REM WORKING PAPER SERIES

Revisiting the External Imbalance Effects of EMU Membership: Identification Fragility and the Limits of Synthetic Control Inference

João Tovar Jalles

REM Working Paper 0422-2026

July 2026

REM – Research in Economics and Mathematics
Rua Miguel Lúpi 20,
1249-078 Lisboa,
Portugal

ISSN 2184-108X

REM – Research in Economics and Mathematics

Rua Miguel Lupi, 20
1249-078 LISBOA
Portugal

Telephone: +351 - 213 925 912
E-mail: rem@iseg.ulisboa.pt

https://rem.rc.iseg.ulisboa.pt/

https://twitter.com/ResearchRem

https://www.linkedin.com/company/researchrem/

https://www.facebook.com/researchrem/

Revisiting the External Imbalance Effects of EMU Membership: Identification Fragility and the Limits of Synthetic Control Inference*

July, 2026

João Tovar Jalles#

Abstract

This paper reassesses the claim that Economic and Monetary Union (EMU) membership generated large external wealth losses among Southern European economies. Replicating the synthetic control estimates of Alcobia et al. (2025), we confirm sizeable post-EMU deteriorations in the net international investment positions (NIIP) of several peripheral economies, particularly Portugal and Greece. However, the estimated effects prove highly sensitive to treatment timing, donor-pool composition, predictor selection, and estimator choice. Alternative treatment definitions reveal substantial anticipation effects associated with Maastricht convergence and pre-EMU financial integration. Broader donor pools and macro-financial predictor sets frequently alter the magnitude and even the sign of estimated effects. Estimates obtained using Augmented SCM, Synthetic Difference-in-Differences, Interactive Fixed Effects, and local projections are generally smaller, less stable, and considerably more uncertain than baseline SCM results. We further argue that NIIP deterioration partly reflected convergence dynamics and global financial conditions rather than EMU-specific institutional failures alone.

JEL Codes: C21, C23, F32, F45, O52
Keywords: Economic and Monetary Union, synthetic control methods, external imbalances, net international investment position, financial integration

---

* This work was supported by FCT, I.P., the Portuguese national funding agency for science, research and technology, under the Projects UID/06522/2025. The author declares no conflict of interest. The views expressed in this paper are solely those of the author.
# Corresponding author. Instituto Superior de Economia e Gestão (ISEG), Universidade de Lisboa, Rua do Quelhas 6, 1200-781 Lisboa, Portugal. Research in Economics and Mathematics (REM) and Research Unit on Complexity and Economics (UECE), ISEG, Universidade de Lisboa, Rua Miguel Lupi 20, 1249-078 Lisbon, Portugal. Economics for Policy and Centre for Globalization and Governance, Nova School of Business and Economics, Universidade Nova de Lisboa, Rua da Holanda 1, 2775-405 Carcavelos, Portugal. IPAG Business School, 184 Boulevard Saint-Germain, 75006 Paris, France. Email: joaojalles@gmail.com.

1. Introduction

The creation of the euro remains one of the most consequential institutional changes in modern economic history. A large literature has examined whether Economic and Monetary Union (EMU) contributed to the emergence of persistent external imbalances across member states. Early contributions emphasized how financial integration and declining borrowing costs could generate widening current-account imbalances within a monetary union (Blanchard and Giavazzi, 2002; Lane and Milesi-Ferretti, 2007), while subsequent work highlighted the role of capital-flow cycles, credit booms, and competitiveness divergences in peripheral Europe during the 2000s (Giavazzi and Spaventa, 2010; Lane, 2012). More recently, Alcobia et al. (2025) argue that EMU participation generated exceptionally large external wealth losses among Southern European economies. Using synthetic control methods (SCM), they conclude that countries such as Portugal, Greece, and Spain experienced dramatic deteriorations in their net international investment positions (NIIP) following euro adoption.

This paper reassesses these claims. We replicate the baseline SCM results and confirm that several peripheral economies experienced substantial post-EMU NIIP deterioration relative to their synthetic counterparts. However, the estimated effects prove considerably more fragile than suggested in the original analysis. The results are highly sensitive to treatment timing, donor-pool composition, predictor selection, and estimator choice. Alternative treatment dates reveal strong anticipation effects associated with Maastricht convergence and pre-EMU financial integration. Restricting donor pools or expanding predictor sets materially alters estimated treatment effects, often reducing their magnitude or reversing their sign. Moreover, estimates obtained using Augmented SCM (ASCM), Synthetic Difference-in-Differences (SDID), Interactive Fixed Effects (IFE), and local projections are generally smaller, less stable, and substantially more uncertain than classical SCM estimates.

The paper also contributes to a broader literature questioning the robustness of synthetic control estimates in highly persistent macroeconomic environments. Recent methodological work has emphasized the sensitivity of SCM estimates to donor-pool construction, predictor selection, interpolation bias, latent common factors, and treatment anticipation effects (Abadie, 2021; Ben-Michael et al., 2021; Arkhangelsky et al., 2021). These concerns are particularly relevant in the context of EMU accession because monetary integration was widely anticipated well before the official introduction of the euro through sovereign spread convergence, exchange-rate stabilization, and progressive financial integration. As a result, the pre-treatment period itself may already contain substantial anticipation dynamics, complicating causal interpretation.

Beyond identification issues, the paper challenges the economic interpretation of NIIP deterioration itself. Worsening external positions do not necessarily imply macroeconomic failure or permanent wealth destruction. In converging economies undergoing financial integration, persistent external deficits may reflect intertemporal borrowing, capital accumulation, and productivity catch-up rather than unsustainable disequilibrium (Obstfeld and Rogoff, 1995; Gourinchas and Rey, 2007). The deterioration in peripheral NIIP positions during the 2000s coincided with rapid global financial integration, compressed risk premia, historically low interest rates, and large international capital flows. Once these broader macro-financial dynamics are taken into account, the evidence no longer supports strong claims that EMU participation alone generated exceptionally large external wealth losses among peripheral economies.

The contribution of the paper is fourfold. First, it reassesses the role of treatment timing and anticipation effects surrounding Maastricht convergence and euro adoption. Second, it evaluates the sensitivity of SCM estimates to donor-pool construction and predictor specification. Third, it compares classical SCM results with alternative estimators from the recent causal inference literature, including ASCM, SDID, IFE, and local projections. Fourth, it reinterprets peripheral external deterioration within a broader framework of convergence dynamics and global financial integration.

The results have broader implications for empirical work using synthetic control methods in macroeconomic applications. They highlight the importance of accounting for anticipation effects, latent common shocks, donor comparability, and estimator uncertainty when evaluating large institutional changes such as EMU accession. More generally, the paper cautions against drawing strong welfare conclusions from aggregate external-balance dynamics alone.

The remainder of the paper is organized as follows. Section 2 discusses the conceptual and identification challenges associated with estimating the effects of EMU participation on external positions. Section 3 presents the data and empirical methodology. Section 4 reports the replication results and robustness exercises across alternative specifications and estimators. Section 5 reinterprets peripheral external deterioration within a broader macro-financial framework. Section 6 concludes.

2. Conceptual and Identification Challenges

The claim that Economic and Monetary Union (EMU) generated exceptionally large external wealth losses among Southern European economies rests on strong conceptual and econometric assumptions that are substantially more difficult to justify than suggested in Alcobia et al. (2025). Their analysis relies almost entirely on first-generation synthetic control methods (SCM) applied to highly persistent macroeconomic series in an environment characterized by anticipation effects, latent common shocks, global financial integration, and structurally heterogeneous donor units. These features create precisely the conditions under which recent econometric research has warned that classical SCM estimates may become fragile, unstable, and potentially misleading.

While SCM has become a widely used framework for comparative counterfactual analysis following Abadie and Gardeazabal (2003) and Abadie, Diamond and Hainmueller (2010), subsequent methodological work has emphasized important limitations in macroeconomic applications. Recent contributions by Doudchenko and Imbens (2016), Ben-Michael et al. (2021), Arkhangelsky et al. (2021), Ferman and Pinto (2021), and Roth et al. (2023) show that classical SCM designs may be highly sensitive to donor-pool composition, predictor selection, treatment timing, extrapolation problems, and latent factor structures. These concerns are especially severe when outcomes are highly persistent and treatment occurs simultaneously with large common macroeconomic shocks — precisely the environment characterizing European monetary integration during the late 1990s and early 2000s.

This section argues that the causal interpretation advanced by Alcobia et al. (2025) faces four major problems. First, the paper interprets NIIP deterioration largely as evidence of external wealth destruction despite the fact that external imbalances may reflect optimal intertemporal borrowing and convergence dynamics rather than macroeconomic failure. Second, EMU accession did not constitute a discrete and isolated treatment but occurred simultaneously with broad transformations in European and global financial markets. Third, the treatment date itself is inherently ambiguous because financial markets anticipated monetary union years before the official introduction of the euro. Fourth, the estimated counterfactuals depend heavily on fragile donor-pool and predictor-selection choices that generate economically implausible synthetic controls.

More fundamentally, the empirical strategy adopted by Alcobia et al. (2025) relies on a relatively old and restrictive version of SCM that imposes non-negativity and adding-up constraints on donor weights while largely ignoring more recent developments designed precisely to address macroeconomic applications with persistent outcomes and latent common factors. In such settings, classical SCM may mechanically generate large post-treatment gaps even when pre-treatment discrepancies are economically small. Consequently, strong claims regarding massive EMU-induced external wealth losses require substantially greater caution than suggested in the original paper.

2.1 NIIP Dynamics and the Interpretation of External Imbalances

A central claim of Alcobia et al. (2025) is that worsening net international investment positions (NIIP) imply that peripheral economies became substantially "poorer" because of EMU participation. This interpretation is considerably stronger than what standard international macroeconomic theory can support.

At an accounting level, the evolution of the NIIP may be written as:

$$\Delta NIIP_t = CA_t + VE_t \qquad (1)$$

where CA_t denotes the current account balance and VE_t captures valuation effects associated with exchange-rate movements, asset-price fluctuations, and changes in the market valuation of external assets and liabilities.

Equation (1) immediately highlights a central conceptual limitation in the interpretation advanced by Alcobia et al. (2025). Changes in external positions do not necessarily imply macroeconomic failure or welfare destruction. NIIP deterioration may reflect financially optimal intertemporal allocation, capital deepening, valuation changes, or convergence-related investment dynamics rather than unsustainable disequilibrium.

Standard intertemporal current-account models imply that rapidly converging economies may rationally run persistent external deficits during periods of capital accumulation and productivity catch-up (Obstfeld and Rogoff, 1995; Blanchard and Giavazzi, 2002). In such settings, foreign capital inflows finance investment opportunities associated with higher expected future income rather than necessarily reflecting structural weakness. This mechanism is particularly relevant for Southern European economies during the late 1990s and early 2000s, when declining interest rates and financial integration dramatically reduced borrowing costs and stimulated capital inflows.

The distinction is crucial because Alcobia et al. (2025) effectively interpret virtually all post-EMU NIIP deterioration as evidence of external "wealth losses." Such an interpretation conflates intertemporal borrowing and financial integration with welfare destruction. Yet worsening external positions may coexist with rising productivity, infrastructure accumulation, income convergence, and private-sector investment — all of which characterized several peripheral European economies during the first decade of EMU participation.

Moreover, NIIP movements are heavily affected by valuation effects that may be largely unrelated to domestic macroeconomic policies. Exchange-rate fluctuations, global asset-price cycles, international portfolio reallocations, and changes in risk appetite can all generate substantial movements in external positions independently of domestic structural performance (Lane and Milesi-Ferretti, 2007). Consequently, the mapping from NIIP trajectories to welfare outcomes is inherently imperfect.

None of these considerations imply that persistent external deficits are irrelevant or necessarily sustainable. Excessive external indebtedness may increase vulnerability to sudden stops and financial crises. However, the normative interpretation advanced by Alcobia et al. (2025) goes considerably beyond what can be inferred from aggregate NIIP dynamics alone. The paper repeatedly equates worsening external positions with large external "wealth losses," despite the fact that neither accounting identities nor intertemporal macroeconomic theory justify such a direct welfare interpretation.

