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Sectoral Balances, Financial Markets, and Business Cycles in the US Economy

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ABSTRACT

This paper investigates the interaction between private-sector financial balances, financial conditions, and business-cycle dynamics in the United States, with particular attention to the distinct roles of households and non-financial corporations. Building on the sectoral-balances tradition (Godley and Cripps 1983; Zezza 2009) and Minsky's financial instability hypothesis (Minsky 1986, 1992), the paper interprets private-sector balances as indicators of expenditure dynamics, leverage accumulation, and financial fragility. We use a structural vector autoregressive (SVAR) framework to identify the dynamic interactions between output, asset prices, interest rates, credit spreads, and private-sector financial balances, extending the framework proposed by Casadio and Paradiso (2010, 2012). Our findings suggest that the macroeconomic significance of private financial balances depends on the historical setting in which they evolve. The post–Global Financial Crisis (GFC) estimates indicate a weaker connection between credit-spread disturbances, output contraction, and corporate adjustment, but do not establish that financial fragility has disappeared.

JEL Codes: E32; E44; E37; G12

Keywords: sectoral balances; business cycles; credit spreads; asset prices; structural VAR; United States

1. INTRODUCTION

Financial crises are frequently preceded by prolonged increases in leverage, rapid credit expansion, and increasingly fragile financing structures (Minsky 1986, 1992; Kindleberger 1978; Borio and Lowe 2004; Borio 2014; Jordà, Schularick, and Taylor 2013). The US experience gives this problem particular relevance. Although the dot-com recession and the Global Financial Crisis (GFC) differed in their origins and severity, both followed expansions in which asset-price increases and private borrowing played important roles (Godley 1999; Godley, Papadimitriou, and Zezza 2006; Gorton 2012; Mian and Sufi 2014). Favorable financial conditions can encourage households and firms to expand expenditure, while rising asset values support borrowing and reinforce expectations of continued growth. When these conditions reverse, attempts to reduce debt or rebuild financial positions can depress expenditure and amplify the downturn. These interactions have motivated approaches that place financial fragility, balance-sheet adjustment, and their relationship with aggregate demand at the center of macroeconomic analysis (Eggertsson and Krugman 2012; Geanakoplos 2010).

The sectoral-balances tradition associated with the New Cambridge School (Godley and Cripps 1983) provides a framework for examining these expenditure and financing patterns. A sector's financial balance measures the difference between its income and expenditure, including capital expenditure: a surplus represents net lending, while a deficit represents net borrowing. Because one sector's expenditure generates income elsewhere, the balances of the private, government, and foreign sectors must sum to zero across the economy. This accounting relationship provides a coherent basis for studying how expenditure decisions interact across sectors, although it does not determine the direction of causality (Godley and Lavoie 2007; Zezza 2009). A reduction in private surpluses or an increase in private deficits can accompany expenditure growth that supports aggregate demand (Hatzius 2003; Zezza 2009). Where that expenditure increasingly depends on borrowing, its continuation may become vulnerable to changes in financing conditions (Godley 1999). This perspective connects the analysis of financial balances to Minsky's (1986, 1992) account of endogenous financial instability. Favorable financing conditions can sustain expenditure while encouraging greater reliance on borrowing, leaving households and firms vulnerable when those conditions reverse.

Casadio and Paradiso (2010, 2012) incorporate this distinction into a structural VAR of the US economy, jointly modeling output, equity prices, credit spreads, long-term interest rates, and household and non-financial corporate balances. Their findings described a system of feedbacks: financial conditions influenced household and corporate expenditure relative to income, while output and sectoral balances affected financial markets. They also find that a positive innovation in the corporate balance preceded an expansion in output, which they interpret as evidence of its leading role in the business cycle, consistent with Minsky's account of financial instability.

Starting from this identification framework, we re-estimate the structural VAR model over its original sample using the current data vintage and then extend the analysis through 2025Q4. We examine whether the estimated relationships remain stable and compare shock transmission before and after the GFC within a common specification. Direct comparisons of normalized impulse responses identify changes in propagation, while variance and historical decompositions assess the importance of the shocks for cyclical fluctuations and particular historical episodes.

The results reveal a substantial weakening of the estimated credit-spread channel after 2008. A comparable adverse spread shock is followed by a much smaller output contraction in the later sample, together with a weaker medium-run improvement in corporate net lending. The composition of private-balance fluctuations also changes: household balances become more closely associated with output shocks, while corporate balances become more strongly associated with their own movements.

The paper is divided as follows: Section 2 develops the accounting and behavioral interpretation of sectoral balances and describes the changing US configuration. Section 3 reviews the relevant literature as section 4 discusses the data and the methodology. Section 5 presents the stability evidence, impulse responses, and decompositions. Section 6 concludes.

2. THE SECTORAL BALANCES APPROACH AND SOME STYLIZED FACTS ON THE US ECONOMY BEFORE AND AFTER THE GLOBAL FINANCIAL CRISIS

2.1 Sectoral Balances and Macroeconomic Adjustment

The sectoral-balances approach originated from the accounting framework of Godley and Cripps (1983)[4], and was later formalized within Stock-Flow Consistent models by Godley and Lavoie (2007). In its simplest form, the framework states that the financial balances of the private sector, government sector, and foreign sector must sum to zero ex post. Although this relationship is an accounting identity, its macroeconomic implications depend on the expenditure and financing decisions undertaken by each sector.

From a macroeconomic perspective, sectoral balances summarize the interaction between saving, investment, borrowing, and expenditure decisions across institutional sectors. A sector running a financial deficit contributes positively to aggregate demand by spending more than its income, while a sector running a financial surplus contributes negatively by spending less than its income. Because the balances must add up ex post, persistent changes in one sector's position necessarily imply adjustments elsewhere in the economy. In this perspective, periods of above-trend growth are typically associated with at least one sector increasing expenditure relative to income through a reduction in financial surpluses or an expansion of deficits (Hatzius 2003).

Following Godley's terminology, we begin with the national-income identity:

$$Y = G + X - M + PX \qquad \text{(A)}$$

where (Y) denotes national income, (G) government expenditure on goods and services, (PX) total private expenditure, including consumption and investment, and (M) imports. Here, (X) includes exports together with net property income and net current transfers received from

[4] The modern sectoral-balances framework also builds on earlier traditions of social accounting and flow-of-funds analysis associated with Copeland (1949), which emphasized the importance of tracking inter-sector financial flows and balance-sheet positions within a coherent accounting framework.

abroad. All variables are flows measured in consistent prices; a common deflator can be used to express them in real terms.

Subtracting (T), defined as taxes and other current receipts of government net of transfers to the private sector, and rearranging gives:

$$Y - T - PX = (G - T) + (X - M) \quad \text{(B)}$$

Or, equivalently

$$0 = (G - T) + (X - M) - PNS \quad \text{(B1)}$$

where PNS is private net saving—i.e., private disposable income (Y-T) less total private expenditure, including both consumption and investment. Private net saving therefore equals the government deficit plus the current account balance. Here, "net saving" means saving after investment expenditure: a positive value indicates private net lending, while a negative value indicates private expenditure exceeding disposable income. The foreign sector's financial balance has the opposite sign to the domestic current account, so the financial balances of all three sectors sum to zero.

This relationship provides a starting point for understanding changes in aggregate demand. Consider an increase in private expenditure relative to income. It initially supports demand, but the resulting expansion also affects tax receipts, imports, and saving. Conversely, an attempt by households and firms to increase net saving by cutting expenditure can weaken activity, reducing income and changing the balances of the government and foreign sectors. The balance ultimately observed therefore reflects both the initial spending decisions and the adjustment they set in motion (Hatzius 2003; Zezza 2009).

The accounting identity alone cannot determine this adjustment. As Nikiforos and Taylor (2025) emphasize, its interpretation requires a theory of macroeconomic closure. Within an effective-demand framework, changes in expenditure affect output and income, helping reconcile the

financial positions that different sectors seek to achieve. Shaikh (2012) similarly distinguishes the ex-post equality of the balances from the ex-ante decisions underlying them: accounting consistency does not imply that intended saving, investment, and borrowing are automatically compatible at an unchanged level of activity. Each sector has its own behavioral relationships, while their interaction determines the evolution of the economy (Godley and Cripps 1983; Godley and Lavoie 2007; Dos Santos and Macedo e Silva 2010).

For this reason, the balances should be interpreted jointly. An increase in private net saving during a downturn may reflect retrenchment in consumption and investment, while a simultaneous increase in the government deficit may reflect falling tax receipts and measures supporting private income. A declining private surplus during an expansion may instead accompany stronger expenditure. Neither the sign nor the movement of an individual balance is sufficient to establish the strength of demand or the direction of causality. The configuration of the balances, together with the behavior underlying their changes, is what matters.

Financial balances also connect current expenditure decisions to the evolution of assets and liabilities. A sector can finance expenditure exceeding income by issuing liabilities or reducing financial assets. Its balance consequently records net financial transactions, while changes in the value of existing assets and liabilities also affect its financial position. Persistent deficits can increase vulnerability when they entail rising debt commitments or the depletion of liquid assets, but the balance alone does not reveal the composition of financing or the capacity to service outstanding obligations (Godley and Lavoie 2007; Dos Santos and Macedo e Silva 2010).

This connection is central to the analysis of debt-led growth. Private expenditure financed through borrowing can sustain activity while increasing dependence on continued access to finance. Godley (1999) and Hatzius (2003) emphasize the potential vulnerability of such expenditure patterns, while Zezza (2009) relates the pre-GFC US expansion to increasing private indebtedness, particularly among households. When borrowers subsequently seek to repair their financial positions, the reduction in expenditure can weaken demand unless other spending expands sufficiently. The relevant question is therefore whether the financing arrangements supporting an expansion can continue, and how the economy adjusts when they change.

Understanding these processes also requires disaggregating the private sector. We write:

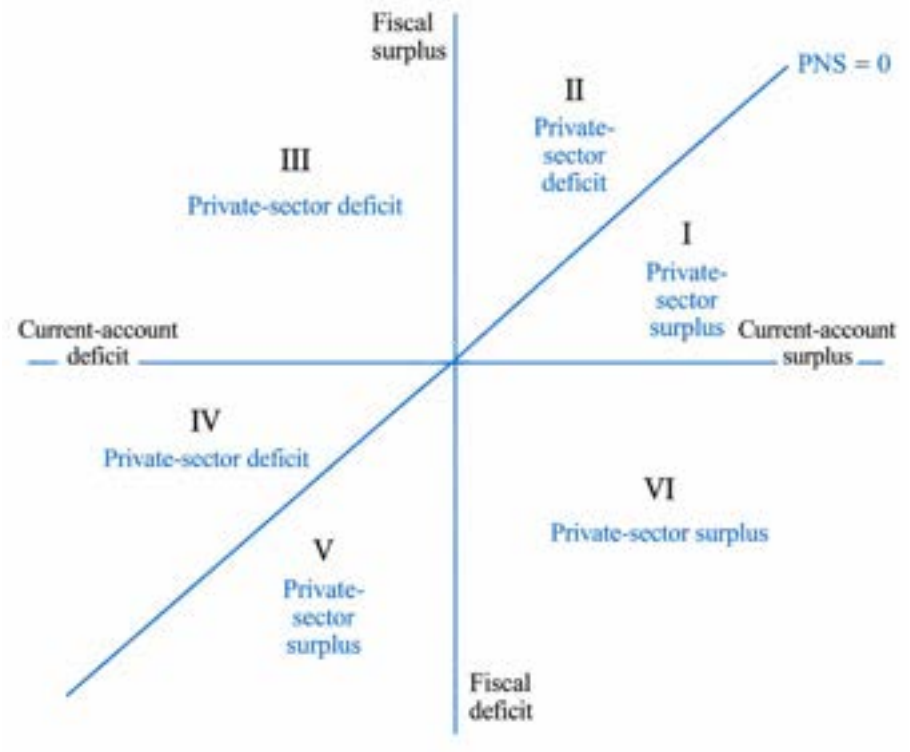
$$PNS = HNS + FNS \qquad \text{(C)}$$

where (HNS) denotes household net saving and (FNS) the combined net saving of financial and non-financial businesses, including non-corporate enterprises. Household positions reflect consumption, residential investment, and income and saving decisions, whereas non-financial corporate positions reflect the relationship between internal funds, investment, and external financing needs. Similar movements in aggregate private net saving may therefore conceal different adjustments by households and firms, with different consequences for activity and financial conditions.

