking valuation variable that must jump to the saddle path, and its steady-state level is jointly determined by export demand and by the domestic allocation of output across consumption, innovation, and entry.*

This reinterpretation has three main implications. First, once exports are an autonomous

demand component rather than an unrestricted residual, the NFA position must be a forward-looking financial variable that jumps immediately to the saddle path. Second, the steady-state level of external wealth is jointly determined by the external environment, through export demand, and by the internal allocation of output across consumption, firm innovation, and firm entry. Third, the model predicts that growth and external wealth need not move together along transition paths.

These implications matter for the interpretation of observable external adjustment. In the canonical view, a change in the foreign asset position is read primarily as the cumulative result of past current-account imbalances. In the valuation view, that same change can instead reflect an immediate revaluation induced by a shift in export demand or by a shock that changes the economy's expected growth path. The distinction is substantive because it changes how one reads the joint behavior of the current account, the trade balance, and growth. A country can experience stronger growth prospects together with a lower foreign asset position, not because its intertemporal budget constraint has been violated, but because the market value of its external position is being jointly determined with the domestic allocation of resources. This is why the model speaks directly to episodes in which financial prices and real adjustment move sharply on impact while the underlying productive structure changes only gradually.

Through the valuation channel, tariffs have an immediate effect on the foreign asset position.

Proposition 4. *In the valuation approach, an increase in tariffs reduces import absorption and shifts the $\dot{B} = 0$ locus downward, thereby altering the equilibrium valuation of external wealth and improving the trade balance. Under the maintained small-open-economy assumptions, however, tariffs do not affect the Schumpeterian dynamics of firm size, innovation, or economic growth.*

4.4 Adjustment to External Shocks

To further clarify how the mechanism of external adjustment changes under the valuation approach, this subsection considers two comparative-dynamics exercises: an export-demand shock and a world interest rate shock.

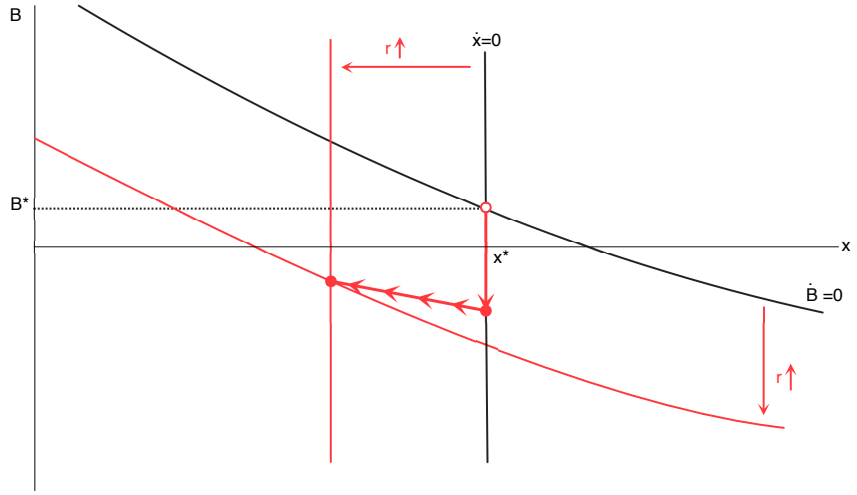
Export-Demand Shock. Panel B of Figure 2 shows that an increase in export demand shifts the $\dot{B} = 0$ locus downward, producing an immediate fall in the foreign asset position while leaving firm size unchanged on impact. The downward jump in B is not a paradox. In this model a stronger export market raises the value of resources used domestically and permits the economy to run a different intertemporal allocation. The equilibrium portfolio value therefore adjusts immediately, just as any other forward-looking asset price would. What changes on impact is not the physical stock of varieties or knowledge, but the valuation of the external position consistent with the new saddle path. The trade balance jumps up because exports increase while the Schumpeterian state is unchanged on impact. Unlike in the canonical approach, the external position is not determined solely by intertemporal saving decisions. It reflects the interaction between export demand and the domestic uses of output.