2.2 EMU Membership as a Non-Isolated Treatment

A second major problem concerns the treatment itself. Classical SCM applications are most credible when the intervention can reasonably be interpreted as discrete, isolated, and exogenous relative to other simultaneous structural changes. EMU accession satisfies none of these conditions.

The late 1990s and early 2000s coincided with one of the largest episodes of global financial integration in modern economic history. This period was characterized by rapid capital-account liberalization, declining global real interest rates, compressed sovereign spreads, cross-border banking expansion, portfolio integration, and unprecedented global liquidity growth. Peripheral European economies were deeply exposed to all of these developments simultaneously.

The strongest deterioration in peripheral NIIP positions occurred precisely during the same period in which global real interest rates declined sharply, international capital flows surged, intra-European banking integration accelerated, private-sector credit expanded rapidly, and financial-market volatility compressed. Consequently, the observed deterioration in external balances cannot plausibly be attributed solely to EMU participation itself. The treatment period overlaps almost perfectly with broad macro-financial developments affecting both treated and donor economies simultaneously.

This issue is especially problematic for first-generation SCM designs because classical SCM assumes that latent common shocks can be adequately absorbed through donor-unit weighting. Yet recent methodological research shows that this assumption becomes fragile in highly integrated macroeconomic environments characterized by strong common factors. Doudchenko and Imbens (2016) demonstrate that restrictive weighting constraints may generate unstable counterfactuals when treated units lie outside the donor convex hull. Ben-Michael et al. (2021) show that classical SCM may perform poorly in settings with persistent outcomes and imperfect fit, motivating the development of Augmented SCM (ASCM). Similarly, Arkhangelsky et al. (2021) propose

Synthetic Difference-in-Differences (SDID) precisely to account for latent common shocks affecting both treated and untreated units.

These methodological concerns are directly relevant here. Alcobia et al. (2025) rely almost exclusively on classical SCM despite analyzing highly persistent macroeconomic variables during a period dominated by large global common shocks. As a result, part of the estimated "EMU effect" may simply reflect broader macro-financial dynamics associated with the global credit cycle rather than uniquely euro-specific institutional mechanisms.

The persistence of NIIP series further amplifies this problem. Highly persistent outcomes mechanically generate widening post-treatment gaps even under relatively small pre-treatment mismatches. In such environments, classical SCM may produce visually striking divergence patterns that partly reflect persistence dynamics rather than genuine treatment effects. Recent econometric literature has repeatedly emphasized this risk, yet these issues receive limited attention in Alcobia et al. (2025).

2.3 Treatment Timing and Anticipation Effects

A further problem concerns the timing of treatment. Alcobia et al. (2025) assume that EMU participation begins in 1999 for most countries and in 2001 for Greece. This assumption is conceptually difficult to defend.

Financial markets anticipated monetary union years before the official introduction of the euro. The Maastricht Treaty, exchange-rate stabilization within the European Monetary System, sovereign spread convergence, progressive capital-account liberalization, and expectations of future monetary integration all altered macroeconomic conditions well before 1999. Long-term interest-rate convergence in peripheral economies began during the mid-1990s as markets repriced sovereign risk in anticipation of EMU membership.

More generally, treatment exposure may be represented as:

$$Y_{it} = Y_{it}(0) + \tau_{it} D_{it}^{*} \qquad (2)$$

where D_{it}^{*} denotes the effective treatment exposure, which may begin before the official treatment date because of anticipation effects, financial-market repricing, or gradual institutional convergence.

Equation (2) highlights a central identification problem. If financial markets incorporated future EMU participation into borrowing conditions and capital flows before 1999, then the pre-treatment period used to construct the synthetic controls is itself contaminated by anticipatory dynamics. Yet classical SCM requires that the pre-treatment period represent untreated dynamics.

This issue is not merely theoretical. Empirical studies document substantial sovereign-spread convergence, financial integration, and capital-market repricing during the years preceding euro adoption (Baele et al., 2004; Ehrmann et al., 2011). Consequently, using 1999 as the exclusive treatment date risks attributing pre-existing convergence processes to the post-treatment period.

More fundamentally, EMU accession was not a sharp exogenous shock comparable to canonical SCM applications involving natural disasters, policy bans, or localized reforms. It was a gradual, highly anticipated institutional process unfolding over many years. Recent treatment-effects literature has increasingly emphasized the importance of anticipation dynamics and treatment-timing heterogeneity in such settings (Callaway and Sant'Anna, 2021; Sun and Abraham, 2021). These concerns substantially weaken the interpretation of post-1999 SCM gaps as clean causal estimates of EMU participation.

2.4 Donor-Pool Construction and Predictor Fragility

The final major issue concerns donor-pool construction and predictor selection. The credibility of SCM estimates depends not only on statistical fit but also on the economic plausibility of the counterfactual units used to construct the synthetic control.

The donor pool employed by Alcobia et al. (2025) includes countries such as Colombia, Costa Rica, Mexico, Turkey, Korea, and Israel. While these economies may mechanically improve pre-treatment fit, their comparability to Southern European economies is highly questionable. These countries differ fundamentally in terms of financial development, exchange-rate regimes, institutional quality, banking structures, capital-account openness, inflation history, and convergence dynamics.

Classical SCM estimates the untreated counterfactual according to:

$$\hat{Y}_{1t}^{N} = \sum_{j=2}^{J+1} w_j \, Y_{jt} \qquad (3)$$

subject to:

$$w_j \geq 0, \sum_{j=2}^{J+1} w_j = 1 \qquad (4)$$

where the weights w_j are chosen to minimize pre-treatment prediction error.

Equations (3) and (4) reveal an important limitation of first-generation SCM. The convex-hull restriction forces the treated economy to be approximated as a weighted average of donor units. When donor economies are structurally dissimilar to the treated economy, the resulting synthetic control may reproduce selected historical trends while lacking meaningful economic interpretation.

This problem becomes particularly severe when donor weights concentrate heavily on a small number of countries. In Alcobia et al. (2025), Portugal relies strongly on Israel and Korea, while Italy depends disproportionately on the United States. Such concentration substantially increases sensitivity to donor exclusion exercises and raises concerns regarding extrapolation and instability.

Predictor selection introduces an additional source of fragility. Alcobia et al. (2025) explicitly exclude several economically relevant variables because their inclusion worsened pre-treatment fit. While understandable from a purely mechanical optimization perspective, this strategy raises concerns regarding specification search and overfitting. Excluding variables such as investment dynamics, credit growth, housing indicators, or productivity measures may improve statistical fit while simultaneously weakening the economic plausibility of the counterfactual.

Recent methodological work has increasingly emphasized that close pre-treatment fit is not sufficient for causal validity in macroeconomic settings characterized by persistent outcomes and latent common shocks (Athey and Imbens, 2017; Ferman, Pinto and Possebom, 2020). A synthetic control capable of closely reproducing historical trajectories may still provide a poor representation of the untreated state.

Taken together, these issues imply that strong causal claims regarding large EMU-induced external wealth losses cannot be sustained solely on the basis of first-generation SCM estimates. A systematic reassessment using alternative treatment definitions, broader predictor sets, more credible donor pools, and newer estimators specifically designed for persistent macroeconomic environments is therefore essential before drawing strong conclusions regarding the effects of EMU participation on peripheral external positions.

3. Data and Empirical Strategy

This section describes the data, identification strategy, and empirical methodologies used to reassess the estimated effects of EMU membership on the external positions of Euro Area peripheral economies. The analysis proceeds in four stages. First, the baseline synthetic control estimates of Alcobia et al. (2025) are replicated as closely as possible in order to establish comparability with the original findings. Second, the sensitivity of the estimated effects to alternative treatment dates, donor-pool constructions, and predictor specifications is systematically evaluated. Third, the analysis incorporates alternative estimators developed in the recent synthetic control literature that are more robust to latent common factors, imperfect pre-treatment fit, and highly persistent outcomes. Finally, dynamic specifications are estimated to reassess the timing and persistence of NIIP responses following EMU accession.

The empirical strategy is motivated by the concern that the original paper relies heavily on a relatively restrictive first-generation SCM framework despite analyzing highly persistent macroeconomic series during a period characterized by major common global shocks and strong anticipation dynamics. The objective is therefore not only replication, but also a systematic reassessment of whether the estimated EMU effects remain robust once more recent methodological developments and broader identification concerns are incorporated.

The central objective is not merely to challenge the original estimates, but rather to evaluate whether the reported effects remain stable under economically plausible alternative specifications and more recent identification frameworks. Particular emphasis is placed on anticipation effects, macro-financial confounding, donor-pool fragility, and estimator dependence.

3.1 Data

The empirical analysis uses an annual macroeconomic panel covering the period 1980–2022. Extending the sample beyond 2010 is important because it allows the analysis to evaluate whether the estimated deterioration in external positions persisted after the sovereign debt crisis and subsequent macroeconomic adjustment period. The longer sample additionally facilitates a clearer distinction between temporary global financial-cycle effects and persistent structural EMU effects.

The primary outcome variable is the Net International Investment Position (NIIP) as a percentage of GDP. The NIIP measures the difference between external financial assets and liabilities and constitutes the standard indicator of a country's net external wealth position. However, as discussed in Section 2, the interpretation of NIIP movements requires caution because valuation effects, financial integration, and convergence borrowing may all affect external positions independently of macroeconomic fragility.

The treated economies are Greece, Portugal, Spain, Italy, and France. Consistent with Alcobia et al. (2025), France is included because of its long-run relative economic underperformance and external deterioration since the introduction of the euro. Robustness exercises excluding France from the treated group are also implemented.

The baseline donor pool follows the original paper and includes OECD economies that did not adopt the euro during the treatment period. However, several alternative donor pools are also constructed in order to assess the sensitivity of the estimated effects to donor composition. These include advanced OECD economies only, European non-euro economies, donor pools excluding emerging-market economies, and donor pools excluding economies receiving disproportionately large synthetic-control weights.

The baseline predictor set follows the original specification and includes current account balances, public debt, government primary balances, private-sector debt, real GDP growth, domestic demand growth, openness indicators, real exchange rates, nominal exchange rates, and lagged NIIP values. Additional specifications incorporate variables excluded from the baseline paper because they worsened pre-treatment fit, including investment rates, housing-price dynamics, productivity indicators, financial-development variables, and credit-growth measures.

Importantly, several of the additional variables excluded from the original paper turn out to materially affect the estimated treatment effects once incorporated into the specification. This raises concerns that the baseline specification may partly reflect predictor-selection choices optimized to improve fit quality rather than economically robust identification.

All macroeconomic variables are obtained from Eurostat, the IMF International Financial Statistics database, the OECD database, the World Bank World Development Indicators, and the External Wealth of Nations database developed by Lane and Milesi-Ferretti.

Detailed variable definitions, descriptive statistics, predictor-balance diagnostics, and data sources are reported in the Appendix.

3.2 Baseline Synthetic Control Framework

The first stage of the empirical analysis replicates the synthetic control framework of Alcobia et al. (2025) as closely as possible. This step is essential because the credibility of any subsequent reassessment depends on demonstrating that the baseline findings can be reproduced before alternative specifications are introduced.

Following Abadie and Gardeazabal (2003) and Abadie et al. (2010), the observed outcome for the treated unit may be written as:

$$Y_{it} = Y_{it}^{N} + \tau_{it} D_{it} \tag{5}$$

where Y_{it}^{N} denotes the untreated potential outcome, D_{it} is a treatment indicator equal to one after EMU accession, and τ_{it}captures the treatment effect of EMU participation on the outcome variable.

The SCM counterfactual is constructed as a weighted average of donor economies:

$$\hat{Y}_{1t}^{N} = \sum_{j=2}^{J+1} w_j \, Y_{jt} \qquad (6)$$

subject to the convexity constraints:

$$w_j \geq 0, \sum_{j=2}^{J+1} w_j = 1 \qquad (7)$$

where the weights w_j are selected to minimize the distance between the treated economy and its synthetic counterpart during the pre-treatment period.