2.2 The US Economy through Sectoral Balances

Figure 1 (Zezza 2020) represents the accounting relationships developed in section 2.1. The current-account balance is measured on the horizontal axis and the government financial balance on the vertical axis, with positive values denoting surpluses. Since private net saving equals the current-account balance minus the government financial balance, the upward-sloping diagonal identifies combinations for which (PNS=0). Points above this line correspond to private net borrowing, while points below it correspond to private net lending. The axes and diagonal divide the diagram into six regions. A fiscal surplus combined with a current-account deficit necessarily entails a private-sector deficit, as in region III. Conversely, a fiscal deficit combined with a current-account surplus necessarily entails private net lending, as in region VI. When the government and current-account balances have the same sign, their relative magnitudes determine the private position. In the upper-right quadrant, private net saving is positive when the current-account surplus exceeds the fiscal surplus and negative in the opposite case. In the lower-left quadrant, where both the fiscal and external positions are in deficit, private net saving is positive when the government deficit exceeds the current-account deficit in absolute terms. Regions IV and V therefore distinguish two configurations that share fiscal and external deficits but imply opposite private financial positions.

Figure 1. Sectoral Balances



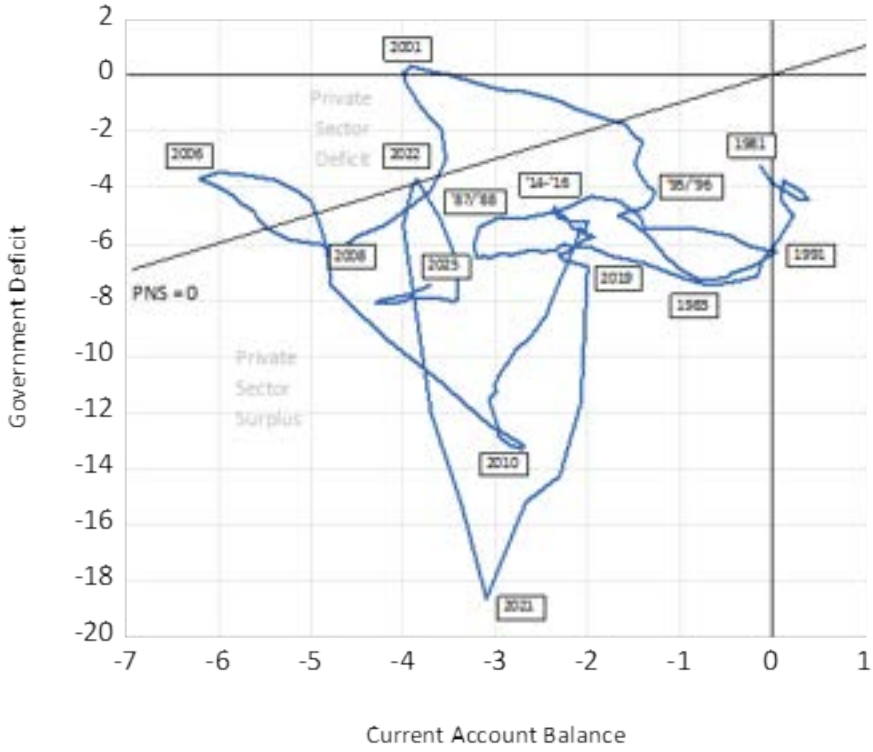
Source: Zezza (2020)

Figure 2 applies this representation to the US economy. Most observations lie in the lower-left quadrant, indicating the coexistence of government and current-account deficits. Within that quadrant, however, the trajectory moves across the diagonal, revealing substantial changes in the private-sector position. The observations associated with much of the 1980s and early 1990s lie below the diagonal, where government deficits coexist with private net lending. The movement toward the late-1990s fiscal surplus, together with a deteriorating current account, shifts the economy above the diagonal. Around the turn of the century, the private sector consequently occupied a net borrowing position despite the apparent improvement in the public finances.

The subsequent return to fiscal deficit did not immediately restore sustained private net lending. During the expansion preceding the GFC, the widening current-account deficit continued to be associated with private expenditure exceeding income. The crisis then produces a pronounced movement below the diagonal, as the government deficit expands and the current-account deficit narrows. The post-crisis trajectory largely remains in the private-surplus region, with the

pandemic generating an exceptional further displacement. The persistence of the external deficit therefore coexists with a substantial change in its domestic counterparts.

Figure 2. Joint Evolution of the US Current-Account Balance and Government Deficit, % of GDP



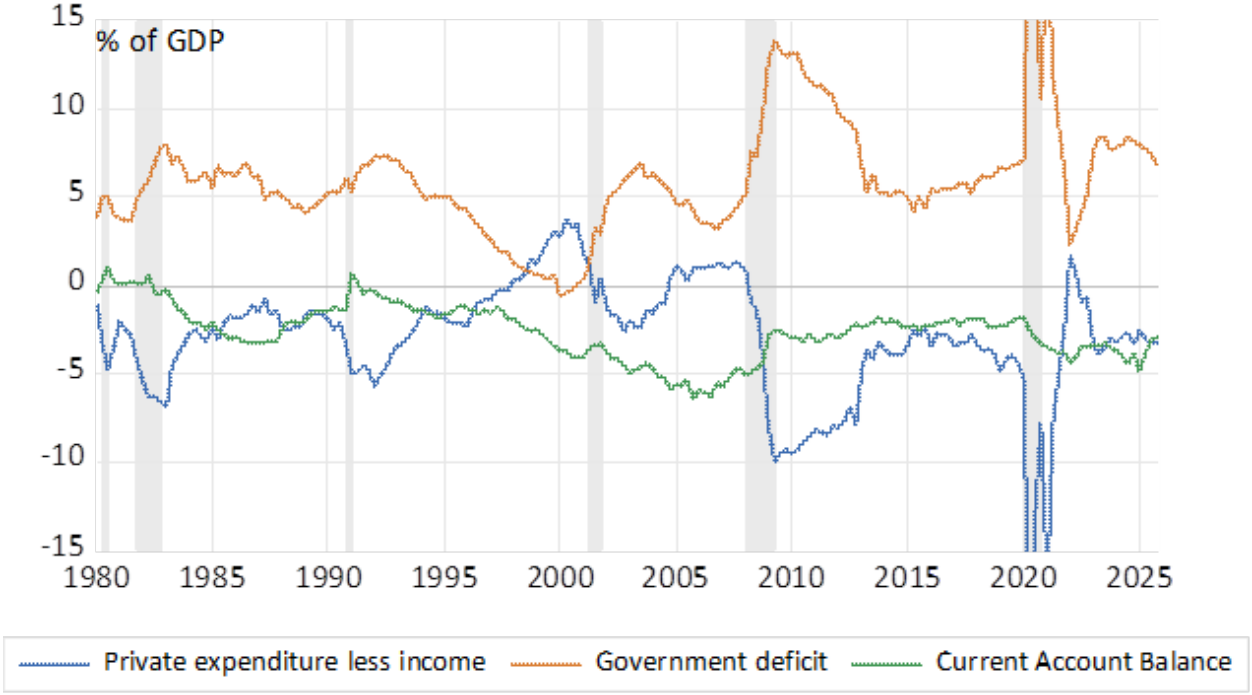
Source: FRED

Figure 3 presents the temporal dimension of these adjustments. It should be noted that the negative sign on private net saving (PNS/GDP) in equation (B) implies that the figure is describing private expenditure less disposable income, that is *negative* net saving as in (Godley et al. 2007b).

Starting in 1992 and throughout the late 1990s, the US economy famously enjoyed a long period of relatively smooth and rapid "Goldilocks" expansion. The progressive increase in private expenditure relative to income coincided with a reduction in the government deficit and a deterioration of the current account. By the end of the decade, the coexistence of an external deficit and – for the first time in recorded data – a fiscal surplus had its counterpart in substantial private net borrowing. Against most of the financial press and economic commentators, Godley (1999) famously questioned the sustainability of this configuration, arguing that continued

growth increasingly depended on borrowing and asset-price appreciation sustaining private expenditure. The concern was that a reversal of private spending, without an offsetting change in fiscal policy or external demand, would weaken activity and undermine the fiscal projections premised on continued expansion.

Figure 3. US Balances of the Main Sectors in Historical Perspective, % of GDP, 1980Q1–2025Q4



Notes: Shaded areas correspond to the FED quarterly recession indicator.
Source: FRED

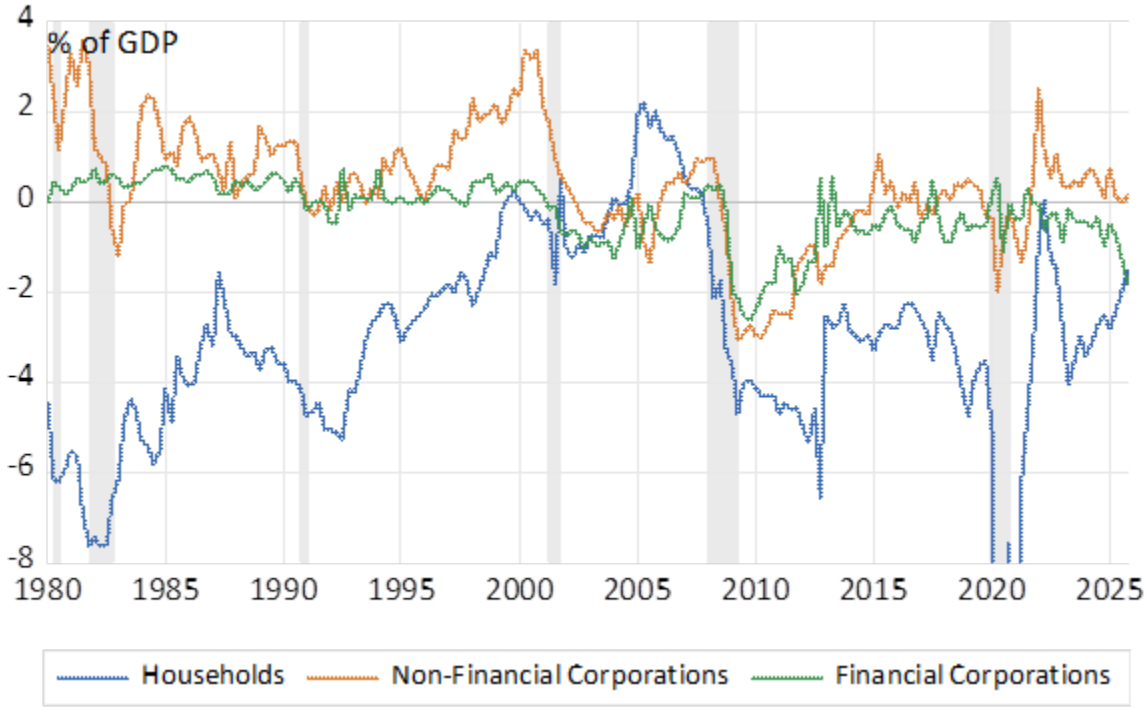
The collapse of the technology-equity boom was followed by a pronounced adjustment in business expenditure. The 2001 recession was distinctive in the importance of the contraction in business investment, while household expenditure was comparatively resilient (Bernanke 2003). Figure 4 shows the corresponding movement in non-financial corporate expenditure less income: the substantial deficit recorded around the turn of the century narrowed and subsequently became a surplus. This improvement in the corporate financial balance should therefore be interpreted alongside the contraction in expenditure, rather than as an unambiguous indication of stronger corporate activity.