World-Interest-Rate Shock. Interest-rate shocks affect both the external position and the Schumpeterian block. A higher interest rate affects the portfolio valuation equation directly, but it also changes the profitability of entry and innovation. Through that channel it changes firm size, growth, and the internal allocation of final output. The response of the foreign asset position is therefore linked to the response of the Schumpeterian block.

When a higher interest rate lowers steady-state firm size, the economy experiences a downward jump in the foreign asset position followed by a gradual fall in firm size. When a higher interest rate instead raises steady-state firm size, the economy still exhibits a downward jump in external wealth, but growth eventually accelerates. In both cases the

model predicts that faster growth can be associated with lower net foreign assets along the transition.

Panel A. Increase in r when higher r lowers steady-state firm size.



Panel B. Impulse responses of growth and the foreign asset position in the same case.

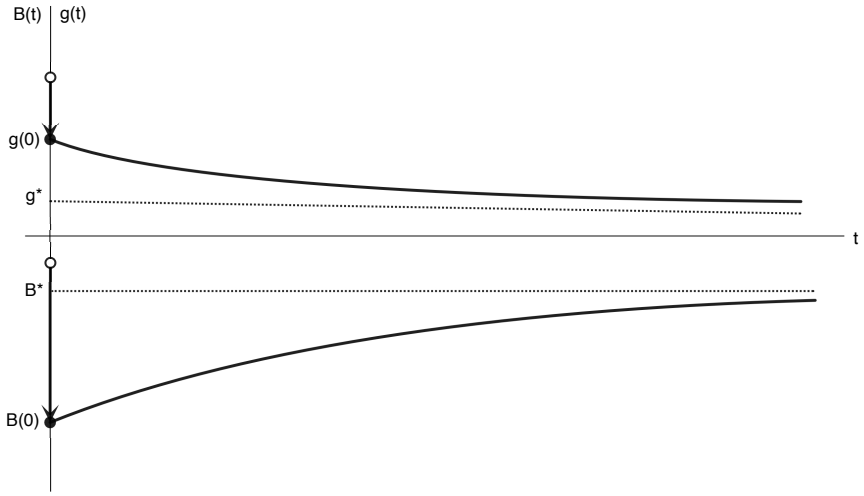
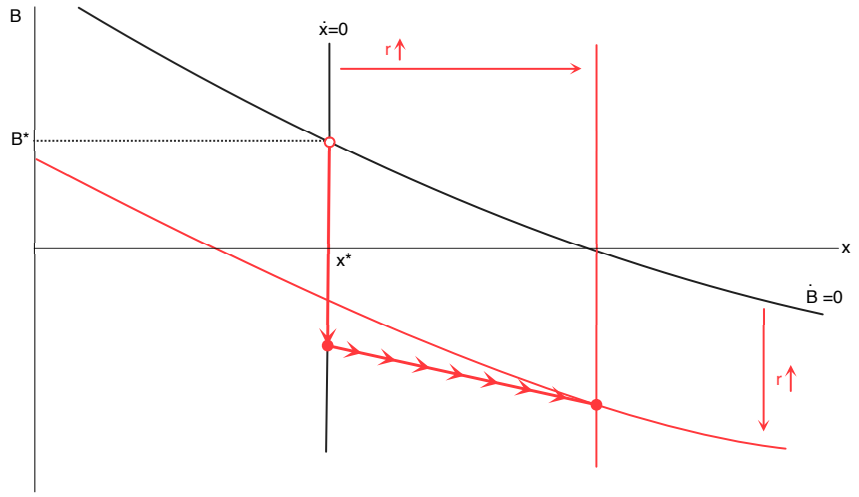


Figure 3: Interest-rate shocks when higher r lowers steady-state firm size.