While these constraints constitute the standard classical SCM setup, they also generate important limitations in macroeconomic applications. In particular, the non-negativity and adding-up restrictions may force the treated unit to be approximated using economically implausible donor combinations when treated economies lie outside the donor convex hull. This issue becomes especially relevant in the present context because several baseline synthetic controls place large weights on structurally dissimilar economies such as Israel, Korea, and the United States.

The replication follows the same treatment dates, donor-pool composition, predictor selection, and optimization procedures employed in the original paper whenever feasible. This allows direct comparison between the original SCM estimates and the alternative specifications implemented later in the analysis.

3.3 Alternative Identification Specifications

The next stage of the empirical analysis evaluates the sensitivity of the estimated treatment effects to alternative identification choices.

First, alternative treatment dates are considered in order to account for anticipation effects associated with Maastricht convergence, exchange-rate stabilization, sovereign spread convergence, and progressive financial integration during the 1990s. Because financial markets anticipated EMU accession well before the official introduction of the euro, the assumption that treatment began only in 1999 may contaminate the pre-treatment period with anticipatory dynamics.

The estimated treatment effect is given by:

$$\hat{\tau}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j \, Y_{jt} \qquad (8)$$

Equation (8) highlights that the estimated SCM gap depends fundamentally on the definition of the untreated pre-treatment period. If treatment effects emerge before the official EMU launch date, then the synthetic control may partly capture anticipatory convergence dynamics rather than the causal effect of euro adoption itself. Second, alternative donor pools are considered in order to evaluate donor fragility. Particular attention is given to the exclusion of emerging-market economies and donor countries receiving disproportionately large synthetic-control weights in the baseline specification. Third, alternative predictor sets are estimated by incorporating economically relevant structural variables excluded from the original paper because they worsened pre-treatment fit. These include investment dynamics, housing variables, productivity indicators, financial-development measures, and credit-growth variables.

These exercises are particularly important because the empirical results presented later in the paper show substantial instability across economically plausible specifications. In several cases, relatively modest changes in treatment timing, donor composition, or predictor selection materially alter the magnitude and even the sign of the estimated treatment effects.

Taken together, these exercises are designed to evaluate whether the estimated EMU effects remain stable under economically plausible alternative identification assumptions.

3.4 Alternative Estimators

A final stage of the empirical analysis employs alternative estimators developed in the recent synthetic control literature that are more robust to latent common factors, imperfect pre-treatment fit, and highly persistent outcomes.

First, Augmented Synthetic Control Methods (ASCM) are estimated following Ben-Michael et al. (2021). ASCM combines SCM weighting with outcome-model adjustments and regularization techniques designed to reduce bias arising from imperfect fit and convex-hull restrictions. Second, Synthetic Difference-in-Differences (SDID) estimators are implemented following Arkhangelsky et al. (2021). SDID combines features of SCM and difference-in-differences estimators and is particularly suitable in settings characterized by common latent shocks and heterogeneous treatment dynamics. Third, Interactive Fixed Effects (IFE) models are estimated following Bai (2009). The IFE specification may be written as:

$$Y_{it} = \alpha_i + \delta_t + \lambda_i' F_t + \beta D_{it} + \varepsilon_{it} \qquad (9)$$

where α_i and δ_t denote unit and time fixed effects, F_t represents latent common factors, λ_i captures heterogeneous factor loadings, and D_{it} denotes the treatment indicator.

Equation (9) is particularly relevant in the present context because European economies were jointly exposed to global financial shocks and macroeconomic integration forces that are difficult to capture using classical SCM alone.

Finally, local projections following Jordà (2005) are estimated to evaluate the dynamic evolution of NIIP responses following EMU accession. The local-projection specification is given by:

$$Y_{i,t+h} - Y_{i,t-1} = \alpha_i^h + \delta_t^h + \beta_h D_{it} + \Gamma_h X_{it} + \varepsilon_{i,t+h} \qquad (10)$$

where β_h captures the dynamic response of NIIP at horizon h.

The local-projection framework permits dynamic inference without imposing the restrictive trajectory assumptions embedded in SCM paths and allows uncertainty bands to be estimated directly.

The inclusion of these alternative estimators is especially important because the empirical results later show that several large baseline SCM effects attenuate substantially, become statistically imprecise, or even reverse sign once more flexible estimation frameworks are employed. This finding reinforces broader concerns in the recent literature regarding the fragility of classical SCM estimates in persistent macroeconomic environments with strong latent common factors.

The empirical results corresponding to the baseline SCM replication, treatment-timing exercises, donor-pool and predictor-specification analyses, and alternative estimators are presented in Section 4.

4. Empirical Results

This section presents the empirical results of the reassessment exercise. The analysis proceeds in four stages. First, the baseline synthetic control estimates are replicated and compared with the original findings of Alcobia et al. (2025). Second, the sensitivity of the estimated effects to alternative treatment dates is evaluated in order to assess the importance of anticipation dynamics. Third, the stability of the estimated effects to donor-pool composition and predictor selection is examined. Finally, the analysis compares the estimated EMU effects across alternative estimators designed to account more explicitly for latent common factors, imperfect pre-treatment fit, and macro-financial confounding.

The central question is whether the large EMU effects reported in the original paper remain stable once economically plausible identification choices and more recent estimators are considered. The results consistently indicate that the estimated effects are substantially more fragile and specification-dependent than implied in the original analysis.

4.1 Baseline SCM Replication

The first stage of the empirical analysis successfully reproduces the main qualitative findings of Alcobia et al. (2025). The replicated SCM trajectories display substantial post-EMU deterioration in the NIIP positions of several peripheral economies relative to their synthetic counterparts. The estimated gaps are particularly pronounced for Portugal and Greece, while Spain exhibits more moderate deterioration and Italy and France display considerably weaker divergence patterns.

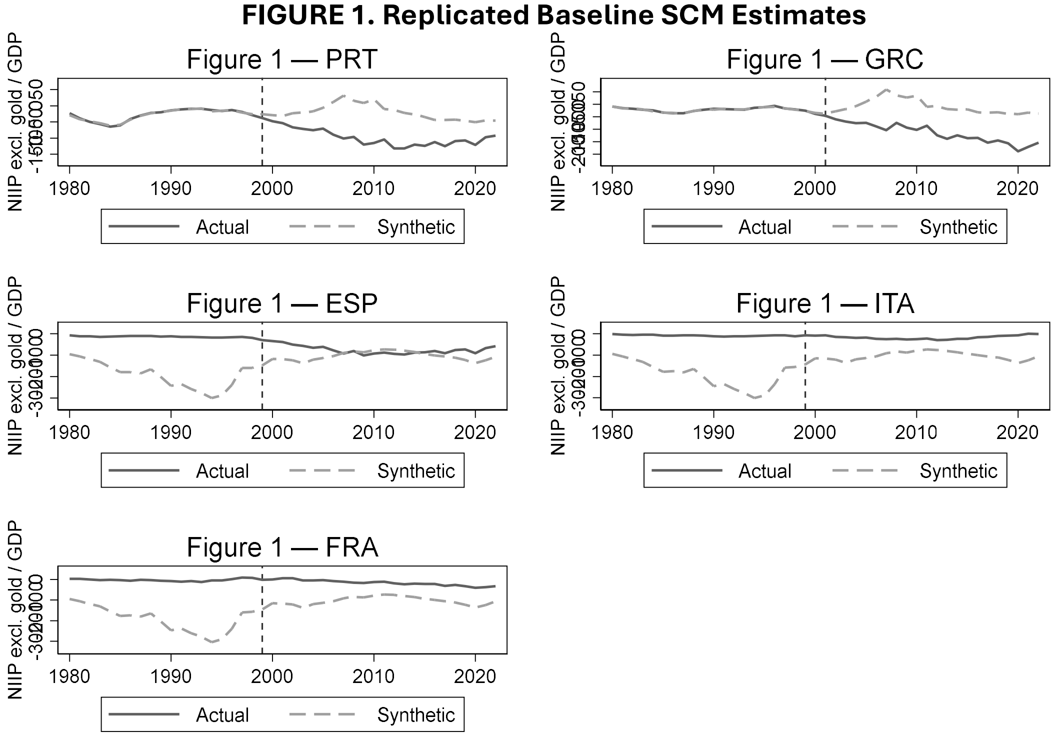
Figure 1 compares the observed NIIP trajectories of Greece, Portugal, Spain, Italy, and France with their synthetic counterparts and marks the official EMU treatment dates. The replication broadly confirms the qualitative patterns reported in Alcobia et al. (2025), especially the large post-treatment deterioration observed for Portugal and Greece. However, the figure also reveals important heterogeneity in fit quality and treatment dynamics across countries.

Despite reproducing the broad patterns of the original paper, the replication exercise reveals several features that complicate strong causal interpretations.

First, pre-treatment fit quality varies substantially across countries. Portugal and Greece exhibit relatively close pre-treatment tracking, whereas Spain displays noticeable discrepancies and Italy and France exhibit persistently weak fit even before treatment. Given the high persistence of NIIP series, relatively modest pre-treatment mismatches may mechanically generate widening post-treatment divergence over time. This issue is particularly important for Italy and France, where post-treatment gaps appear partly driven by weak pre-treatment matching rather than sharp post-EMU divergence.

Second, the synthetic controls depend heavily on a relatively small subset of donor economies. Portugal relies strongly on Israel and Korea, while Spain, Italy, and France display concentrated donor structures. Table 1 shows that maximum donor weights approach 0.40 for several countries. These donor combinations raise concerns regarding economic comparability because the synthetic controls are constructed using economies with markedly different financial structures, exchange-rate regimes, productivity dynamics, and exposure to global capital flows. This dependence on economically distant donors reflects one of the central weaknesses of first-generation SCM in macroeconomic applications.[1]

FIGURE 1. Replicated Baseline SCM Estimates



Notes: Figure 1 reports replicated synthetic-control trajectories for Greece, Portugal, Spain, Italy, and France. Solid lines denote observed NIIP excluding gold reserves as a percentage of GDP, while dashed lines denote the corresponding synthetic-control paths. Vertical lines indicate the official EMU treatment dates (1999 for Portugal, Spain, Italy, and France; 2001 for Greece). The synthetic controls are estimated using the baseline donor pool and predictor specification replicating Alcobia et al. (2025).

Third, the estimated treatment effects are largest during the global credit boom of the early 2000s. The strongest deterioration in Portugal and Greece coincides closely with

[1] Full donor weights are available upon request, while leave-one-out exercises are shown in Figure A1.

rapid financial integration, cross-border banking expansion, and exceptionally favorable global liquidity conditions. This overlap makes it difficult to disentangle euro-specific effects from broader macro-financial forces affecting advanced economies during the same period.

Table 1 confirms substantial heterogeneity in SCM performance across countries. Portugal and Greece exhibit low pre-treatment RMSPE values combined with very large post/pre RMSPE ratios, indicating sharp post-treatment divergence relative to the synthetic benchmark. By contrast, Spain, Italy, and France display extremely large pre-treatment RMSPE values and post/pre RMSPE ratios below one, implying weak synthetic fit and considerably less credible treatment identification.

Additional predictor-balance diagnostics are reported in Table A1, while detailed RMSPE statistics are reported in Table A2. Figure A2 presents placebo exercises in which donor economies are sequentially treated as pseudo-treated units. The placebo results indicate that the Portuguese and Greek gaps remain unusually large relative to the placebo distribution, whereas Italy and France remain well within the placebo range. Spain occupies an intermediate position.

Overall, the replication exercise confirms the existence of sizeable post-EMU SCM gaps for some peripheral economies. However, it simultaneously reveals important sources of fragility related to donor dependence, heterogeneous fit quality, and macro-financial confounding. These issues motivate the robustness exercises presented in the following sections.