The adjustment also changed the composition of the expenditure supporting the economy. The decline in business spending around 2001 occurred alongside continued growth in personal expenditure, while fiscal expansion helped offset the weakening of private demand. Figure 3 records the associated return from government surplus to deficit. The recovery consequently involved a reconfiguration of the sectoral balances: fiscal support and household expenditure became more prominent as firms reduced expenditure relative to internal funds.

During the subsequent expansion, household expenditure increasingly exceeded income. Rising residential property values and access to mortgage finance supported this development, while the current-account deficit remained substantial. The distinction from the late-1990s expansion is visible in Figure 4: household net borrowing became more pronounced, whereas the non-financial corporate deficit was smaller than around the dot-com peak. Microeconomic evidence supports the relevance of housing collateral to this process. Mian and Sufi (2011) find that existing homeowners increased borrowing against rising home equity during 2002–06, linking house-price appreciation to the accumulation of household leverage.

In 2007, Godley was among the voices warning again about the implications of this dependence on borrowing as the housing market weakened, questioning the official CBO projections that combined continued growth and fiscal consolidation with persistent private deficits. Their alternative scenario illustrated that even a stabilization of household debt relative to income could require a substantial decline in new borrowing, with adverse consequences for expenditure (Godley et al. 2007a). By November, Godley placed greater emphasis on the developing credit contraction and on whether fiscal and external demand could offset its effects (Godley et al. 2007b).

Figure 4. Decomposition of the US Private Sector Balance (Expenditure Less Income), % of GDP, 1980Q1–2025Q4



Notes: Shaded areas correspond to the FED quarterly recession indicator.
Source: [source to be supplied by authors]

The GFC brought a much broader contraction in private expenditure relative to income. Falling housing wealth and impaired access to finance affected households whose debt commitments had accumulated during the preceding expansion. Mian, Rao, and Sufi (2013) document that consumption declined more strongly in areas experiencing larger losses of housing net worth, with household leverage contributing to the severity of the adjustment. This evidence helps interpret the sharp decline in household expenditure less income in Figure 4, while avoiding the inference that the aggregate financial balance alone identifies the underlying mechanism.

Corporate expenditure also adjusted, and the aggregate private sector moved decisively into net lending. The simultaneous expansion of the government deficit reflected both the deterioration in activity and measures supporting income and expenditure, while the current-account deficit narrowed. Figures 2 and 3 therefore record the joint outcome of private retrenchment and changes in its public and external counterparts. The private surplus and government deficit were mutually consistent accounting positions arising from these interacting adjustments.

The subsequent recovery did not restore the pre-crisis household-deficit configuration. Household expenditure generally remained below disposable income, while non-financial corporate expenditure fluctuated more closely around income. Government deficits narrowed from their crisis peak but continued to coexist with aggregate private net lending and an external deficit. Reducing fiscal support under these conditions required an expansion of expenditure elsewhere, if activity was to be sustained (Papadimitriou et al. 2011). The post-GFC configuration consequently differed from the preceding expansion both in the composition of private expenditure and in the role of its fiscal counterpart.

The pandemic generated a further increase in private net saving under markedly different circumstances. Restrictions on consumption and production coincided with exceptional support to private incomes, producing the large household surplus visible in Figure 4 and its fiscal counterpart in Figure 3. The subsequent recovery in expenditure relative to income reduced these exceptional balances. The similarity between the direction of the private-balance movements during the GFC and the pandemic should therefore not obscure the differences in their origins, financing conditions, and policy responses. An increase in private net lending can arise through different combinations of expenditure contraction and income support, with different implications for subsequent activity.

At the same time, household and corporate balances exhibit distinct cyclical patterns, while the configuration linking private expenditure to the fiscal and external positions changes substantially over the sample. The descriptive evidence does not establish that the transmission of financial shocks changed, nor does it identify the GFC as a unique statistical break. It provides an economic rationale for examining whether relationships estimated largely from pre-crisis experience remain informative in the subsequent period. The empirical analysis carried out in section 4 therefore evaluates the stability of the macro-financial system and compares the responses of output and private financial balances before and after the GFC.

3. LITERATURE REVIEW

The sectoral-balances literature examines how expenditure and financing decisions across institutional sectors interact in shaping macroeconomic adjustment. Building on Godley's analysis of private, public, and external financial positions, it combines accounting consistency with behavioral explanations of saving and expenditure (Godley and Cripps 1983; Godley 1999; Godley and Lavoie 2007). Dos Santos and Macedo e Silva (2010) situate this approach within stock-flow-consistent modeling, while Jonáš and Komínek (2017) clarify its relationship with national and financial accounts. These contributions connect sectoral flows to balance-sheet accumulation without treating accounting identities as sufficient explanations of economic behavior. Empirical studies reveal distinct cyclical patterns across sectors. Barbosa-Filho et al. (2008) find that US household net borrowing is procyclical and tends to lead activity, with residential investment playing an important role, whereas business borrowing generally tracks or lags the cycle. Government borrowing moves countercyclically, partly reflecting automatic stabilizers.

Casadio and Paradiso (2010, 2012) connect this literature to financial-market dynamics by distinguishing household and non-financial corporate balances within a structural macro-financial framework. Their analysis models feedback between these balances, output, equity prices, interest rates, and credit spreads, highlighting differences in sectoral responses and the cyclical information contained in the corporate financing gap. Complementing this approach, Dotsis (2024), using historical data for 18 advanced economies over 1870–2020, finds that weaker aggregate private financial balances predict higher banking-crisis risk, particularly alongside rapid credit growth. His analysis also identifies household–corporate disaggregation as an important extension.

The relationship between financial balances and macroeconomic instability is central to Minsky's financial instability hypothesis. According to Minsky (1986, 1992), capitalist economies are inherently prone to cycles of rising leverage and increasing fragility. During prolonged expansions, optimistic expectations and favorable financing conditions encourage households and firms to rely progressively more heavily on debt-financed expenditure. As leverage increases and margins of safety decline, the economy becomes increasingly vulnerable to adverse shocks and financial reversals.

Subsequent contributions formalize these mechanisms through interactions among investment, credit conditions, asset prices and changing perceptions of acceptable leverage. Nikolaidi and Stockhammer (2017) show that Minskyan models encompass distinct mechanisms involving debt accumulation, credit rationing and asset-price dynamics. Dafermos (2018) explicitly connects this literature with Godley's sectoral-balances framework: expenditure responds to a desired debt-to-income ratio that evolves endogenously with economic conditions, potentially generating cycles and instability. This formalization complements earlier analyses of the vulnerabilities associated with sustained borrowing-led expansions (Godley and Izurieta 2002; Godley, Papadimitriou, and Zezza 2008).

Corporate financing gaps provide one connection between these mechanisms and observable financial balances. When investment exceeds internally generated funds, firms must obtain external finance or draw down financial assets. Casadio and Paradiso (2010 2012) emphasize the cyclical information contained in this gap, arguing that financing imbalances can anticipate adjustments in investment and activity. Using firm-level evidence, Davis, de Souza, and Hernandez (2019) document an increasing incidence of Ponzi financing among US non-financial corporations, concentrated among smaller firms, but find limited support for a strong business-cycle relationship. Their results caution against inferring a uniform progression toward fragility from aggregate corporate balances.

A broader macro-financial literature examines how balance-sheet conditions and credit markets amplify economic fluctuations. Bernanke, Gertler, and Gilchrist (1999) show how deteriorating borrower net worth raises external finance premia, reinforcing declines in investment and output. Kiyotaki and Moore (1997) identify feedback effects between collateral values and borrowing capacity, while Geanakoplos (2010) and Adrian and Shin (2010) emphasize changes in leverage and financing conditions. These mechanisms complement analyses of debt-induced demand contractions and finance-dominated accumulation (Eggertsson and Krugman 2012; Hein 2012), although their theoretical foundations differ.

Empirical research connects these amplification mechanisms with the accumulation of financial imbalances. Borio (2014) characterizes financial cycles as persistent interactions between credit and property prices, often extending beyond conventional business-cycle frequencies. Jordà, Schularick, and Taylor (2013) show that more credit-intensive expansions tend to be followed by deeper recessions and slower recoveries. More recently, Greenwood et al. (2022) find that rapid credit expansion combined with asset-price growth, in either the household or non-financial business sector, predicts an increased probability of financial crisis. Their evidence supports the view that vulnerabilities accumulate during expansions and can be partly identified before a crisis occurs.

Financial-market prices also contain information about subsequent macroeconomic adjustment. Gilchrist and Zakrajšek (2012) show that corporate credit spreads, particularly their component unrelated to expected default losses, predict economic activity. Extending attention beyond average growth outcomes, Adrian, Boyarchenko, and Giannone (2019) find that deteriorating financial conditions are associated with a pronounced worsening of downside growth risk. Financial conditions therefore convey information about both the expected path of activity and the probability of unusually adverse outcomes.

Recent contributions further clarify why the effects of borrowing change over time and differ across sectors. Drehmann, Juselius, and Korinek (2023) identify a propagation mechanism through which household borrowing initially supports expenditure but generates subsequent debt-service obligations that weigh on activity. The resulting adjustment can persist beyond the initial credit expansion. However, household and corporate debt need not have equivalent consequences. Jordà, Kornejew, Schularick, and Taylor (2022) find that corporate credit booms do not generally exhibit the same adverse recovery pattern as household credit booms; their costs depend importantly on frictions in debt restructuring and resolution. This evidence makes the institutional organization and sectoral composition of indebtedness central to the analysis of financial amplification.