Figure 3 shows the case $\beta\theta\phi < \eta - 1$, in which a higher interest rate lowers steady-state firm size. The foreign asset position overshoots on impact and then partially recovers, while firm size and growth decline over time. In that case growth and the foreign asset position comove negatively along the transition, while growth and the trade balance comove positively. The model therefore generates a connection between external adjustment and the supply side that is absent from the conventional intertemporal setup.

The economic intuition is straightforward. When higher interest rates depress the scale at which firms operate, both entry and in-house innovation become less attractive. Domestic resources are reallocated away from growth-generating activities, but the valuation of the external position also falls because the economy's future income and export capacity weaken. The result is a transition with slower growth and a lower foreign asset position.

Panel A. Increase in r when higher r raises steady-state firm size.



Panel B. Impulse responses of growth and the foreign asset position in the same case.

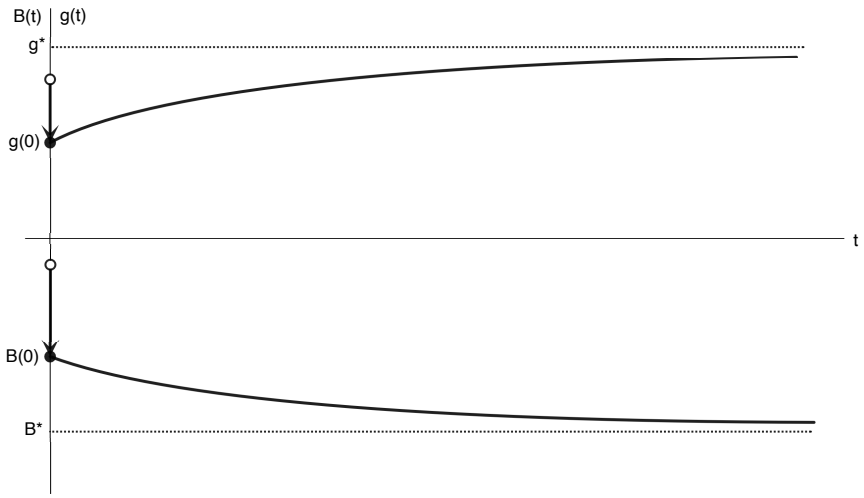


Figure 4: Interest-rate shocks when higher r raises steady-state firm size.

Figure 4 shows the case $\beta\theta\phi > \eta - 1$, in which a higher interest rate raises steady-state firm size. The foreign asset position again falls on impact, but firm size and growth subse-

quently increase. In that case the transition can feature a permanent growth acceleration together with lower external wealth. The model therefore delivers a robust implication: along transition paths, external wealth and growth need not move together.

This second case is the more surprising one and therefore especially informative. When entry is sufficiently costly relative to the fixed operating burden, a higher interest rate can reduce firm proliferation enough to raise average firm scale. Larger firms then innovate more aggressively, so growth eventually rises even though the foreign asset position falls on impact. External wealth is not a sufficient statistic for the growth prospects of the economy.

5 Conclusion

This paper develops a Schumpeterian small open economy model to study the interaction between innovation, firm dynamics, and external adjustment. By solving the model under both the canonical intertemporal interpretation of the net foreign asset position and an alternative valuation-based interpretation, the analysis highlights how different assumptions about the nature of external wealth generate fundamentally different dynamics. In the canonical approach, the foreign asset position evolves gradually through current-account accumulation and remains largely disconnected from the Schumpeterian growth block. In the valuation approach, external wealth becomes a forward-looking asset price determined jointly by export demand, financial-market valuation, and the allocation of resources across consumption, innovation, and firm entry. The same accounting identities therefore support markedly different mechanisms of external adjustment.

The paper also shows that the relationship between growth and external balances depends critically on how exports are modeled. When exports are treated as a residual, innovation and firm dynamics have no influence on the determination of the trade balance or foreign asset position. Once exports are modeled explicitly, however, changes

in firm size, innovation, and industrial structure affect the economy's external position through their impact on resource allocation and export capacity. At the same time, tariffs on final goods continue to affect the trade balance without altering long-run innovation or growth under the maintained small-open-economy assumptions.