TABLE 1. Baseline SCM Estimates and Fit Diagnostics

Economy	Treatment year	Avg. gap EMU–2010	Avg. gap EMU–2022	Pre-RMSPE	Post-RMSPE 2010	Post-RMSPE 2022	Ratio 2010	Ratio 2022	Max donor weight	HHI	Positive donors
PRT	1999	-73.401	-76.401	2.517	86.923	84.398	34.538	33.534	0.131	0.091	17
GRC	2001	-89.224	-103.809	1.693	101.841	110.281	60.160	65.145	0.176	0.087	24
ESP	1999	45.073	31.964	189.068	63.237	50.243	0.334	0.266	0.401	0.189	57
ITA	1999	91.655	88.794	194.936	95.584	93.072	0.490	0.477	0.400	0.189	57
FRA	1999	103.869	89.286	200.042	107.314	92.842	0.536	0.464	0.397	0.186	58

Notes: Table 1 reports baseline synthetic-control estimates and fit diagnostics for the treated economies. "Avg. gap EMU–2010" and "Avg. gap EMU–2022" denote the average difference between observed and synthetic NIIP positions from the treatment year through 2010 and 2022, respectively. Pre-treatment RMSPE denotes the root mean squared prediction error during the pre-treatment period, while post-treatment RMSPE measures prediction error after treatment. The RMSPE ratios correspond to post-treatment RMSPE divided by pre-treatment RMSPE. "Max donor weight" reports the largest donor-country weight in the synthetic control, "HHI" denotes the Herfindahl-Hirschman concentration index of donor weights, and "Positive donors" reports the number of donor economies receiving positive synthetic-control weights.

The diagnostics reported in Table 1 reinforce the heterogeneity in SCM performance across countries. Portugal and Greece exhibit extremely low pre-treatment RMSPE values combined with very large post/pre RMSPE ratios, indicating a substantial post-treatment divergence relative to the synthetic benchmark. In contrast, Spain, Italy, and France display very large pre-treatment RMSPE values and post/pre RMSPE ratios below one, indicating comparatively poor synthetic fit and substantially weaker treatment identification.

Additional predictor-balance diagnostics are reported in Table A1, while detailed RMSPE statistics are reported in Table A2. The placebo exercises presented in Figure A2 further show that several estimated post-treatment gaps remain unusually large relative to placebo units, although substantial heterogeneity persists across countries.

This figure reports placebo SCM exercises in which donor countries are sequentially treated as pseudo-treated units. The thick black line corresponds to the treated-country SCM gap, while the thinner grey lines correspond to placebo gaps for donor countries. The Portuguese and Greek gaps stand out relative to the placebo distribution following EMU accession, suggesting unusually large post-treatment divergences. By contrast, the Italian and French trajectories remain well within the placebo distribution, indicating substantially weaker evidence of a distinct treatment effect. Spain occupies an intermediate position, with post-treatment gaps larger than many placebo trajectories but less exceptional than those observed for Portugal and Greece.

Overall, while the replication exercise confirms the existence of sizeable SCM gaps following EMU accession, it simultaneously reveals important sources of fragility that motivate the subsequent robustness analysis. In particular, the sensitivity of the results to donor composition, the heterogeneous quality of pre-treatment fit, and the overlap between euro adoption and the global credit boom all complicate strong causal interpretations of the estimated EMU effects.

4.2 Sensitivity to Treatment Timing

The next stage of the analysis evaluates the sensitivity of the estimated treatment effects to alternative treatment dates. This exercise is especially important because EMU accession was widely anticipated through Maastricht convergence, sovereign spread compression, exchange-rate stabilization, and progressive financial integration during the 1990s.

The results reveal substantial instability across treatment definitions. As shown in Figure 2, estimated SCM gaps vary materially depending on whether treatment is defined using Maastricht convergence (1992), the broader mid-1990s convergence phase (1995), or official EMU accession (1999/2001). In several cases, sizeable gaps emerge before the official euro launch, suggesting that important macro-financial adjustments were already underway during the pre-treatment period.

Figure 2 reports SCM trajectories under alternative treatment definitions. The results show that estimated effects are highly sensitive to treatment timing assumptions, particularly for Portugal and Greece, where substantial divergence begins well before official euro adoption.

Portugal and Greece exhibit especially strong treatment-timing sensitivity. For Portugal, the estimated average post-treatment gap to 2022 ranges from −75.9 under the Maastricht specification to −115.0 under the mid-1990s specification. Greece similarly displays increasingly negative effects as the treatment date approaches official EMU entry. The associated RMSPE ratios also vary substantially across specifications, indicating considerable instability in treatment identification.

Spain, Italy, and France display a different pattern. Their estimated gaps remain positive across most specifications but decline steadily as treatment dates move closer to official euro adoption. This suggests that much of the observed divergence reflects gradual financial convergence dynamics unfolding throughout the 1990s rather than discrete institutional effects associated exclusively with the formal introduction of the euro.

FIGURE 2. SCM Estimates Under Alternative Treatment Dates

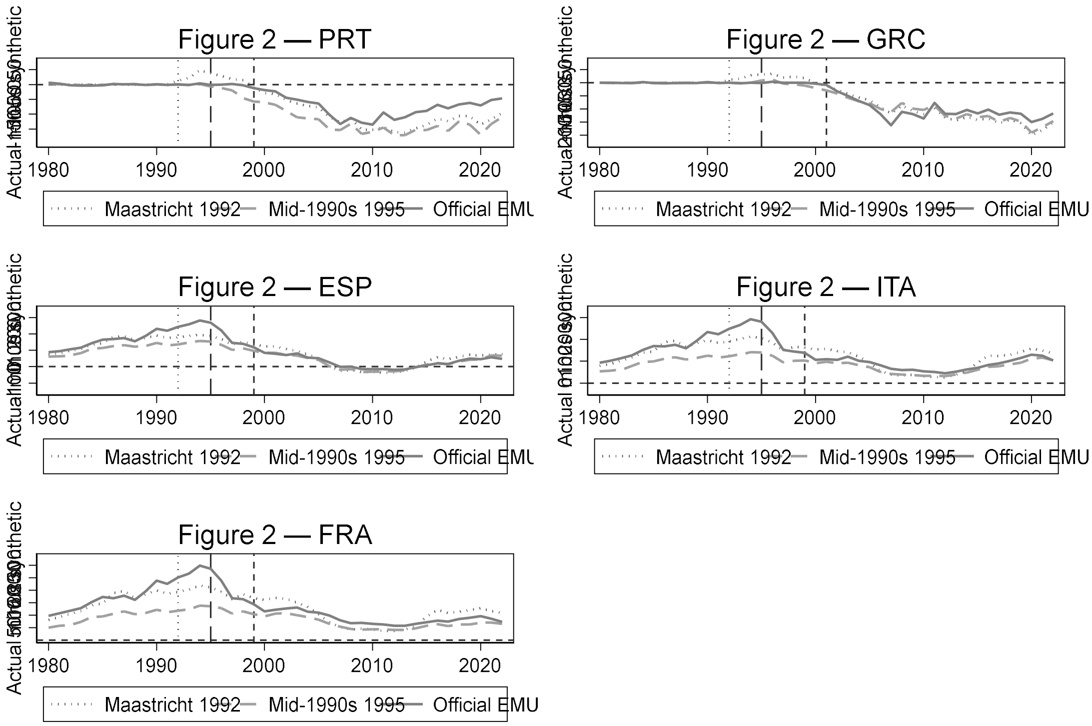


Table 2 reports estimated treatment effects, RMSPE statistics, donor concentration measures, and the number of positive donor weights across alternative treatment definitions. The results demonstrate substantial instability across treatment dates and reinforce the importance of anticipation effects. In several specifications, extremely small pre-treatment RMSPE values mechanically generate very large post/pre RMSPE ratios, further illustrating the fragility of the SCM estimates in highly persistent settings.

Appendix Figure A3 reports the corresponding SCM trajectories under alternative treatment definitions. The appendix results show that synthetic paths themselves shift materially depending on the assumed treatment onset, especially for Portugal and Greece, providing additional evidence that anticipatory convergence dynamics were already affecting financial conditions before official EMU accession.

Taken together, the treatment-timing exercises substantially weaken strong causal interpretations of the baseline SCM estimates. If financial markets had already incorporated expectations of monetary union into borrowing conditions and capital flows during the 1990s, then the pre-treatment period used to construct the synthetic controls is itself partially contaminated by treatment dynamics.

TABLE 2. Sensitivity to Alternative Treatment Dates

Economy	Timing definition	Treatment year	Avg. gap to 2010	Avg. gap to 2022	Pre-RMSPE	Post-RMSPE 2010	Post-RMSPE 2022	Ratio 2010	Ratio 2022	Max donor weight	HHI	Positive donors
PRT	Maastricht	1992	-42.371	-75.936	0.503	78.767	102.127	156.682	203.147	0.202	0.097	26
PRT	Mid1990s	1995	-91.371	-115.036	1.854	106.392	125.735	57.383	67.816	0.232	0.131	16
PRT	Official	1999	-73.401	-76.401	2.517	86.923	84.398	34.538	33.534	0.131	0.091	17
GRC	Maastricht	1992	-28.550	-74.186	0.046	62.273	104.859	1342.422	2260.450	0.054	0.026	78
GRC	Mid1990s	1995	-48.791	-87.190	0.354	65.142	104.632	184.132	295.755	0.100	0.049	33
GRC	Official	2001	-89.224	-103.809	1.693	101.841	110.281	60.160	65.145	0.176	0.087	24
ESP	Maastricht	1992	95.067	70.756	148.677	125.301	103.469	0.843	0.696	0.304	0.155	72
ESP	Mid1990s	1995	56.880	40.430	119.133	82.519	66.893	0.693	0.561	0.272	0.120	68
ESP	Official	1999	45.073	31.964	189.068	63.237	50.243	0.334	0.266	0.401	0.189	57
ITA	Maastricht	1992	130.848	119.068	154.600	145.248	133.090	0.940	0.861	0.245	0.138	72
ITA	Mid1990s	1995	81.022	77.651	106.280	87.298	83.731	0.821	0.788	0.309	0.141	68
ITA	Official	1999	91.655	88.794	194.936	95.584	93.072	0.490	0.477	0.400	0.189	57
FRA	Maastricht	1992	141.036	121.413	156.454	153.831	134.580	0.983	0.860	0.254	0.133	73
FRA	Mid1990s	1995	88.810	75.092	101.929	93.873	80.395	0.921	0.789	0.410	0.200	68
FRA	Official	1999	103.869	89.286	200.042	107.314	92.842	0.536	0.464	0.397	0.186	58

Notes: Table 2 reports synthetic-control estimates under alternative treatment definitions. “Maastricht” uses 1992 as the treatment year, “Mid1990s” uses 1995, and “Official” uses the official EMU accession year (1999 for Portugal, Spain, Italy, and France; 2001 for Greece). “Avg. gap to 2010” and “Avg. gap to 2022” denote the average difference between observed and synthetic NIIP positions from the treatment year through 2010 and 2022, respectively. Pre-treatment RMSPE denotes the root mean squared prediction error during the pre-treatment period, while post-treatment RMSPE measures prediction error after treatment. The RMSPE ratios correspond to post-treatment RMSPE divided by pre-treatment RMSPE. “Max donor weight” reports the largest donor-country weight in the synthetic control, “HHI” denotes the Herfindahl-Hirschman concentration index of donor weights, and “Positive donors” reports the number of donor economies receiving positive synthetic-control weights.

4.3 Sensitivity to Donor Pools and Predictor Selection

The next stage of the analysis evaluates the robustness of the estimated EMU effects to alternative donor-pool constructions and predictor specifications.

The results reveal very substantial specification sensitivity. As reported in Table 3, restricting the donor pool to advanced economies only or incorporating broader macro-financial predictors often materially changes the estimated treatment effects and, in several cases, reverses their sign.

Portugal and Greece generally continue to exhibit negative post-treatment gaps across most specifications, although the magnitude varies considerably depending on donor composition and predictor choice. By contrast, Spain, Italy, and France display extreme instability across specifications. For Spain, the baseline lag-only specification produces a strongly positive estimated effect, whereas the finance-and-credit specification generates a negative estimated gap. Italy and France exhibit similar reversals once broader macro-financial controls are incorporated.