Structural vector autoregressive models provide an empirical framework for examining the joint dynamics of financial conditions, private-sector behavior and economic activity. The closest

antecedent to the present analysis is Casadio and Paradiso (2010, 2012), who incorporate household and non-financial corporate balances alongside output, equity prices, credit spreads and long-term interest rates in a US structural VAR. Their specification treats sectoral balances as endogenous components of macro-financial adjustment and allows their responses to financial disturbances to differ. By analyzing cyclical deviations in both balances within a common system, their approach connects the sectoral-balances literature with empirical research on financial shock transmission.

A related literature investigates the macroeconomic effects of disturbances originating in credit markets. Gilchrist, Yankov, and Zakrajšek (2009) employ a structural factor-augmented VAR and find that unexpected increases in corporate bond spreads generate substantial and persistent contractions in economic activity. Their use of bond and equity information helps distinguish the information contained in credit spreads from that already reflected in stock prices. These findings support the joint inclusion of credit-market and equity-market variables when examining financial transmission, although their framework does not explicitly model household and corporate net lending.

Subsequent research highlights the importance of distinguishing financial shocks from other disturbances that also move financial prices. Caldara et al. (2016) use a structural VAR with a penalty-function identification approach to separate financial and uncertainty shocks. They find that both can depress activity, with uncertainty disturbances having particularly adverse effects when accompanied by tighter financial conditions. Their analysis illustrates why an observed widening of credit spreads cannot automatically be interpreted as an autonomous credit-supply disturbance: its structural interpretation depends on the identifying assumptions and the variables included in the model.

Other contributions question the stability of macro-financial relationships. Prieto, Eickmeier, and Marcellino (2016) estimate a Bayesian VAR with time-varying parameters for the United States, examining credit-spread, house-price and stock-price shocks. They find that the contribution of financial disturbances to output fluctuations varies substantially over time and increases during the Global Financial Crisis. Hubrich and Tetlow (2015), using a Markov-switching VAR,

distinguish changes in shock variances from changes in dynamic coefficients when analyzing the interaction between financial stress and the macroeconomy. This distinction is important because a greater contribution of financial shocks to observed fluctuations may reflect larger disturbances, altered propagation, or both.

The present paper brings these strands together by retaining household and non-financial corporate balances within a common structural system and examining its stability over an extended sample. Its contribution lies in assessing whether the relationships documented by Casadio and Paradiso remain informative after the Global Financial Crisis, as discussed in the following section.

4. DATA AND METHODOLOGY

The changing configuration of US sectoral balances also raises the question of whether their interaction with financial conditions has remained stable. We investigate these relationships using a structural vector autoregressive model that jointly describes output, financial-market variables, and household and non-financial corporate balances. Following Casadio and Paradiso (2010, 2012), this framework allows private balances to respond to macro-financial disturbances and to contribute to the subsequent adjustment of the system.

We first re-estimate the specification over the original sample, 1980Q1–2010Q2, using the current data vintage, and then extend the analysis through 2025Q4. Retaining the same variables, filtering method, lag length, and identifying restrictions provides a common basis for assessing whether the relationships documented in the earlier study remain informative over the longer period.

The analysis uses quarterly US data drawn from Federal Reserve Economic Data and the Federal Reserve Financial Accounts. The model includes real GDP, the S&P 500 index scaled by nominal GDP, the spread between Moody's seasoned Baa corporate bond yield and the ten-year

Treasury yield, the ten-year Treasury yield, and the financial balances of households and non-financial corporations.

Real GDP enters in logarithms, while the equity-price measure is the S&P 500 index divided by nominal GDP and multiplied by 100. Household and non-financial corporate balances are measured as net lending in percentages of nominal GDP, with positive values denoting net lending and negative values net borrowing. This sign convention is the reverse of the expenditure-less-income representation used in the preceding descriptive figures. The Treasury yield and Baa spread are measured in percentage points.

Following Casadio and Paradiso, all six variables are transformed into cyclical components using the two-sided Hodrick–Prescott filter with a quarterly smoothing parameter of 1,600. The cyclical component of log real GDP is multiplied by 100 and therefore approximately measures percentage deviations from trend. The remaining cycles retain the units of the underlying variables. This transformation focuses the analysis on cyclical interactions: an increase in a financial-balance cycle indicates higher net lending relative to its estimated trend, without necessarily implying an actual sectoral surplus. The trend serves as a statistical reference path rather than a benchmark for financial sustainability.

Let

$$x_t = [y_t, q_t, b_t, r_t, h_t, f_t]'$$

denote the vector of cyclical variables, where the entries correspond respectively to output, scaled equity prices, the Baa spread, the ten-year yield, and the household and non-financial corporate balances. We estimate a reduced-form VAR with a constant and two lags:

$$x_t = c + \Phi_1 x_{\{t-1\}} + \Phi_2 x_{\{t-2\}} + u_t$$

$$E(u_t u_t') = \Sigma_u$$

The two-lag specification is retained across the original sample, the extended sample, and the historical subsamples. Together with the common variable definitions and identifying restrictions, this makes the estimates comparable without introducing changes in the model's dynamic structure.

Structural identification follows the contemporaneous restrictions of Casadio and Paradiso. Reduced-form innovations are related to mutually orthogonal structural shocks through

$$Au_t = B\varepsilon_t$$

$$E(\varepsilon_t \varepsilon_t') = I$$

where (B) is diagonal and

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ * & 1 & * & * & * & * \\ * & 0 & 1 & * & 0 & 0 \\ * & * & 0 & 1 & 0 & 0 \\ * & * & 0 & * & 1 & 0 \\ * & * & * & 0 & 0 & 1 \end{bmatrix},$$

$$B = diag\left[\sigma_y, \sigma_q, \sigma_b, \sigma_r, \sigma_h, \sigma_f\right]$$

Asterisks denote freely estimated coefficients. The restrictions distinguish the slower adjustment of real activity from the contemporaneous interaction of financial markets and sectoral balances. Output does not respond within the quarter to the other structural disturbances. The equity-price equation includes all remaining variables, while the spread equation includes output and the long-term yield, and the long-rate equation includes output and equity prices. The household-balance equation includes output, equity prices, and the long-term yield, reflecting income, valuation, and borrowing-cost channels. The corporate-balance equation includes output, equity prices, and the Baa spread, reflecting the role of activity, market valuations, and corporate financing conditions.

These restrictions apply to the contemporaneous equations; the impact responses to structural shocks are determined jointly by $(A^{-1}B)$. Both private balances also interact with the other

variables through the lagged dynamics. The resulting shocks are labeled according to their respective structural equations: output, equity prices, credit spreads, long-term interest rates, household balances, and corporate balances. Their economic interpretation remains conditional on the identifying assumptions. In particular, the spread and long-rate shocks do not uniquely identify credit-supply and monetary-policy disturbances, respectively.

The sample extension encompasses substantial changes in private financial positions and the financial and policy environment. We therefore assess the stability of the reduced-form coefficients and innovation covariance matrix, presenting the diagnostic procedures alongside their findings in Section 5. We also estimate the same model over 1980Q1–2007Q4 and 2008Q1–2025Q4 to compare transmission before and after the GFC. This division provides an economically motivated historical comparison rather than a break date selected by the statistical tests. Differences between the subsamples consequently describe changes across these periods, rather than the causal effect of the crisis itself.

Impulse responses are calculated from impact through twenty quarters. For the historical comparison, shocks are normalized to produce a positive one-unit contemporaneous movement in their associated variable. Denoting the response of variable (i) to shock (s) at horizon (k) in period (R) by ($IRF_{i,s}^{R}(k)$), we calculate

$$\widetilde{IRF}_{i,s}^{R}(k) = \frac{IRF_{i,s}^{R}(k)}{IRF_{i,s}^{R}(0)}$$

and compare the periods using

$$\Delta IRF_{i,s}(k) = \widetilde{IRF}_{i,s}^{POST}(k) - \widetilde{IRF}_{i,s}^{PRE}(k)$$

This normalization holds the initial movement constant across periods: for example, a credit-spread shock raises the spread by one percentage point in each subsample. The comparison therefore distinguishes differences in transmission from differences in the scale of one-standard-deviation shocks. Confidence intervals for the post-minus-pre response differences are obtained

directly using a recursive wild bootstrap with 999 retained replications, re-estimating the VAR, structural parameters, and normalization in each replication. The intervals are pointwise at each horizon.

Forecast-error variance and historical decompositions complement this comparison by assessing the contribution of the identified disturbances to forecast uncertainty and realized cyclical movements. Whereas normalized impulse responses compare propagation following equally sized initial movements, these decompositions also reflect the estimated scale or realized sequence of shocks. Section 5 draws on this distinction to examine whether changes in transmission are accompanied by changes in the importance of financial and sectoral-balance disturbances for US fluctuations.

5. RESULTS

5.1 From the Original-Sample Benchmark to the Extended Sample

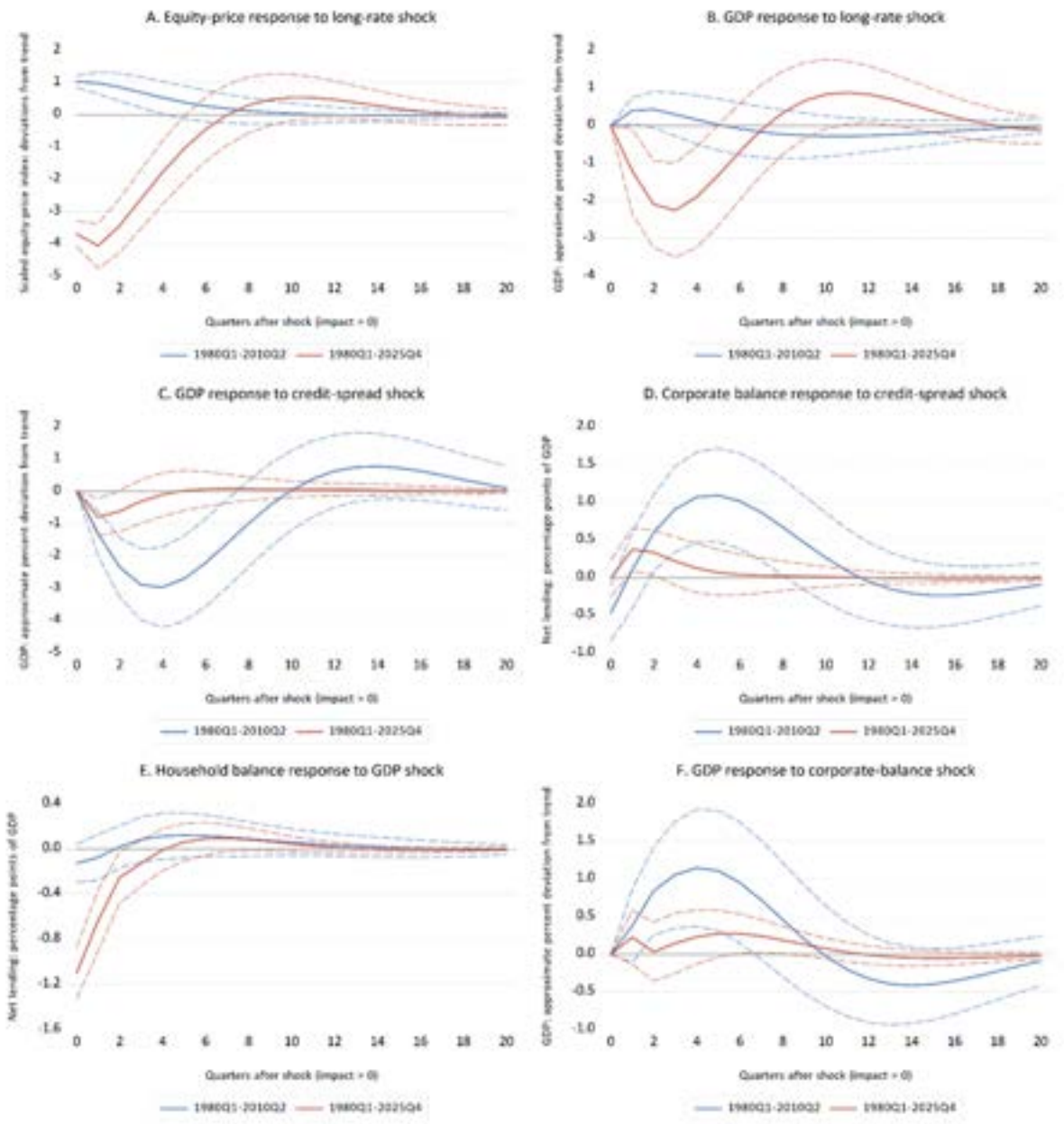
Casadio and Paradiso (2012) identify a system of feedbacks between financial conditions, private financial balances, and economic activity. In their estimates, increases in equity prices initially reduce household and corporate net lending, consistent with an expansion of expenditure relative to income. Credit-spread disturbances depress output and subsequently raise private net lending. Household and corporate balances also respond differently to activity: an output expansion is followed by higher household net lending and lower corporate net lending, which the authors associate with household saving and business investment, respectively. In the reverse direction, a positive innovation in the corporate balance precedes an expansion in output. They interpret this relationship as evidence of the cyclical information contained in corporate financing positions.