More broadly, the framework provides a bridge between endogenous growth theory and international macroeconomics. By integrating innovation, entry, market structure, trade, and asset valuation within a unified equilibrium model, it clarifies how production-side dynamics and financial-market forces jointly shape external adjustment. Extending the framework to allow for endogenous world interest rates, international capital-market imperfections, exchange-rate movements, or growth effects of trade policy represents a promising direction for future research.

References

Aguiar, Mark A., Manuel Amador, and Doireann Fitzgerald. 2025. "Tariff Wars and Net Foreign Assets." National Bureau of Economic Research Working Paper 33743.

Barro, Robert J., and Xavier Sala-i Martin. 2004. *Economic Growth.* . 2 ed., Cambridge, MA:MIT Press.

Bayas-Erazo, Miguel, and Guido Lorenzoni. 2025. "Tariffs, Trade Deficits, and Liquidity Supply." Working paper.

Blanchard, Olivier J. 1985. "Debt, Deficits, and Finite Horizons." *Journal of Political Economy*, 93(2): 223–247.

Chu, Angus C., and Pietro F. Peretto. 2026. "Schumpeterian Growth Theory, the Great Acceleration, and the Great Divergence." In progress.

Ghironi, Fabio. 2006. "Macroeconomic Interdependence under Incomplete Markets." *Journal of International Economics*, 70(2): 428–450.

Ghironi, Fabio, and Marc J. Melitz. 2005. "International Trade and Macroeconomic Dynamics with Heterogeneous Firms." *Quarterly Journal of Economics*, 120(3): 865–915.

Ghironi, Fabio, and Marc J. Melitz. 2007. "Trade Flow Dynamics with Heterogeneous Firms." *American Economic Review*, 97(2): 356–361.

Ghironi, Fabio, Jaewoo Lee, and Alessandro Rebucci. 2015. "The Valuation Channel of External Adjustment." *Journal of International Money and Finance*, 57: 86–114.

Gourinchas, Pierre-Olivier, and Hélène Rey. 2007. "International Financial Adjustment." *Journal of Political Economy*, 115(4): 665–703.

Itskhoki, Oleg, and Dmitry Mukhin. 2025. "The Optimal Macro Tariff." National Bureau of Economic Research Working Paper 33839.

Kleinman, Bennett, Ernest Liu, Stephen J. Redding, and Motohiro Yogo. 2023. "Neoclassical Growth in an Interdependent World." National Bureau of Economic Research Working Paper 31951.

Lane, Philip R., and Gian Maria Milesi-Ferretti. 2001. "The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries." *Journal of International Economics*, 55(2): 263–294.

Lane, Philip R., and Gian Maria Milesi-Ferretti. 2007. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004." *Journal of International Economics*, 73(2): 223–250.

Lucas, Jr., Robert E. 1982. "Interest Rates and Currency Prices in a Two-Country World." *Journal of Monetary Economics*, 10(3): 335–359.

Obstfeld, Maurice, and Kenneth Rogoff. 1995. "Exchange Rate Dynamics Redux." *Journal of Political Economy*, 103(3): 624–660.

Obstfeld, Maurice, and Kenneth Rogoff. 1996. *Foundations of International Macroeconomics.* Cambridge, MA:MIT Press.

Peretto, Pietro F. 2015. "From Smith to Schumpeter: A Theory of Take-Off and Convergence to Sustained Growth." *European Economic Review*, 78: 1–26.

Peretto, Pietro F. 2026. *Knowledge, Industry and the Endogenous Growth of Nations.* MIT Press. Forthcoming.

Uribe, Martin, and Stephanie Schmitt-Grohé. 2017. *Open Economy Macroeconomics.* Princeton University Press.

Yaari, Menahem E. 1965. "Uncertain Lifetime, Life Insurance, and the Theory of the Consumer." *Review of Economic Studies*, 32(2): 137–150.