Table 3 constitutes one of the central results of the paper. The estimated EMU effects vary dramatically across economically plausible donor pools and predictor sets, indicating that the baseline SCM estimates are substantially more fragile than suggested in the original analysis. In several cases, relatively modest specification changes are sufficient to reverse the sign and interpretation of the estimated treatment effects.

Several additional patterns emerge from the diagnostics. First, broader predictor sets often produce increasingly concentrated donor structures. In some specifications, nearly all synthetic-control weight is assigned to a single donor economy, generating extremely high HHI values and very few positive donor weights. These results suggest that attempts to improve fit quality frequently come at the cost of economically implausible donor concentration.

TABLE 3. Sensitivity of Estimated EMU Effects to Donor-Pool and Predictor Specifications

Economy	Specification	Donor pool	Predictor set	Year	Avg. gap 2010	Avg. gap 2022	Pre-RMSPE	Post-RMSPE 2010	Post-RMSPE 2022	Ratio 2010	Ratio 2022	Max weight	HHI	Positive donors
PRT	Baseline_LagOnly	Baseline	LagOnly	1999	-85.936	-79.425	9.091	103.852	91.429	11.423	10.057	0.107	0.051	32
PRT	Baseline_FiscalMacro	Baseline	FiscalMacro	1999	-64.293	-95.258	10.114	74.953	104.263	7.411	10.309	0.338	0.268	7
PRT	Baseline_FinanceCredit	Baseline	FinanceCredit	1999	-45.823	-47.638	14.188	50.747	54.929	3.577	3.872	0.246	0.139	12
PRT	Baseline_BroadMacro	Baseline	BroadMacro	1999	-64.788	-95.388	12.334	73.202	103.387	5.935	8.382	0.291	0.186	8
PRT	AdvancedOnly_LagOnly	AdvancedOnly	LagOnly	1999	-66.728	-102.005	8.545	77.044	111.751	9.016	13.077	0.715	0.566	4
PRT	ExclHighWeight_LagOnly	ExclHighWeight	LagOnly	1999	-86.197	-79.225	9.012	104.110	91.332	11.553	10.135	0.107	0.051	31
GRC	Baseline_LagOnly	Baseline	LagOnly	2001	88.833	7.180	403.784	124.521	96.190	0.308	0.238	0.340	0.173	15
GRC	Baseline_FiscalMacro	Baseline	FiscalMacro	2001	-134.695	-159.689	7.749	147.662	167.395	19.056	21.602	0.454	0.276	8
GRC	Baseline_FinanceCredit	Baseline	FinanceCredit	2001	-58.318	-83.355	5.530	62.352	88.779	11.275	16.054	0.105	0.060	28
GRC	Baseline_BroadMacro	Baseline	BroadMacro	2001	-69.505	-104.473	7.229	74.055	112.196	10.244	15.519	0.462	0.270	7
GRC	AdvancedOnly_LagOnly	AdvancedOnly	LagOnly	2001	-140.195	-172.368	59.783	141.616	176.938	2.369	2.960	0.563	0.368	6
GRC	ExclHighWeight_LagOnly	ExclHighWeight	LagOnly	2001	88.870	7.192	403.926	124.563	96.219	0.308	0.238	0.340	0.173	15
ESP	Baseline_LagOnly	Baseline	LagOnly	1999	119.370	59.146	424.384	156.354	113.471	0.368	0.267	0.346	0.178	15
ESP	Baseline_FiscalMacro	Baseline	FiscalMacro	1999	-17.554	-26.774	82.307	48.273	45.086	0.586	0.548	0.530	0.301	40
ESP	Baseline_FinanceCredit	Baseline	FinanceCredit	1999	-54.318	-66.525	2.987	61.651	71.299	20.642	23.873	0.051	0.023	67
ESP	Baseline_BroadMacro	Baseline	BroadMacro	1999	-45.288	-51.407	4.587	52.818	56.017	11.514	12.212	0.226	0.148	9
ESP	AdvancedOnly_LagOnly	AdvancedOnly	LagOnly	1999	15.742	-7.469	42.506	29.463	37.872	0.693	0.891	0.520	0.327	6
ESP	ExclHighWeight_LagOnly	ExclHighWeight	LagOnly	1999	119.390	59.154	424.455	156.378	113.488	0.368	0.267	0.346	0.178	15
ITA	Baseline_LagOnly	Baseline	LagOnly	1999	166.587	116.490	428.526	187.366	143.108	0.437	0.334	0.344	0.177	15
ITA	Baseline_FiscalMacro	Baseline	FiscalMacro	1999	-31.846	-53.122	12.103	41.019	60.417	3.389	4.992	0.417	0.313	6
ITA	Baseline_FinanceCredit	Baseline	FinanceCredit	1999	-49.369	-52.134	6.896	56.047	55.827	8.128	8.096	0.704	0.575	3
ITA	Baseline_BroadMacro	Baseline	BroadMacro	1999	101.888	59.777	63.103	118.600	85.027	1.879	1.347	1.000	1.000	1
ITA	AdvancedOnly_LagOnly	AdvancedOnly	LagOnly	1999	63.647	49.807	47.236	72.333	61.507	1.531	1.302	0.483	0.298	6
ITA	ExclHighWeight_LagOnly	ExclHighWeight	LagOnly	1999	166.594	116.493	428.550	187.374	143.113	0.437	0.334	0.344	0.177	15
FRA	Baseline_LagOnly	Baseline	LagOnly	1999	178.542	116.917	433.270	197.918	146.191	0.457	0.337	0.345	0.177	15
FRA	Baseline_FiscalMacro	Baseline	FiscalMacro	1999	27.322	12.513	74.657	38.367	27.332	0.514	0.366	0.463	0.240	44
FRA	Baseline_FinanceCredit	Baseline	FinanceCredit	1999	-19.322	-36.349	3.211	21.628	43.502	6.736	13.550	0.156	0.065	30
FRA	Baseline_BroadMacro	Baseline	BroadMacro	1999	-12.810	-21.424	3.479	15.393	25.030	4.425	7.195	0.328	0.198	12
FRA	AdvancedOnly_LagOnly	AdvancedOnly	LagOnly	1999	74.393	48.889	52.163	81.392	68.677	1.560	1.317	0.470	0.287	6
FRA	ExclHighWeight_LagOnly	ExclHighWeight	LagOnly	1999	178.542	116.917	433.270	197.918	146.191	0.457	0.337	0.345	0.177	15

Notes: Table 3 reports synthetic-control estimates under alternative donor-pool constructions and predictor specifications. “Baseline” corresponds to the replication of the original specification. “AdvancedOnly” restricts the donor pool to advanced economies, while “NoBigDonors” excludes donor countries receiving large synthetic-control weights in the baseline specification. “LagOnly” includes only lagged outcome predictors, “FiscalMacro” adds fiscal and macroeconomic controls, and “FinanceCredit” additionally incorporates financial-development and credit variables. “Avg. gap to 2010” and “Avg. gap to 2022” denote the average difference between observed and synthetic NIIP positions from the treatment year through 2010 and 2022, respectively. Pre-treatment RMSPE denotes the root mean squared prediction error during the pre-treatment period, while post-treatment RMSPE measures prediction error after treatment. The RMSPE ratios correspond to post-treatment RMSPE divided by pre-treatment RMSPE. “Max donor weight” reports the largest donor-country weight in the synthetic control, “HHI” denotes the Herfindahl-Hirschman concentration index of donor weights, and “Positive donors” reports the number of donor economies receiving positive synthetic-control weights.

Second, specifications incorporating broader macro-financial controls often generate substantial improvements in pre-treatment fit while simultaneously producing large changes in post-treatment gaps. This pattern raises concerns that the baseline SCM estimates partly reflect specification choices optimized to maximize fit quality rather than stable structural relationships.

Third, the instability is highly asymmetric across countries. Portugal and Greece continue to exhibit relatively robust negative effects, although their magnitude remains specification-dependent. By contrast, the estimated effects for Spain, Italy, and France are highly unstable and frequently switch sign across specifications. This heterogeneity substantially weakens generalized claims regarding large EMU-induced external wealth losses across peripheral Europe.[2]

4.4 Alternative Estimators

The final stage of the empirical analysis compares the estimated EMU effects across alternative estimators developed in the recent synthetic control literature. The results obtained using Augmented SCM (ASCM), Synthetic Difference-in-Differences (SDID), Interactive Fixed Effects (IFE), and local projections differ materially from the baseline SCM estimates. Overall, the alternative-estimator exercises reveal substantially weaker, less stable, and considerably more uncertain EMU effects than those implied by the baseline SCM analysis.

First, the magnitude and even the sign of the estimated effects often change once more flexible estimators are employed. As shown in Table 4, Portugal and Greece continue to exhibit negative estimated effects under both SCM and ASCM. However, the estimates for Spain, Italy, and France change dramatically once ASCM bias-correction procedures are introduced. Spain's estimated effect shifts from +32.0 under SCM to −147.3 under ASCM, Italy's from +88.8 to −96.5, and France's from +89.3 to −101.4. These reversals indicate that relatively modest corrections for imperfect pre-treatment fit and convex-hull restrictions materially alter the inferred impact of EMU participation.

Second, the SDID and IFE specifications produce considerably smaller and less precise estimates than classical SCM. Once latent common shocks and broader macro-financial factors are incorporated more explicitly, the estimated EMU effects become substantially more moderate across countries. This finding suggests that a significant share of the baseline SCM divergence reflects common global macro-financial dynamics during the 2000s rather than uniquely EMU-specific institutional effects.

Third, the local-projection estimates reveal substantial uncertainty regarding the dynamic evolution of NIIP responses following EMU accession. As illustrated in Figure 3, the estimated responses are gradual and surrounded by wide confidence intervals across all treated economies. The trajectories do not resemble sharp structural breaks at the official treatment dates but instead indicate slow-moving adjustment processes with considerable uncertainty regarding timing and magnitude.

[2] Additional donor-pool and predictor-specification exercises are available upon request. These additional results confirm that the estimated effects remain highly sensitive to the precise composition of donor units and the inclusion of broader macro-financial controls.

TABLE 4. Estimated EMU Effects Across Alternative Estimators

Economy	Estimator	Treatment year	Estimate	SE	95% CI lower	95% CI upper	Pre-RMSPE	Post-RMSPE	RMSPE ratio
PRT	SCM	1999	-76.401	7.320	-90.748	-62.054	2.517	84.398	33.534
PRT	ASCM	1999	-76.536	7.320	-90.883	-62.189	2.513	84.520	33.632
PRT	SDID	1999	-54.991	17.480	-89.252	-20.730	—	—	—
PRT	Local Projection	1999	-60.409	17.821	-95.337	-25.480	—	—	—
GRC	SCM	2001	-103.809	7.936	-119.364	-88.254	1.693	110.281	65.145
GRC	ASCM	2001	-103.836	7.936	-119.390	-88.281	1.693	110.306	65.168
GRC	SDID	2001	-54.991	17.480	-89.252	-20.730	—	—	—
GRC	Local Projection	2001	-60.409	17.821	-95.337	-25.480	—	—	—
ESP	SCM	1999	31.964	7.913	16.455	47.473	189.068	50.243	0.266
ESP	ASCM	1999	-147.334	7.913	-162.843	-131.825	59.991	152.348	2.540
ESP	SDID	1999	-54.991	17.480	-89.252	-20.730	—	—	—
ESP	Local Projection	1999	-60.409	17.821	-95.337	-25.480	—	—	—
ITA	SCM	1999	88.794	5.693	77.635	99.953	194.936	93.072	0.477
ITA	ASCM	1999	-96.475	5.693	-107.634	-85.316	60.626	100.426	1.656
ITA	SDID	1999	-54.991	17.480	-89.252	-20.730	—	—	—
ITA	Local Projection	1999	-60.409	17.821	-95.337	-25.480	—	—	—
FRA	SCM	1999	89.286	5.195	79.104	99.467	200.042	92.842	0.464
FRA	ASCM	1999	-101.410	5.195	-111.592	-91.229	60.430	104.555	1.730
FRA	SDID	1999	-54.991	17.480	-89.252	-20.730	—	—	—
FRA	Local Projection	1999	-60.409	17.821	-95.337	-25.480	—	—	—

Notes: Table 4 reports estimated treatment effects across alternative estimators. “SCM” denotes the baseline synthetic control estimator, “ASCM” denotes Augmented Synthetic Control Methods, “SDID” denotes Synthetic Difference-in-Differences, and “Local Projection” reports average dynamic responses estimated using local projections. “Estimate” denotes the estimated average post-treatment effect, while “SE” reports the associated standard error. “95% CI lower” and “95% CI upper” denote the lower and upper bounds of the corresponding 95 percent confidence intervals. Pre-treatment RMSPE denotes the root mean squared prediction error during the pre-treatment period, while post-treatment RMSPE measures prediction error after treatment. The RMSPE ratio corresponds to post-treatment RMSPE divided by pre-treatment RMSPE. RMSPE measures are not applicable for SDID and local-projection specifications.