Re-estimating the model over 1980Q1–2010Q2 using the current data vintage broadly recovers these central patterns. Credit-spread shocks are followed by lower output and, after the initial adjustment, higher household and corporate net lending. Corporate balances initially deteriorate following an output expansion, whereas the household response moves from a small initial decline to a subsequent increase. Positive corporate-balance innovations are followed by higher

output. Although individual responses differ in magnitude and timing, the estimates preserve important features of the interaction between financial conditions, sectoral adjustment, and activity documented in the published study.

Extending the sample through 2025Q4 changes several of these relationships. Figure A1 in the Appendix presents the complete comparison, with original-sample estimates in blue and extended-sample estimates in red. Some responses retain their broad shape, including the initial declines in corporate net lending and credit spreads following a positive output innovation, together with the increase in long-term yields. Others change in timing and persistence: following a credit-spread disturbance, both the output contraction and the improvement in corporate net lending reach their largest magnitudes earlier and dissipate more quickly in the extended sample. These responses also become substantially smaller. Elsewhere, the initial direction changes, notably in the responses of equity prices and output to long-rate shocks, and of long-term yields to equity-price shocks. Figure 5 examines selected aspects of these changes using shocks normalized to produce the same initial movement in their associated variable across the two samples.

Figure 5. Selected Impulse Responses in the Original and Extended Samples



Notes: Panels A–B show equity-price and GDP responses to a long-rate shock; panels C–D show GDP and corporate-balance responses to a credit-spread shock; panels E–F show the household-balance response to a GDP shock and the GDP response to a corporate-balance shock. Shocks are normalized to raise their associated variable on impact by one percentage point for yields and spreads, approximately one percent for GDP, and one percentage point of GDP for corporate net lending. GDP responses are approximate percentage deviations from trend; financial-balance responses are in percentage points of GDP. The equity-price response is measured in units of the scaled index, defined as 100 × S&P 500/nominal GDP. Horizons indicate quarters after the shock, with impact at zero. Bands equal the point estimate ±1.96 standard errors, holding the estimated normalization factors fixed.
Source: Authors' calculations

Panels A and B show how the estimated effects of a long-rate shock change with the sample extension. In the original-sample model, a positive innovation in the ten-year yield initially raises equity prices and output, before the output response becomes negative at later horizons. In the extended sample, both variables decline over the initial quarters. Following a shock that raises the yield by one percentage point, the four-quarter output response changes from approximately 0.16 percent to −1.89 percent. The contrast extends beyond a change in magnitude: the estimated short-run relationship between long rates, valuations, and activity changes direction. Since the identified long-rate innovation can reflect several underlying disturbances, this result should not be interpreted as a reversal of monetary-policy transmission. It instead raises the question of whether the same contemporaneous financial relationships and propagation mechanisms adequately describe the longer period.

Panels C and D reveal a different change in the credit-spread channel. In the original-sample estimates, a shock raising the Baa spread by one percentage point produces a sustained output contraction, reaching approximately −2.97 percent after four quarters. Corporate net lending initially declines but subsequently rises, reaching approximately 1.07 percentage points of GDP at the same horizon. This combination is consistent with firms reducing expenditure relative to internal funds as financing conditions tighten. In the extended sample, both adjustments are much smaller: the four-quarter output response is approximately −0.09 percent and the corporate-balance response approximately 0.13 percentage points of GDP. The earlier pattern of persistent output contraction accompanied by corporate retrenchment is therefore still there, but considerably less pronounced.

The final two panels connect these financial-market changes to the relationship between sectoral balances and activity. Panel E shows that the household balance responds more negatively to an output innovation in the extended sample. Following a shock that initially raises output by approximately one percent, the impact response of household net lending changes from about −0.13 to −1.10 percentage points of GDP. This larger initial decline subsequently dissipates. Because the financial balance reflects expenditure, income, and its scaling by GDP, the response cannot by itself identify a particular household saving or consumption mechanism. It

nevertheless indicates a change in the immediate relationship between activity and household net lending.

Panel F examines the feedback from corporate balances to output. A shock raising corporate net lending by one percentage point of GDP is followed by an output expansion of approximately 1.15 percent after four quarters in the original-sample estimates, compared with approximately 0.23 percent in the extended sample. The positive response emphasized by Casadio and Paradiso remains visible in the point estimates, but its magnitude is markedly reduced. Together with the household response, this suggests that extending the sample changes both the adjustment of private balances to activity and the cyclical information conveyed by sectoral-balance innovations.

These comparisons reveal substantial sensitivity to the estimation period, encompassing sign changes in financial-market responses, weaker credit-spread transmission, and altered relationships between private balances and activity. They do not establish that all these changes are statistically significant, nor that they occurred at the same historical juncture. The samples overlap, and the extended estimates combine episodes with different disturbances and financial conditions. The following analysis therefore assesses the stability of the system and then compares pre- and post-GFC responses directly, to determine which aspects of the broader sample sensitivity are supported by evidence of differences in shock transmission.

5.2 Stability of the Estimated Relationships

The sample sensitivity documented above raises the question of whether a single set of estimated relationships adequately describes the extended period. We examine this question by distinguishing stability in the coefficients governing the system's dynamics from stability in the covariance matrix of its innovations. The distinction matters for interpreting the impulse responses: changes in estimated responses may reflect changes in dynamic adjustment, in the contemporaneous relationships used to identify structural disturbances, or in the distribution of those disturbances. Table 1 summarizes the evidence for the full sample and for an estimation period ending in 2019Q4.

Table 1. Stability of the Estimated Relationships

Panel A. Equation-level coefficient stability: Quandt–Andrews test p-values

Estimation period	Equation	Maximum	Exponential	Average
1980Q1–2025Q4	Output	<0.0001	0.0027	0.0004
	Equity prices	0.0221	0.1636	0.0473
	Credit spread	0.2373	0.5745	0.3128
	Long-term yield	0.1654	0.2754	0.0937
	Household balance	<0.0001	0.0106	0.0347
	Corporate balance	0.2337	0.1779	0.0394
1980Q1–2019Q4	Output	0.0008	0.1639	0.0348
	Equity prices	0.0908	0.3050	0.0847
	Credit spread	0.0083	0.6620	0.4550
	Long-term yield	<0.0001	0.0771	0.0856
	Household balance	0.0001	0.0316	0.0021
	Corporate balance	0.0074	0.1654	0.0335

Panel B. Residual covariance stability

Estimation period	Trimming	Supremum LR	Maximizing split: end of first regime	Bootstrap p-value
1980Q1–2025Q4	20%	318.49	2016Q4	0.003
1980Q1–2025Q4	15%	346.79	2019Q1	0.002
1980Q1–2019Q4	20%	101.21	1997Q2	0.017
1980Q1–2019Q4	15%	101.21	1997Q2	0.022

Notes: All models include two lags and a constant. Panel A reports p-values for the maximum, exponential and average LR F-statistics testing coefficient stability at an unknown breakpoint. Trimming is 20 percent for the full sample and 15 percent for the pre-COVID sample. Panel B tests constancy of the reduced-form residual covariance matrix; p-values use 999 bootstrap replications. Reported split dates identify the end of the first regime. Both full-sample covariance maxima occur at the upper boundary of the admissible search interval. The pre-COVID checks shorten the estimation period while retaining the maintained data transformations. Complementary full-sample Bai–Perron sequential tests, using 20 percent trimming, a maximum of two breaks and a 5 percent significance level, select breaks in output at 2017Q1 and equity prices at 2014Q4, and no breaks in the other equations.
Source: Authors' calculations

The equation-level Quandt–Andrews tests provide uneven evidence of coefficient instability. Over the full sample, the maximum, exponential and average statistics all reject stability at the 5 percent level for the output and household-balance equations. The evidence is less consistent for equity prices and corporate balances, where rejection depends on the statistic considered, while none of the three statistics rejects stability for credit spreads or long-term yields. The changes in impulse responses therefore do not correspond to equally strong evidence of coefficient instability in every equation. Since responses depend on the entire system, a change in a particular response need not originate in the coefficients of the corresponding equation alone.

The estimated timing also varies across equations and testing procedures. Complementary Bai–Perron sequential tests select one break in the output equation, at 2017Q1, and one in the equity-price equation, at 2014Q4, but no breaks in the remaining equations. In particular, they do not reproduce the rejection for household balances obtained from the Quandt–Andrews tests. Taken together, these results question coefficient constancy in parts of the system without identifying a common date at which all relationships change.

Evidence of instability remains when the estimation period ends before the pandemic. For household balances, all three Quandt–Andrews statistics continue to reject stability. For output, credit spreads, long-term yields and corporate balances, the results depend on the statistic used, while the equity-price equation does not reject at the 5 percent level. These checks indicate that the evidence is not confined to estimates incorporating observations from 2020 onward, although its strength and location depend on the sample.

The covariance tests provide more consistent evidence against stability. The bootstrap supremum likelihood-ratio test rejects constancy of the residual covariance matrix under both trimming choices, in both the full and pre-COVID samples. The associated dates nevertheless require caution. In the full sample, the maximum occurs at the latest admissible split under each trimming rule, moving from 2016Q4 to 2019Q1 when trimming falls from 20 to 15 percent. In the pre-COVID sample, both choices locate the maximum at 1997Q2. Thus, rejection is more consistent than the dating of the change. Moreover, covariance instability alone does not establish that the transmission of a given structural shock has changed.

Overall, the evidence cautions against interpreting the extended-sample impulse responses as relationships that remained constant throughout the period. It does not, however, establish the GFC as a uniquely identified breakpoint. We therefore treat the pre- and post-GFC comparison as a historically motivated investigation of shock transmission, rather than as a partition selected by these tests. The next subsection examines directly which differences between the two periods are supported by the bootstrap evidence.

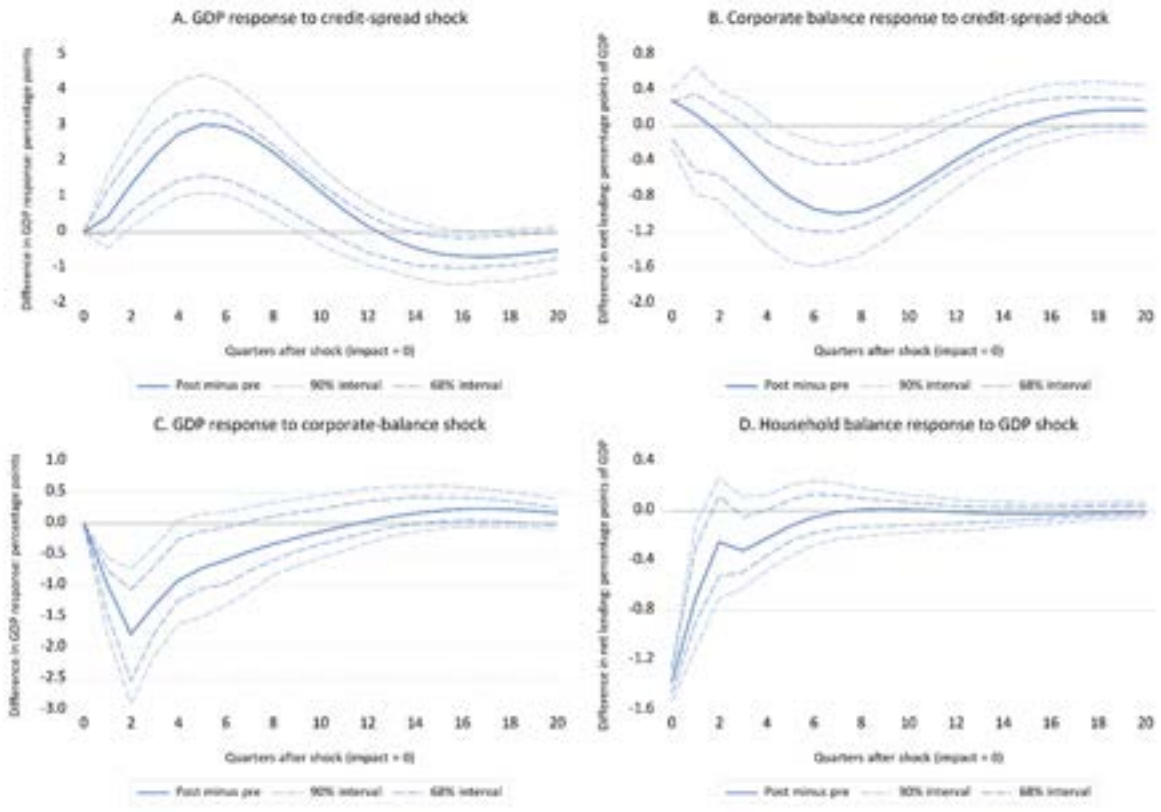
5.3 Shock Transmission before and after the GFC

The stability evidence motivates a direct comparison of shock transmission before and after the GFC. We estimate the model over 1980Q1–2007Q4 and 2008Q1–2025Q4, maintaining the same specification and identification restrictions. Figure A2 in the Appendix presents the complete set of normalized responses for the two periods. Figure 6 focuses on four relationships, plotting the post-GFC response minus its pre-GFC counterpart as in Jordà and Taylor (2025), together with 90 and 68 percent pointwise bootstrap intervals. Each shock produces the same initial movement in its associated variable across the two samples, so the comparison concerns transmission conditional on that movement rather than differences in the typical size of disturbances. The discussion below uses the 90 percent intervals to assess the evidence for differences.

The clearest sustained change concerns the transmission of credit-spread disturbances to output. In the pre-GFC estimates, a shock raising the Baa spread by one percentage point generates a prolonged contraction: output falls by approximately 3.26 percent after four quarters and remains around 1.99 percent below its baseline after eight quarters. The post-GFC contraction is smaller and dissipates sooner. Output falls by approximately 1.07 percent after two quarters, but the response has narrowed to −0.49 percent by the fourth quarter and becomes slightly positive thereafter. Consequently, the post-minus-pre difference in panel A reaches approximately 3.04 percentage points after five quarters. Its 90 percent interval excludes zero from quarters two to nine. The attenuation suggested by the extended-sample comparison therefore also appears in the direct comparison of the two historical periods.

The corporate-balance response helps characterize this change. Before the GFC, the initial decline in corporate net lending following a credit-spread shock is followed by a persistent increase, reaching approximately 1.08 percentage points of GDP after six quarters. The post-GFC response also turns positive after impact, but peaks earlier and declines more rapidly. At the six-quarter horizon, it amounts to approximately 0.14 percentage points of GDP. Panel B accordingly shows a negative post-minus-pre difference, with the 90 percent interval excluding zero between quarters five and ten. The difference concerns principally the persistence of the adjustment: the early increase in corporate net lending remains visible, but the sustained improvement accompanying the pre-GFC output contraction is substantially reduced.

Figure 6. Changes in Shock Transmission after the GFC: Selected Impulse-Response Differences



Notes: Solid lines show normalized post-GFC (2008Q1–2025Q4) minus pre-GFC (1980Q1–2007Q4) impulse responses. Shocks raise the credit spread by one percentage point (panels A–B), corporate net lending by one percentage point of GDP (panel C), or output by approximately one percent (panel D) on impact. Light and dark dashed lines denote 90 and 68 percent pointwise percentile intervals, respectively, based on 999 recursive wild-bootstrap replications, with both models re-estimated and responses normalized within each replication. Output-

response differences are expressed in percentage points; balance-response differences are in percentage points of GDP. The horizontal line indicates no difference between periods. Horizons denote quarters after impact.
Source: Authors' calculations

Taken together, these responses indicate a weaker combination of output contraction and corporate financial retrenchment following credit-spread disturbances after the GFC. The pre-GFC pattern is consistent with firms reducing expenditure relative to income as activity weakens. Net lending alone cannot separate adjustments in investment from changes in internal funds, however, and the comparison does not identify which institutional or policy developments account for the change in transmission.

Panel C examines the reverse relationship, from corporate balances to activity. A shock raising corporate net lending by one percentage point of GDP precedes an output expansion in the pre-GFC estimates, whereas the post-GFC point estimates indicate an initial contraction. After two quarters, the respective output responses are approximately 0.89 and −0.89 percent, yielding a difference of −1.78 percentage points. The 90 percent interval excludes zero during the first three quarters after impact. At longer horizons, the evidence is less decisive. The result therefore points to a change in the short-run output response to corporate-balance innovations, rather than establishing a persistent reversal over the entire adjustment path. It also cautions against interpreting an improvement in corporate net lending as having the same implications for activity across periods.

Household adjustment to output innovations also differs, primarily on impact and in the following quarter. For an output shock normalized to raise GDP by approximately one percent initially, household net lending falls by about 0.14 percentage points of GDP before the GFC, compared with 1.51 percentage points afterwards. The impact difference in panel D is therefore approximately −1.37 percentage points of GDP. Its 90 percent interval excludes zero at impact and after one quarter, while subsequent differences are less precisely estimated. The post-GFC estimates suggest a stronger immediate decline in household net lending relative to output, but do not establish a sustained divergence in household adjustment.

The direct comparison thus supports a differentiated interpretation of the sample sensitivity documented in Section 5.1. The most sustained differences concern credit-spread transmission to output and corporate balances. Changes in the output response to corporate-balance innovations and in household adjustment to activity are concentrated at shorter horizons. These findings do not imply that every visible change in Figure A2 represents a statistically supported difference, nor do the pointwise intervals constitute a joint test of the complete response paths. Having established where transmission differs most clearly, we next examine the contribution of the identified disturbances to fluctuations in output and private financial balances.

5.4 The Changing Contribution of Structural Shocks

The impulse responses establish how transmission differs across periods, but do not determine the relative contribution of each disturbance to fluctuations in the system. A shock may generate a substantial response to a given initial movement while accounting for only a small share of forecast uncertainty. We therefore examine structural forecast-error variance decompositions for our main output variables: GDP and the two private financial balances. Unlike the normalized impulse responses, these decompositions incorporate the estimated scale of disturbances as well as their propagation. Table 2 reports the percentage of forecast-error variance attributed to each shock at four-, eight- and twenty-quarter horizons (corresponding to one, two, and five years after the shock, respectively).

Table 2. Structural Forecast-Error Variance Decompositions before and after the GFC

Variable	Period	Horizon	Output	Equity prices	Credit spread	Long-term yield	Household balance	Corporate balance
Output	Pre-GFC	4	58.5	2.1	24.5	1.0	0.0	13.9
		8	33.7	3.0	43.0	1.0	0.0	19.3
		20	30.0	4.6	43.2	1.4	2.1	18.7
	Post-GFC	4	77.5	0.2	9.3	4.1	2.1	6.8
		8	73.7	0.7	9.8	5.6	3.1	7.1
		20	72.9	0.7	10.2	5.7	3.4	7.2
Household balance	Pre-GFC	4	2.3	12.9	20.1	3.5	43.0	18.1
		8	4.4	11.4	26.5	4.3	32.9	20.5
		20	4.6	12.1	26.9	4.2	31.9	20.3
	Post-GFC	4	54.0	2.0	1.2	6.5	33.0	3.3
		8	51.8	4.7	1.4	7.0	31.9	3.2

		20	51.5	4.8	1.4	7.1	32.0	3.2
Corporate balance	Pre-GFC	4	32.7	15.5	5.6	12.2	5.4	28.7
		8	23.6	16.0	18.1	9.1	4.1	29.1
		20	21.3	15.0	22.7	8.1	4.4	28.5
	Post-GFC	4	26.4	11.6	10.0	4.2	1.1	46.8
		8	23.6	14.5	12.2	7.1	1.1	41.6
		20	23.6	14.4	12.3	7.2	1.1	41.3

Notes: Entries are percentages of forecast-error variance attributed to each identified structural shock. Pre-GFC estimates cover 1980Q1–2007Q4; post-GFC estimates cover 2008Q1–2025Q4. Horizons are forecast horizons in quarters: an H-quarter decomposition accumulates shock contributions from impact through H−1. Both models retain two lags and the same contemporaneous identifying restrictions. Shares incorporate the estimated shock scale and propagation in each period. Figures are point estimates; differences between periods are not accompanied by confidence intervals. Rows may not sum to 100 because of rounding.
Source: Authors' calculations

For output, the decompositions reinforce the evidence of a reduced role for credit-spread disturbances after the GFC. Before the crisis, their contribution increases from approximately 24.5 percent at four quarters to 43.0 percent at eight quarters, remaining close to that level at twenty quarters. In the post-GFC estimates, the corresponding shares are approximately 9.3, 9.8 and 10.2 percent. Corporate-balance disturbances also account for a smaller share of output forecast uncertainty: their eight-quarter contribution falls from 19.3 to 7.1 percent. These changes are consistent with the differences in transmission documented in Section 5.3, although the variance decompositions also reflect differences in shock scale.