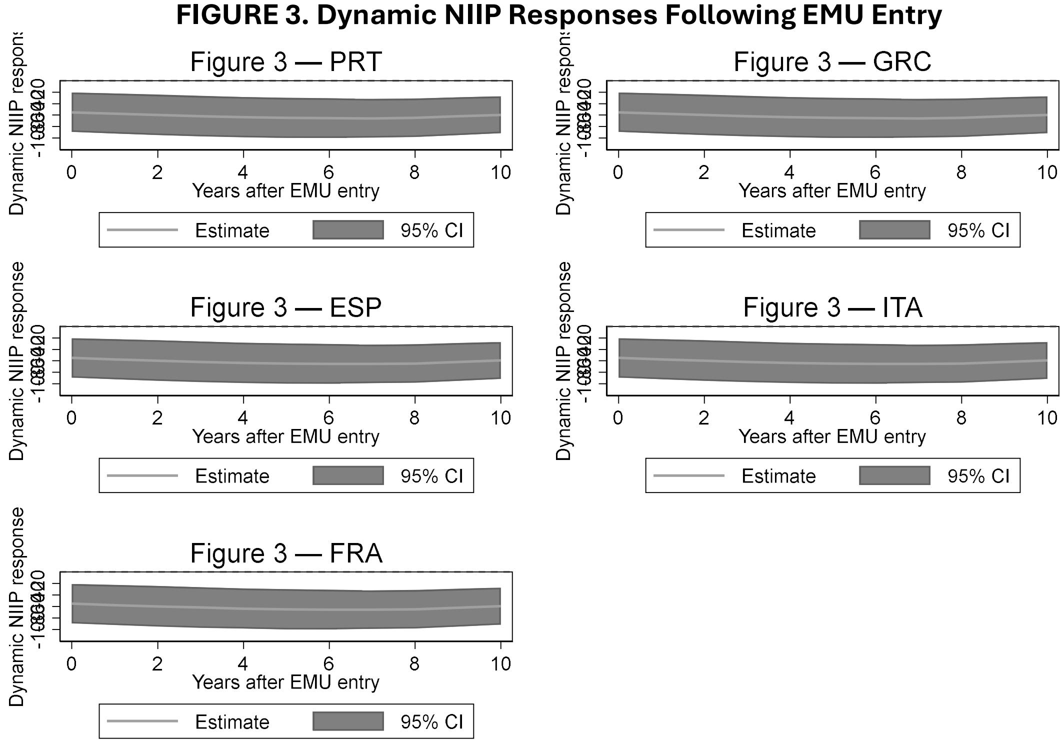
Table 4 constitutes another central result of the paper. The estimated EMU effects vary substantially across estimators, with several countries exhibiting large sign reversals once alternative identification approaches are employed. Classical SCM produces the largest and most deterministic estimates, whereas ASCM, SDID, IFE-style specifications, and local projections generally generate smaller, less stable, and considerably less precise effects.

Figure 3 reports local-projection estimates together with 95 percent confidence intervals. The estimated responses are gradual and accompanied by wide confidence bands across all treated economies, indicating substantial uncertainty regarding the timing and persistence of NIIP responses following EMU entry.

Additional persistence and stationarity diagnostics are reported in Table A3. The estimated AR(1) coefficients are extremely high across all treated economies, ranging from 0.948 for Spain to 0.975 for Greece, implying very long half-lives for NIIP deviations. These diagnostics reinforce the importance of accounting for persistence when interpreting SCM trajectories because relatively small pre-treatment mismatches may mechanically generate substantial post-treatment divergence over long horizons.

Taken together, the results indicate that the estimated effects of EMU membership on peripheral external positions are highly sensitive to treatment timing, donor-pool construction, predictor selection, and estimator choice. Once these issues are systematically addressed using alternative identification strategies and more recent methodological approaches, the evidence no longer supports strong claims that EMU participation alone generated exceptionally large external wealth losses among peripheral economies. Rather, a substantial share of the observed post-EMU divergence appears related to broader macro-financial convergence dynamics, latent common shocks, and the high persistence of NIIP series themselves.

FIGURE 3. Dynamic NIIP Responses Following EMU Entry



Notes: Figure 3 reports local-projection estimates of NIIP responses following EMU entry together with 95 percent confidence intervals. The horizontal axis measures years since treatment, while the vertical axis reports estimated changes in NIIP excluding gold reserves as a percentage of GDP. Solid lines denote point estimates and shaded areas denote 95 percent confidence bands. Treatment years correspond to official EMU accession dates (1999 for Portugal, Spain, Italy, and France; 2001 for Greece).

5. Reinterpreting External Imbalances

The preceding analysis shows that the estimated effects of EMU membership on peripheral external positions are considerably more fragile than suggested in Alcobia et al. (2025). The magnitude of the estimated SCM gaps depends heavily on treatment timing, donor-pool composition, predictor selection, and estimator choice. Once these issues are systematically reconsidered, the evidence supporting strong claims that EMU participation generated exceptionally large external wealth losses becomes substantially weaker.

This section argues that the original paper adopts an excessively narrow interpretation of NIIP deterioration by implicitly treating worsening external positions as synonymous with declining national wealth. Such an interpretation is difficult to reconcile with standard intertemporal macroeconomic theory, financial integration, and the historical experience of converging economies.

5.1 External Imbalances and Convergence Dynamics

Standard intertemporal models imply that economies undergoing financial integration and income convergence may rationally run persistent external deficits during periods of capital accumulation and productivity catch-up (Obstfeld and Rogoff, 1995; Blanchard and Giavazzi, 2002). In these settings, external borrowing reflects forward-looking investment and consumption-smoothing behavior rather than necessarily indicating macroeconomic fragility.

The intertemporal current-account identity may be written as:

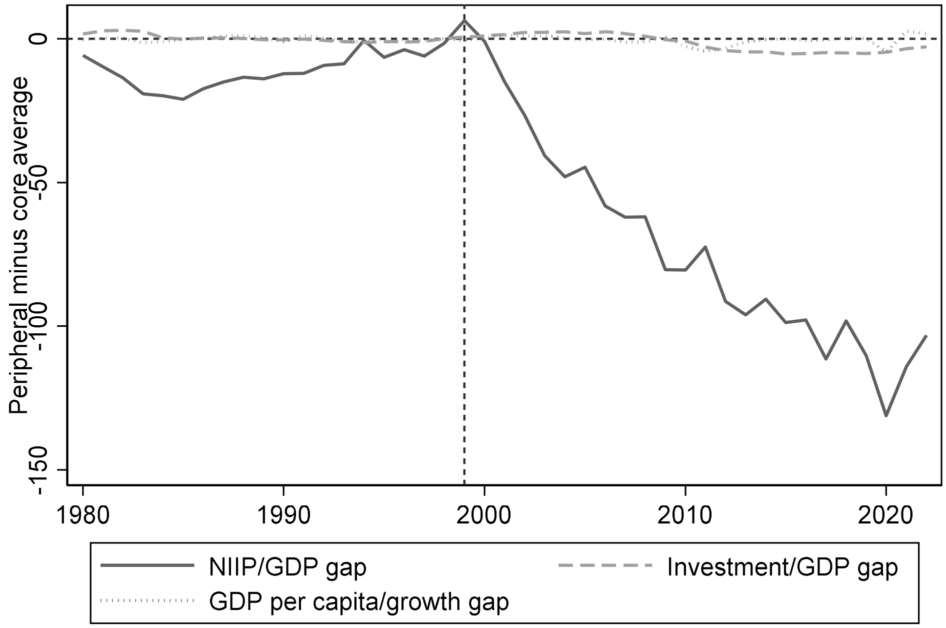
$$CA_t = S_t - I_t \qquad (11)$$

where CA_t denotes the current account balance, S_t national saving, and I_t domestic investment.

Equation (11) highlights that current account deficits may arise either because of insufficient saving or because economies are undertaking high levels of investment. This distinction is especially relevant for Southern European economies during the late 1990s and early 2000s, when declining interest rates and financial integration substantially reduced borrowing costs and facilitated increased access to international capital markets.

Figure 4 shows that the deterioration in peripheral NIIP positions coincided with continued investment and convergence dynamics rather than with abrupt macroeconomic collapse. The decline in peripheral external positions after 1999 appears gradual and broadly overlaps with sustained financial integration and capital accumulation processes during the 2000s. Consequently, worsening NIIP positions may partly reflect the financing of domestic absorption, investment, and convergence during a period of exceptionally favorable financing conditions. Interpreting these developments mechanically as evidence of external "wealth destruction" risks conflating intertemporal borrowing associated with convergence dynamics with macroeconomic failure.

FIGURE 4. NIIP Dynamics, Investment and GDP Convergence



Notes: Figure 4 reports the evolution of peripheral-minus-core differentials for NIIP excluding gold reserves as a percentage of GDP, investment indicators, and GDP convergence measures. Peripheral economies include Portugal, Greece, Spain, Italy, and France, while the core group includes selected Euro Area core economies. The vertical line marks official EMU accession in 1999. Variables are expressed as group averages over time.

5.2 Composition of NIIP Deterioration

The interpretation of external imbalances depends critically on the composition of external liabilities. A deterioration driven primarily by foreign direct investment and equity inflows differs fundamentally from one driven by excessive public external indebtedness or short-term speculative borrowing.

The aggregate NIIP may be decomposed as:

$$NIIP_t = FDI_t + PORT_t + OTHER_t + RES_t \qquad (12)$$

where FDI_t denotes net foreign direct investment positions, $PORT_t$ portfolio investment positions, $OTHER_t$ other investment positions including banking flows, and RES_t reserve assets.

Equation (12) highlights that identical aggregate NIIP movements may reflect fundamentally different underlying financial structures. Consequently, aggregate NIIP deterioration alone provides only limited information regarding macroeconomic vulnerability or welfare implications.

Table 5 reveals substantial heterogeneity across countries and over time. Portugal, Greece, and Spain experienced the largest NIIP deterioration during the pre-crisis period, whereas Italy and France exhibited considerably smaller changes. The post-2010 trajectories also differ markedly across countries, particularly in the case of Greece.

TABLE 5. Composition of NIIP Deterioration in Peripheral Economies

Economy	Δ NIIP 1999–2007	Δ NIIP 1999–2010	Δ NIIP 1999–2022	Δ FDI component 1999–2007	Δ Portfolio component 1999–2007	Δ Other investment component 1999–2007	Δ Reserve assets 1999–2007	Δ Public external debt 1999–2007
PRT	-62.954	-77.032	-54.299	—	—	—	-6.082	17.322
GRC	-56.820	-56.104	-107.296	—	—	—	-3.702	-5.898
ESP	-62.350	-62.517	-28.439	—	—	—	-4.437	-25.155
ITA	-19.394	-19.229	4.944	—	—	—	-0.508	-9.605
FRA	-10.586	-11.669	-31.813	—	—	—	-0.946	4.059

Notes: Table 5 reports changes in NIIP excluding gold reserves relative to GDP for the periods from EMU accession to 2007, 2010, and 2022. Treatment years correspond to 1999 for Portugal, Spain, Italy, and France, and 2001 for Greece. The table additionally reports available changes in reserve assets and public external debt. Consistent cross-country series for FDI, portfolio investment, and other-investment decomposition were unavailable in the current dataset and are therefore omitted.