The counterpart is a greater concentration of output forecast uncertainty in the output shock itself. Its share at eight quarters rises from 33.7 percent before the GFC to 73.7 percent afterwards. Long-rate and household-balance disturbances gain some relative importance, but their contributions remain considerably smaller. The increased own-shock share should not be interpreted as identifying a particular underlying source of output fluctuations, such as productivity or aggregate demand. It refers to the output disturbance identified within the maintained six-variable system.

The change is particularly pronounced for household balances. Before the GFC, their forecast uncertainty is distributed across several disturbances. At eight quarters, household-balance shocks account for 32.9 percent, credit-spread shocks for 26.5 percent, corporate-balance shocks for 20.5 percent and equity-price shocks for 11.4 percent. Output shocks contribute only 4.4

percent. After the GFC, output shocks account for 51.8 percent, while the credit-spread and corporate-balance shares fall to approximately 1.4 and 3.2 percent, respectively. The own-shock share remains close to one-third.

Thus, the stronger immediate household-balance response to output innovations documented above is accompanied by a much larger contribution of those innovations to household forecast uncertainty. The change concerns primarily the composition of the disturbances other than the household-balance shock itself. Within the estimated system, household net lending becomes more closely associated with output disturbances and less with the credit-spread, equity-price and corporate-balance disturbances that contributed substantially before the crisis.

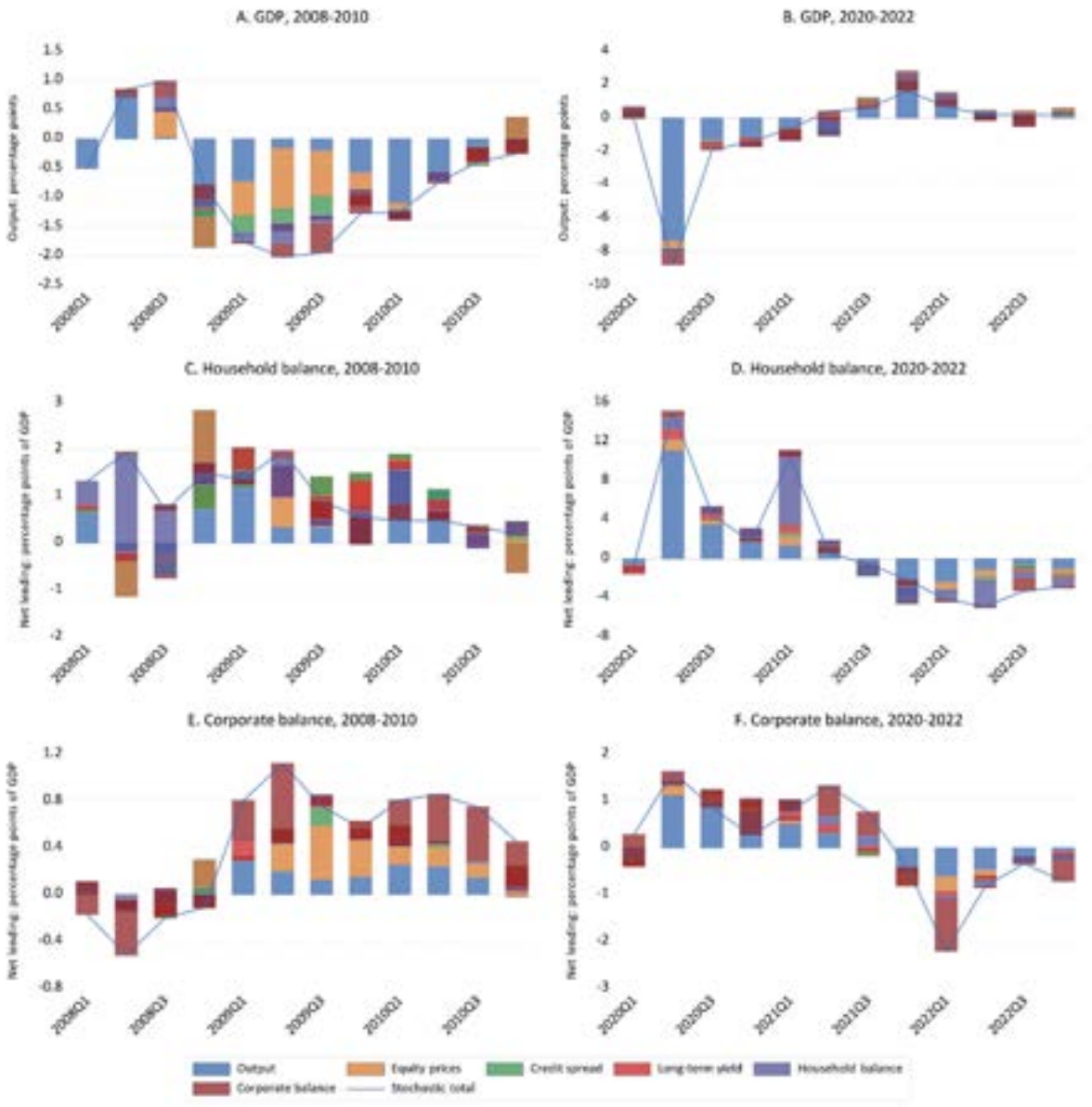
Corporate balances display a different pattern. At eight quarters, the contribution of their own shock rises from 29.1 to 41.6 percent, while the output-shock share remains approximately 23.6 percent in both periods. The credit-spread contribution declines from 18.1 to 12.2 percent; equity-price and long-rate disturbances continue to contribute, with somewhat smaller shares. The timing matters: at four quarters, the credit-spread share is actually higher after the GFC, at 10.0 percent compared with 5.6 percent beforehand. Its lower contribution emerges at longer horizons, consistent with the less persistent corporate adjustment to credit-spread disturbances identified in Section 5.3.

The decompositions therefore reveal distinct changes across the two private sectors. Household-balance forecast uncertainty becomes dominated by output disturbances, whereas corporate-balance uncertainty becomes more concentrated in its own identified shock. Meanwhile, credit-spread and corporate-balance disturbances account for smaller shares of output forecast uncertainty. These are comparisons of estimated shares, rather than formal tests of differences, and a lower share need not imply a lower absolute contribution when total forecast-error variance also changes. To connect these average relationships to specific historical developments, the next subsection examines the contributions of the identified shocks during the GFC and the pandemic.

5.5 Financial Disturbances and Sectoral Adjustment in the Last Two Recessions

The variance decompositions describe the average composition of forecast uncertainty within each estimation period. Historical decompositions complement this evidence by tracing the contributions of the realized sequence of shocks during particular episodes. Figure 7 examines output and private financial balances during the GFC and the pandemic, using the post-GFC model for both episodes. The contributions describe the shock-driven component of each cyclical series, relative to the model's baseline incorporating initial conditions and deterministic terms.

Figure 7. Financial Disturbances and Private-Sector Adjustment during the GFC and the Pandemic



Notes: Historical decompositions from the SVAR estimated over 2008Q1–2025Q4. Panels A–B show output, C–D household net lending, and E–F non-financial corporate net lending, over 2008–2010 and 2020–2022. Colored bars represent contributions from the six identified structural shocks; the blue line shows their sum, labeled "Stochastic total." Contributions exclude the model's baseline associated with initial conditions and deterministic terms. Output contributions are measured in percentage points of the cyclical output component; financial-balance contributions are in percentage points of GDP. Positive balance contributions indicate higher net lending relative to the baseline, not necessarily an actual sectoral surplus. Contributions incorporate the history of shocks from the beginning of the estimation sample, including those preceding the displayed windows. Vertical scales differ across panels. Shock labels follow the maintained identifying restrictions and do not uniquely identify underlying economic mechanisms.
Source: Authors' calculations

During the GFC, the composition of the output contraction changes as the episode unfolds. In 2008Q4, the output shock contributes approximately −1.86 percentage points to the shock-driven output component, partly offset by other disturbances. By 2009Q2, equity-price and credit-spread shocks make substantial negative contributions, of approximately −1.03 and −0.37 percentage points, respectively, against a total stochastic component of −2.02 percent. The financial-market disturbances thus become important contributors to the persistence of weak activity, even though the estimated post-GFC model attributes a smaller average share of output forecast uncertainty to credit-spread shocks than the pre-GFC model does. A lower variance share does not preclude an important contribution during a particular episode.

The accompanying adjustment in private balances differs across sectors. For households, output and credit-spread shocks contribute positively to net lending during the early crisis, while equity-price shocks initially offset part of that increase. In 2008Q4, the respective contributions are approximately 2.83, 0.86 and −2.10 percentage points of GDP. By 2009Q2, the equity-price contribution has turned positive, at approximately 1.13 percentage points of GDP, alongside a household-balance shock contribution of 0.83 points. The increase in household net lending therefore reflects several disturbances whose contributions change over the course of the episode.

Corporate adjustment follows a different composition. In 2009Q2, the shock-driven corporate balance is approximately 1.12 percentage points of GDP above its baseline. Corporate-balance shocks account for approximately 0.69 points, with smaller positive contributions from equity-price and output shocks. The direct contribution attributed to credit-spread shocks is positive but modest. Although higher corporate net lending accompanies weak activity, the decomposition does not attribute this adjustment exclusively to credit-market disturbances. Nor does an increase in net lending establish an improvement in corporate financial health: it may reflect expenditure falling relative to income during the downturn.

The pandemic episode is distinguished by the scale of the output disturbance and the associated household adjustment. In 2020Q2, the stochastic output component falls by approximately 8.80 percent, of which the output shock accounts for −7.35 percentage points. At the same time, the

stochastic household-balance component rises by approximately 15.15 percentage points of GDP, with output shocks contributing 11.11 points. Corporate net lending also rises relative to its baseline, but by much less: its stochastic component amounts to approximately 1.64 percentage points of GDP, including a 1.13-point contribution from output shocks. The joint movement is consistent with a sharp contraction in expenditure relative to income, particularly in the household sector.

The composition of household adjustment subsequently changes. In 2021Q1, household-balance shocks contribute approximately 7.66 percentage points of GDP to a stochastic household-balance component of 10.42 points, while the output-shock contribution is approximately 1.39 points. Thus, the later increase is attributed predominantly to disturbances in the household-balance equation rather than to the output disturbance that dominates the initial pandemic contraction. These shock labels do not separately identify restrictions on consumption, precautionary saving or fiscal transfers. The model records their combined manifestation in output and sectoral balances without distinguishing those mechanisms.