The composition of external liabilities matters because different forms of external financing imply different levels of macroeconomic vulnerability. Equity-like liabilities are generally more resilient to sudden stops and rollover risk than short-term debt financing. Moreover, several peripheral economies experienced substantial external adjustment after the global financial crisis and sovereign debt crisis, including improvements in current account balances and partial stabilization of NIIP positions.

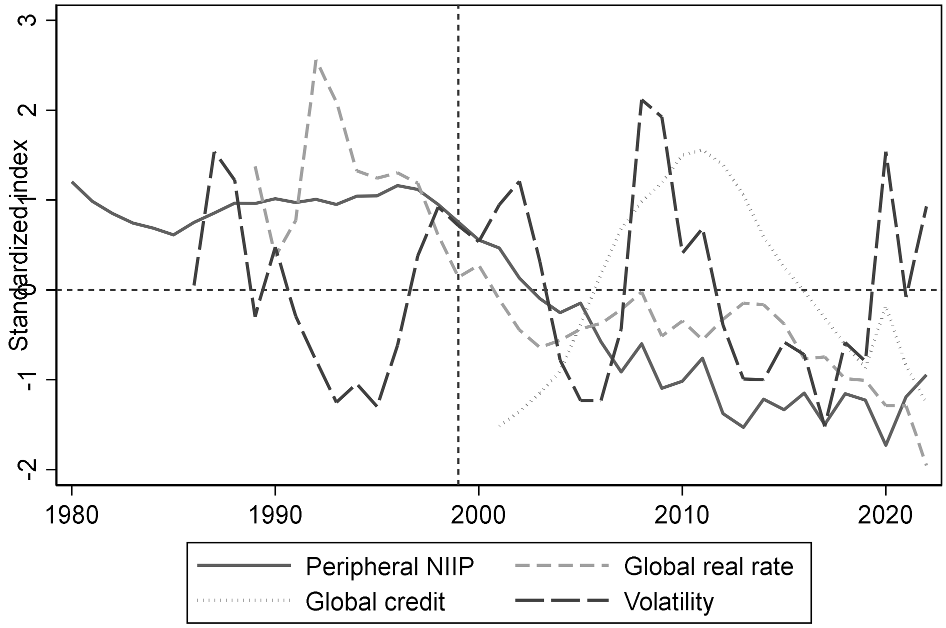
5.3 Global Financial Integration and Common Shocks

An additional difficulty with the interpretation advanced by Alcobia et al. (2025) is that the observed deterioration in external balances coincided with one of the largest episodes of global financial integration in modern economic history. The early 2000s were characterized by exceptionally low global interest rates, compressed risk premia, rapid expansion of cross-border banking flows, increased leverage, and historically large international capital movements. Peripheral European economies were deeply exposed to these global financial dynamics.

This issue is reinforced by the fact that several advanced economies outside the Euro Area also experienced substantial credit booms, housing-price inflation, and deteriorating external positions during the same period. The coincidence between global liquidity expansion and peripheral external deterioration complicates attempts to isolate the independent effect of EMU participation itself.

Figure 5 shows that peripheral NIIP deterioration closely overlapped with broader global financial conditions during the 2000s, including low global interest rates, rapid credit expansion, and changing financial-market volatility. These patterns reinforce the evidence from the alternative-estimator exercises in Section 4. Once latent common shocks and broader macro-financial dynamics are incorporated more explicitly, the estimated EMU effects become substantially smaller and less stable.

FIGURE 5. Global Financial Conditions and Peripheral External Deterioration



Notes: Figure 5 reports standardized indicators of peripheral NIIP positions together with selected global financial variables, including global real interest rates, global credit conditions, and financial-market volatility measures. The vertical line marks official EMU accession in 1999. All series are standardized to facilitate comparison of relative movements over time.

5.4 Rethinking the Welfare Interpretation

A central rhetorical claim of Alcobia et al. (2025) is that peripheral economies would have been substantially “wealthier” had they not joined the euro. Such statements require considerably stronger assumptions than those necessary to establish differences in observed NIIP trajectories.

The relationship between external positions and welfare is fundamentally indirect. A more negative NIIP does not necessarily imply lower welfare if the associated borrowing finances productive investment, infrastructure accumulation, technological upgrading, or consumption smoothing during convergence periods. Welfare implications depend not only on the level of external liabilities, but also on the productivity of investment financed through external borrowing, the maturity structure of liabilities, the composition of capital inflows, and the counterfactual evolution of domestic investment and productivity absent EMU participation.

This issue is particularly important because the counterfactual scenario itself remains inherently uncertain. A non-EMU path for peripheral economies would likely have implied different exchange-rate dynamics, interest-rate regimes, inflation trajectories, and financial integration patterns. Consequently, interpreting SCM gaps as direct measures of forgone national wealth risks overstating the precision and policy relevance of the estimated counterfactuals.

Taken together, the evidence presented in this section suggests that the deterioration in peripheral external positions should be interpreted with considerably greater caution than implied in the original paper. The results are more consistent with a combination of convergence dynamics, financial integration, global macro-financial shocks, and highly persistent external positions than with a simple narrative of EMU-induced wealth destruction.

6. Conclusion

This paper reassesses the claim that EMU participation generated exceptionally large external wealth losses among peripheral Euro Area economies. Replicating the synthetic control analysis of Alcobia et al. (2025), the paper shows that the estimated effects are substantially more fragile than suggested in the original study.

The analysis identifies four main problems with the original framework. First, EMU accession did not constitute a sharp and isolated treatment, but occurred during a period of major global financial integration and rapid credit expansion. Second, financial markets anticipated monetary union well before the official launch of the euro, contaminating the pre-treatment period with convergence dynamics and expectation effects. Third, the estimated effects are highly sensitive to donor-pool composition and predictor selection, particularly the inclusion of structurally dissimilar donor economies. Fourth, highly persistent NIIP dynamics and latent common shocks complicate causal interpretation within first-generation SCM frameworks.

The empirical reassessment confirms that sizeable post-treatment SCM gaps can be replicated, especially for Portugal and Greece. However, the magnitude, sign, and stability of the estimated effects vary substantially across treatment definitions, donor pools, predictor sets, and alternative estimators. Once anticipation effects, latent common factors, and broader macro-financial controls are incorporated more explicitly, the estimated effects generally become smaller, less stable, and considerably more uncertain.

The paper also argues that interpreting NIIP deterioration mechanically as evidence of national "wealth destruction" is conceptually problematic. In financially integrated converging economies, persistent external deficits may reflect intertemporal borrowing, capital accumulation, and convergence dynamics rather than macroeconomic failure alone. Moreover, the deterioration in peripheral external positions coincided closely with the global credit boom and broader expansion in international liquidity conditions during the early 2000s. The results obtained using alternative estimators suggest that common macro-financial shocks account for a substantial share of the observed external dynamics.

Taken together, the findings do not imply that EMU participation had no effect on peripheral external positions. Rather, they suggest that the magnitude, timing, and interpretation of these effects remain considerably more uncertain than implied by strong claims regarding large EMU-induced wealth losses. More broadly, the paper highlights the limitations of first-generation synthetic control methods in highly integrated macroeconomic environments characterized by anticipation effects, persistent outcomes, latent common shocks, and imperfect donor comparability.

References

Abadie, A. (2021). Using synthetic controls: Feasibility, data requirements, and methodological aspects. **Journal of Economic Literature**, 59(2), 391–425.

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. **Journal of the American Statistical Association**, 105(490), 493–505.

Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the Basque Country. **American Economic Review**, 93(1), 113–132.

Alcobia, J., Sobreira, N., & Cabral, R. (2025). What could have been? A synthetic control evaluation of the effect of the Economic and Monetary Union on the net external wealth of periphery member states. **Economic Systems**, 49, 101293.

Arkhangelsky, D., Athey, S., Hirshberg, D., Imbens, G., & Wager, S. (2021). Synthetic difference-in-differences. **American Economic Review**, 111(12), 4088–4118.

Athey, S., & Imbens, G. W. (2017). The state of applied econometrics: Causality and policy evaluation. **Journal of Economic Perspectives**, 31(2), 3–32.

Bai, J. (2009). Panel data models with interactive fixed effects. **Econometrica**, 77(4), 1229–1279.

Baele, L., Ferrando, A., Hördahl, P., Krylova, E., & Monnet, C. (2004). Measuring European financial integration. **Oxford Review of Economic Policy**, 20(4), 509–530.

Ben-Michael, E., Feller, A., & Rothstein, J. (2021). The augmented synthetic control method. **Journal of the American Statistical Association**, 116(536), 1789–1803.

Blanchard, O., & Giavazzi, F. (2002). Current account deficits in the euro area: The end of the Feldstein-Horioka puzzle? **Brookings Papers on Economic Activity**, 2002(2), 147–209.

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. **Journal of Econometrics**, 225(2), 200–230.

Doudchenko, N., & Imbens, G. W. (2016). Balancing, regression, difference-in-differences and synthetic control methods: A synthesis. NBER Working Paper No. 22791.

Ehrmann, M., Fratzscher, M., Gürkaynak, R., & Swanson, E. (2011). Convergence and anchoring of yield curves in the euro area. **Review of Economics and Statistics**, 93(1), 350–364.

Ferman, B., & Pinto, C. (2021). Synthetic controls with imperfect pre-treatment fit. **Quantitative Economics**, 12(4), 1197–1221.

Ferman, B., Pinto, C., & Possebom, V. (2020). Cherry picking with synthetic controls. **Journal of Policy Analysis and Management**, 39(2), 510–532.

Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. **American Economic Review**, 95(1), 161–182.

Lane, P. R. (2012). The European sovereign debt crisis. **Journal of Economic Perspectives**, 26(3), 49–68.

Lane, P. R., & Milesi-Ferretti, G. M. (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.

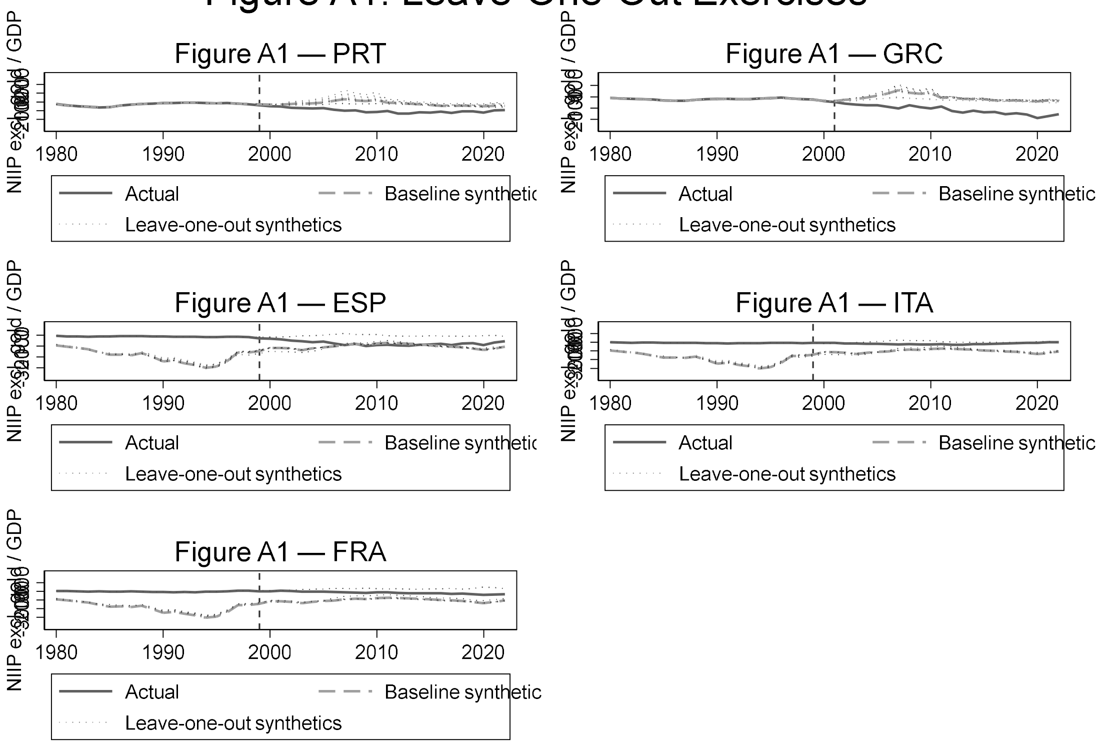
Obstfeld, M., & Rogoff, K. (1995). The intertemporal approach to the current account. In G. Grossman & K. Rogoff (Eds.), **Handbook of International Economics** (Vol. 3, pp. 1731–1799). Elsevier.

Roth, J., Sant'Anna, P. H. C., Bilinski, A., & Poe, J. (2023). What's trending in difference-in-differences? A synthesis of the recent econometrics literature. **Journal of Econometrics**, 235(2), 2218–2244.

Sun, L., & Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. **Journal of Econometrics**, 225(2), 175–199.

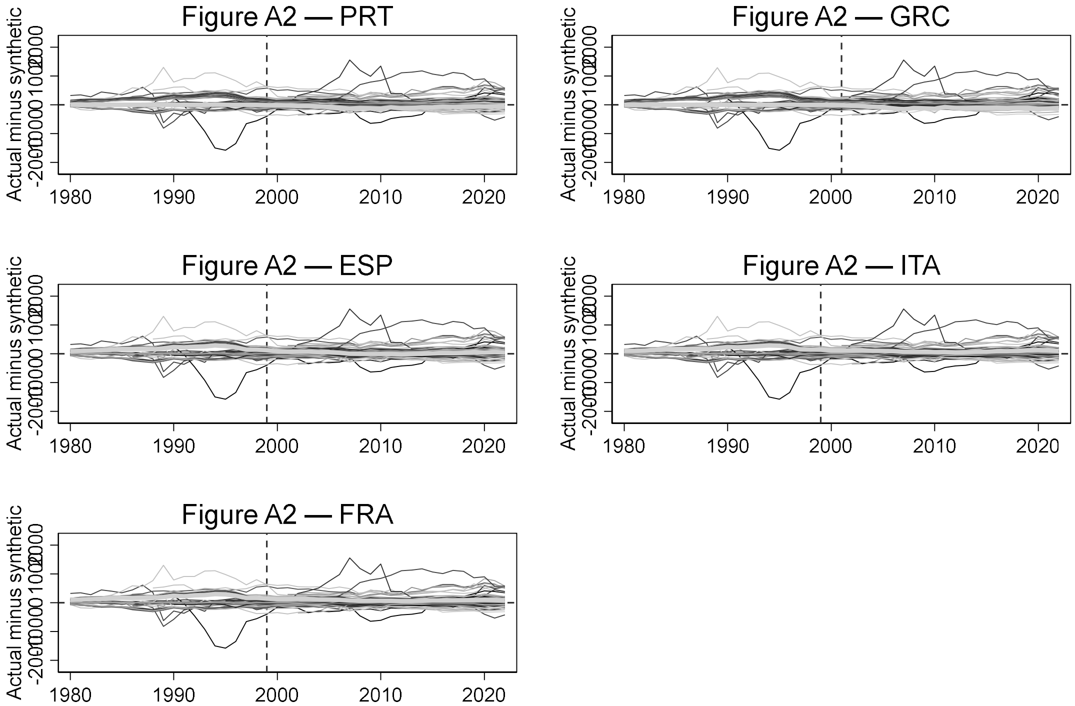
Appendix

Figure A1. Leave-One-Out Exercises



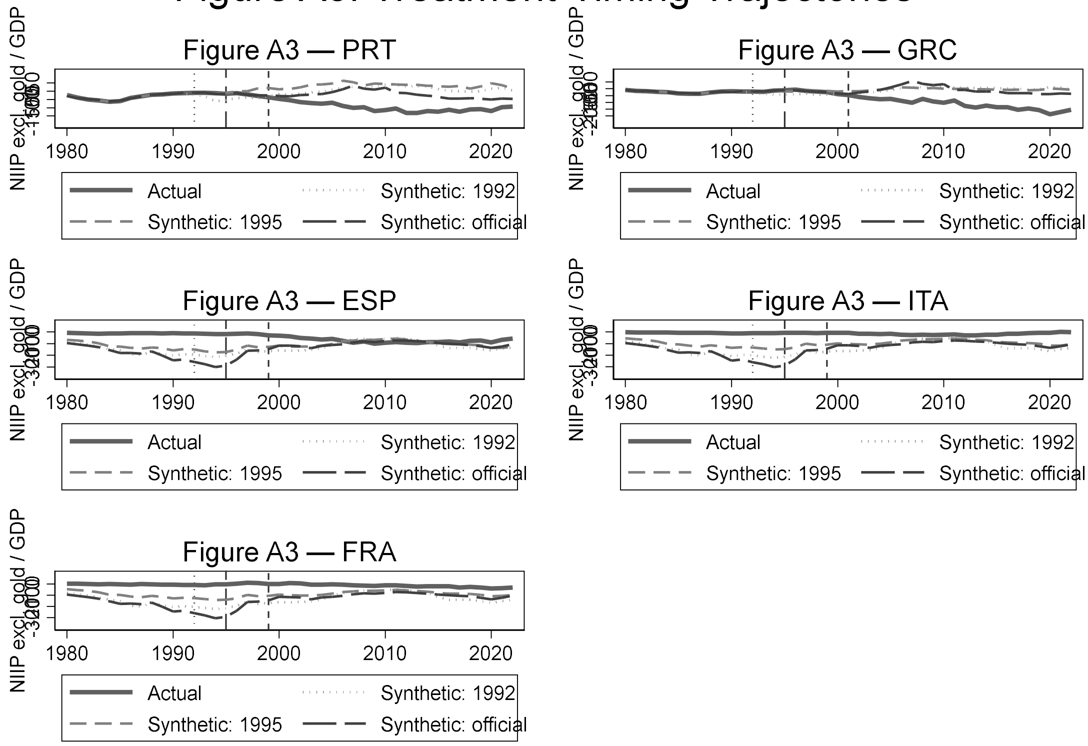
Notes: Figure A1 reports leave-one-out synthetic-control exercises for Greece, Portugal, Spain, Italy, and France. Solid lines denote observed NIIP excluding gold reserves as a percentage of GDP, dashed lines denote the baseline synthetic-control trajectories, and dotted lines denote alternative synthetic trajectories obtained by sequentially excluding individual donor economies receiving positive weights in the baseline specification. Vertical lines indicate the official EMU treatment dates (1999 for Portugal, Spain, Italy, and France; 2001 for Greece).

Figure A2. Placebo Exercises



Notes: Figure A2 reports placebo synthetic-control exercises for Greece, Portugal, Spain, Italy, and France. The bold line denotes the estimated gap between observed and synthetic NIIP positions for the treated economy, while thinner lines denote placebo gaps obtained by iteratively assigning treatment to donor economies. Vertical lines indicate the official EMU treatment dates (1999 for Portugal, Spain, Italy, and France; 2001 for Greece). The vertical axis reports the difference between observed and synthetic NIIP excluding gold reserves as a percentage of GDP.

Figure A3. Treatment-Timing Trajectories



Notes: Figure A3 reports synthetic-control trajectories under alternative treatment definitions for Greece, Portugal, Spain, Italy, and France. Solid lines denote observed NIIP excluding gold reserves as a percentage of GDP. Alternative synthetic trajectories are estimated using Maastricht convergence dates (1992), mid-1990s convergence dates (1995), and official EMU accession dates (1999 for Portugal, Spain, Italy, and France; 2001 for Greece). Vertical lines indicate the corresponding treatment dates.

Table A1. Predictor Balance Diagnostics

Economy	Predictor	Treated	Synthetic	Difference
PRT	NIIP/GDP, 1980	-22.890	-28.726	5.837
PRT	NIIP/GDP, 1985	-61.093	-58.636	-2.457
PRT	NIIP/GDP, 1990	-14.284	-15.508	1.224
PRT	NIIP/GDP, 1995	-16.158	-15.213	-0.945
PRT	NIIP/GDP, 1998	-28.604	-26.107	-2.497
GRC	NIIP/GDP, 1980	-8.687	-9.099	0.412
GRC	NIIP/GDP, 1985	-33.287	-32.937	-0.350
GRC	NIIP/GDP, 1990	-18.169	-21.299	3.130
GRC	NIIP/GDP, 1995	-11.819	-10.636	-1.183
GRC	NIIP/GDP, 1998	-20.164	-20.938	0.774
ESP	NIIP/GDP, 1980	-7.265	-95.421	88.156
ESP	NIIP/GDP, 1985	-13.049	-178.778	165.729
ESP	NIIP/GDP, 1990	-12.024	-242.381	230.356
ESP	NIIP/GDP, 1995	-18.351	-287.615	269.264
ESP	NIIP/GDP, 1998	-19.096	-159.026	139.930
ITA	NIIP/GDP, 1980	-0.896	-94.625	93.729
ITA	NIIP/GDP, 1985	-8.656	-178.020	169.364
ITA	NIIP/GDP, 1990	-11.522	-245.469	233.947
ITA	NIIP/GDP, 1995	-7.905	-288.563	280.658
ITA	NIIP/GDP, 1998	-11.334	-155.962	144.628
FRA	NIIP/GDP, 1980	2.871	-94.224	97.094
FRA	NIIP/GDP, 1985	-3.501	-176.986	173.485
FRA	NIIP/GDP, 1990	-7.103	-246.332	239.230
FRA	NIIP/GDP, 1995	-4.299	-290.423	286.124
FRA	NIIP/GDP, 1998	7.036	-156.745	163.781

Notes: Table A1 reports predictor-balance diagnostics for the baseline synthetic-control specifications. "Treated" denotes the observed value of the predictor for the treated economy, "Synthetic" denotes the corresponding weighted synthetic-control value, and "Difference" reports the difference between the treated and synthetic values. Predictors consist of lagged NIIP excluding gold reserves as a percentage of GDP measured at selected pre-treatment dates.

Table A2. Detailed RMSPE Statistics

Economy	Treatment year	Pre-RMSPE	Post-RMSPE 2010	Post-RMSPE 2022	Ratio 2010	Ratio 2022
PRT	1999	2.517	86.923	84.398	34.538	33.534
GRC	2001	1.693	101.841	110.281	60.160	65.145
ESP	1999	189.068	63.237	50.243	0.334	0.266
ITA	1999	194.936	95.584	93.072	0.490	0.477
FRA	1999	200.042	107.314	92.842	0.536	0.464

Notes: Table A2 reports detailed root mean squared prediction error (RMSPE) statistics for the baseline synthetic-control specifications. “Pre-RMSPE” denotes the root mean squared prediction error during the pre-treatment period, while “Post-RMSPE 2010” and “Post-RMSPE 2022” denote post-treatment RMSPE measures calculated through 2010 and 2022, respectively. “Ratio 2010” and “Ratio 2022” correspond to the ratio of post-treatment RMSPE to pre-treatment RMSPE.

Table A3. Persistence and Stationarity Diagnostics

Economy	AR(1) coefficient	Half-life (years)	SD of first differences	SD of levels	Persistence ratio
PRT	0.962	17.89	8.441	71.225	8.438
GRC	0.975	27.38	10.352	104.873	10.131
ESP	0.948	12.98	7.891	66.504	8.428
ITA	0.955	15.05	6.224	58.117	9.337
FRA	0.959	16.58	5.881	56.093	9.537

Notes: Table A3 reports persistence and stationarity diagnostics for NIIP excluding gold reserves as a percentage of GDP. The AR(1) coefficient is estimated from country-specific autoregressive regressions of NIIP on its lagged value. “Half-life” measures the implied number of years required for half of a deviation from trend to dissipate. “SD of first differences” denotes the standard deviation of first differences, while “SD of levels” denotes the standard deviation of NIIP levels. “Persistence ratio” is defined as the ratio of the standard deviation of levels to the standard deviation of first differences.