The two episodes illustrate why similar movements in private net lending can have different macroeconomic interpretations. During the GFC, financial-market disturbances contribute materially to the persistence of the output contraction, while household and corporate balances adjust through different combinations of shocks. During the pandemic, the initial adjustment is dominated by an output disturbance and an exceptionally large household-balance response, followed by a greater contribution from household-specific innovations. These historical allocations remain conditional on the model's identifying restrictions and the common post-GFC specification. Nevertheless, they reinforce the central implication of the analysis: private financial balances must be interpreted jointly with activity, financial conditions and sectoral composition, rather than treating higher aggregate private net lending as an unambiguous indication of stronger economic conditions.

6. CONCLUSIONS

The sectoral-balances approach provides an accounting framework for understanding how expenditure and income across the private, public and external sectors fit together. Its macroeconomic interpretation nevertheless requires an explanation of how those balances are generated and adjusted. The changing US configurations discussed in this article illustrate that distinction: private net borrowing can sustain an expansion while increasing dependence on continued financing, whereas a movement toward private net lending can accompany expenditure retrenchment and falling activity. An apparently improving fiscal position may therefore coexist with increasing private financial vulnerability, while higher private net lending need not signal stronger economic conditions (Godley 1999; Godley and Lavoie 2007).

Our analysis shows why both sectoral composition and historical context matter for interpreting these configurations. Household and corporate balances respond differently to disturbances, and their relationships with subsequent activity change across periods. The aggregate private balance can consequently conceal differences in the sources of adjustment and in their macroeconomic implications. This finding supports distinguishing the behavior of households and corporations within the broader accounting framework, consistent with evidence of sector-specific borrowing dynamics and adjustment mechanisms (Barbosa-Filho et al. 2008; Drehmann, Juselius, and Korinek 2023; Jordà et al. 2022).

Re-estimation with current data vintages broadly recovers the central relationships documented over the original sample by Casadio and Paradiso (2012). Extending the analysis through 2025, however, qualifies their historical generality. The clearest sustained difference concerns credit-spread transmission: after the GFC, the estimated output contraction is smaller and shorter-lived, and the subsequent increase in corporate net lending is less persistent. The short-run output response to corporate-balance innovations also changes, while household balances display a stronger immediate response to output disturbances. These findings indicate that private financial balances remain relevant to macroeconomic adjustment, but that their estimated relationship with activity cannot be assumed to remain constant.

The weaker post-GFC credit-spread channel does not imply that financial disturbances have ceased to matter. Their smaller contribution to average output forecast uncertainty coexists with

substantial contributions to the persistence of weak activity during the GFC. Financial conditions can therefore remain important during particular episodes even when their estimated average influence declines. This distinction connects the information contained in credit-market developments to the changing transmission and incidence of financial disturbances (Gilchrist, Yankov, and Zakrajšek 2009; Gilchrist and Zakrajšek 2012; Hubrich and Tetlow 2015; Prieto, Eickmeier, and Marcellino 2016). It also cautions against interpreting a smaller response to a normalized shock as sufficient evidence of a smaller contribution to realized fluctuations.

The historical decompositions reinforce the importance of identifying the adjustment behind a movement in net lending. During the GFC, financial-market disturbances contribute to persistent output weakness while household and corporate balances adjust through different combinations of shocks. During the pandemic, the initial output contraction accompanies an exceptionally large household-balance increase, followed by a greater contribution from household-specific innovations. Similar movements toward private net lending thus emerge under different conditions. Their interpretation requires information about expenditure, income and policy responses that the aggregate balance alone cannot provide.

This conclusion also clarifies the relationship between financial balances and financial fragility. Vulnerability depends on accumulated financing commitments and the capacity to meet them, as well as on current flows (Minsky 1986, 1992). Net lending records the balance between income and expenditure, but does not reveal the distribution of debt, debt-service burdens or liquid assets within a sector. An improving balance may reflect expenditure compression, while an apparently moderate aggregate imbalance may conceal vulnerable borrowers (Davis, de Souza, and Hernandez 2019). The results therefore support examining balances alongside financing conditions, without treating the estimated relationships as a direct test of financial fragility or interpreting weaker post-GFC transmission as evidence that vulnerability has diminished.

Our results are of course not definitive. The empirical findings remain conditional on the maintained identification restrictions, filtering procedure and lag specification. The historical comparison documents differences across periods without identifying the institutional or policy changes responsible for them. In particular, the model does not separately recover the

contributions of fiscal transfers, consumption restrictions or changes in investment and internal funds. Incorporating expenditure components, fiscal variables and the distribution of indebtedness would help explain the mechanisms behind the observed differences.

The general implication is that sectoral balances are useful indicators of macroeconomic adjustment when interpreted jointly with the behavior and financing structures that generate them. Their accounting relationships provide the organizing framework; sectoral disaggregation and historical analysis give those relationships economic content. Understanding whether a change in private net lending supports expenditure, reflects retrenchment or accompanies increasing vulnerability requires attention to who is adjusting, through which mechanisms, and under what macro-financial conditions.

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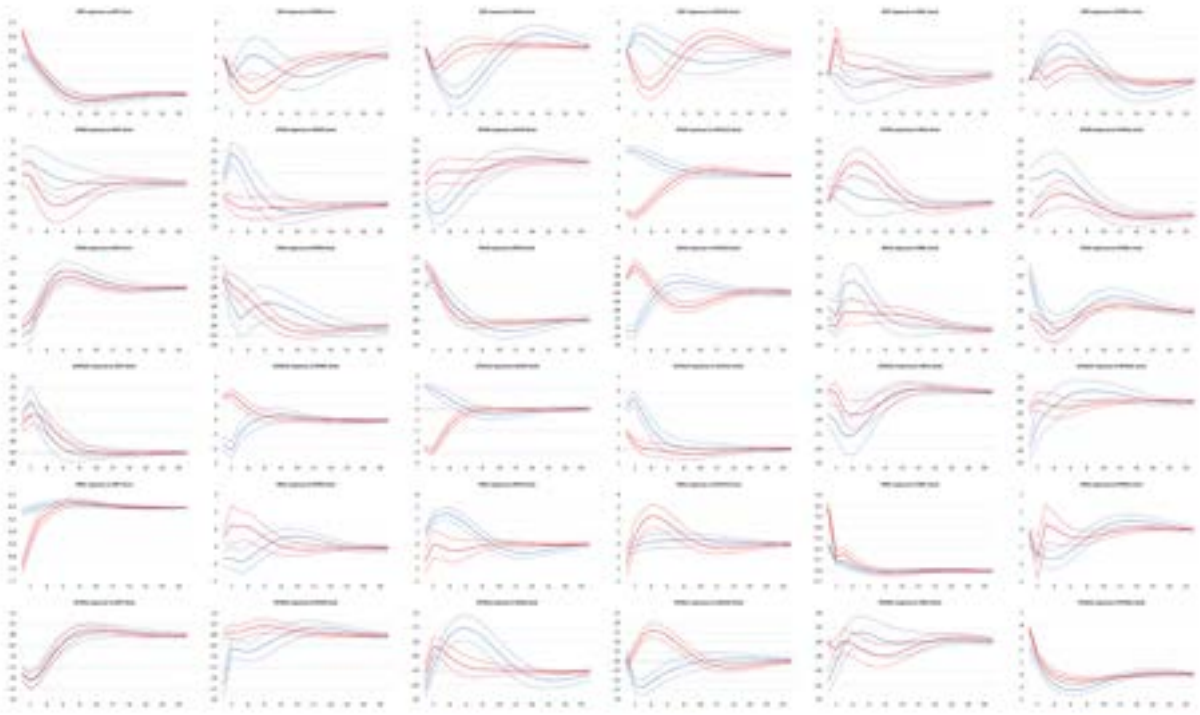
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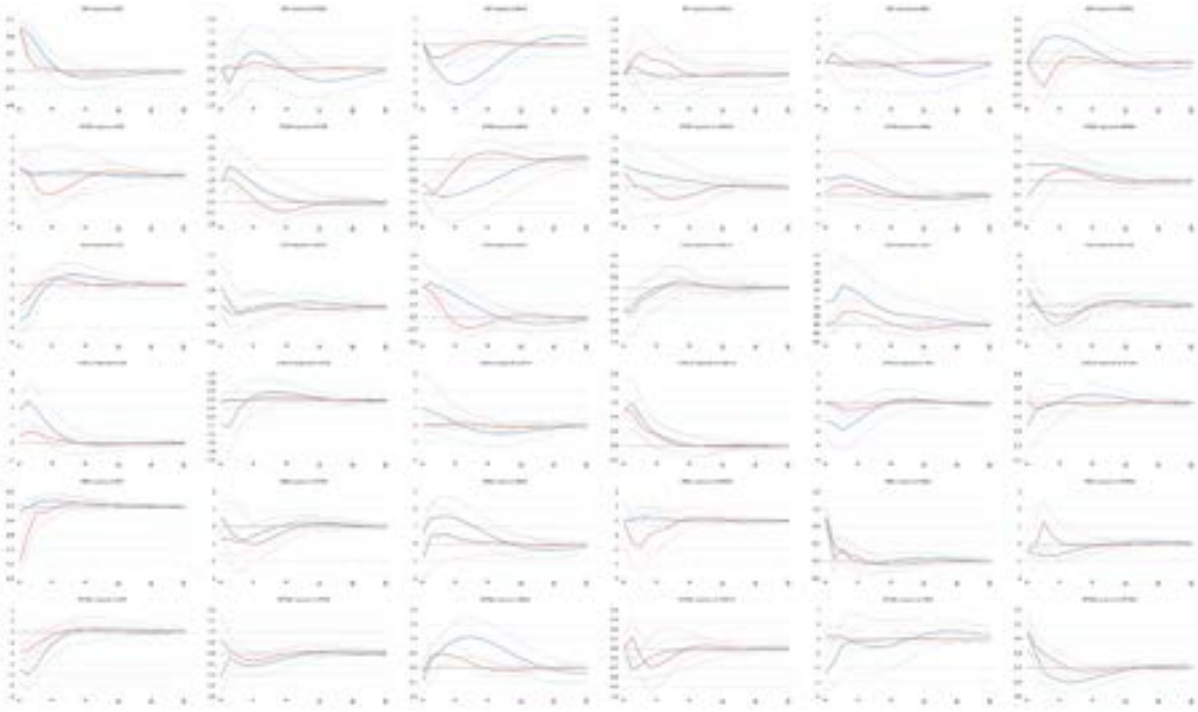
APPENDIX

Figure A1. IRFs from Model 1, Estimated over the Casadio and Paradiso (2012) Original Sample (1980Q1–2010Q2, in Blue) and Our Extended Sample (1980Q1–2025Q4, in Red)



Notes: Dotted lines report 1 s.d. intervals.
Source: Authors' calculations

Figure A2. Normalized Impulse Responses before and after the GFC



Notes: Rows identify response variables and columns identify shocks. Blue lines represent estimates for 1980Q1–2007Q4; red lines represent estimates for 2008Q1–2025Q4. Shocks are normalized to produce a positive one-unit impact in their associated variable. Dotted lines show approximate 90 percent pointwise intervals, calculated from the saved standard errors while holding the estimated normalization denominator fixed. Output responses are expressed in approximate percentage deviations from trend; financial balances are in percentage points of GDP; interest rates and credit spreads are in percentage points; equity-price responses are in units of the scaled equity-price index. Horizons denote quarters after impact.
Source: Authors' calculations