

The Price of Austerity: A Synthetic Control Analysis of Italy’s 1991 Economic Shock

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Abstract

This paper employs the Synthetic Control Method to provide a data-driven assessment of the impact of the 1991 austerity policy on Italy’s GDP per capita. This quantitative technique constructs a synthetic counterfactual, an artificial control unit that closely mirrors Italy’s economic trajectory before the intervention by combining data from a pool of countries. The analysis reveals a pronounced and sustained negative deviation in Italy’s observed economic performance from its synthetic counterpart following the implementation of austerity measures. This stark divergence suggests that the policy had a significant detrimental effect on the Italian GDP. The findings, bolstered by robustness and placebo checks, offer quasi-experimental evidence on the profound economic costs of fiscal consolidation, challenging simplistic narratives, and providing a nuanced perspective for future policy design.

Keywords: Synthetic Control Method, Austerity Policies, Fiscal Consolidation, Economic Growth, Italian Economy.

JEL Codes: C23, E62, E65

1 Setting the Stage: From Economic Miracle to Secular Stagnation

This paper constitutes the third and final part of a broader qualitative and quantitative analysis of Italian economic growth in recent decades and its determinants. The motivation for this overarching study lies in Italy’s distinct growth trajectory: once considered an economic “miracle” in the post-war period, the country has experienced a pronounced slowdown and significant stagnation over the past quarter century.

Building directly on the findings of the preceding papers, this article investigates a central hypothesis: whether Italy’s economic stagnation can be, at least partially, attributed to the regime of fiscal consolidation policies initiated in the 1990s. The foundation for this inquiry is provided by the historical growth decomposition presented in the first article, which revealed a critical dynamic. Periods of slower GDP growth were consistently associated with a sluggish government spending growth, with exports only picking up the slack in aggregate demand. In contrast, episodes of more robust expansion were linked to a significant positive contribution from government expenditure. This empirical regularity offers a critical insight: It suggests that stronger growth phases have public spending playing a pivotal role, whereas weaker phases were characterized by a reliance on external demand, often coinciding with subdued domestic components. Consequently, this paper examines the counterfactual: specifically, whether the systematic constraint on fiscal policy, aimed at meeting Maastricht criteria and subsequent fiscal rules, acted as a primary drag on aggregate demand, thereby locking the Italian economy into a state of secular stagnation.

This analysis focuses on the fiscal consolidation that began in 1991. This choice is grounded in the historical analysis by [Arena \(2025\)](#), which identifies this policy shift as a structural break for the Italian economy. The post-1992 period is characterized by a sharp and persistent decline in GDP growth, coupled with a fundamental change in what drove that growth: the primary engine shifted from domestic public

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expenditure to reliance on net exports. The concurrence of this major policy change with a drastic transformation in both the pace and composition of growth makes it a critical case study for understanding the origins of Italy's secular stagnation.

This article tries to fill the literature gap by conducting a causal analysis of one of the main drivers of Italian economic performance, in this case, the driver of stagnation. We specifically investigate the causal channel through which the shift to a fiscal consolidation regime, by suppressing the component of demand with an high multiplicative impact (public spending), systematically curtailed Italy's growth potential from the 1990s onward.

This article does not aim to measure the generic impact of austerity measures on GDP, an approach that would not, for instance, fully capture the distinct context of post-2008 austerity. Rather, it focuses specifically on the fiscal consolidation plan initiated in 1991 and the ensuing era of post-Maastricht austerity.

This paper introduces a methodological innovation employing the Synthetic Control Method (SCM). Although this approach remains rare in heterodox economics, it is particularly suited for the causal evaluation of macroeconomic policies. The credibility of our findings is supported by two key elements: first, the methodological robustness of the synthetic control estimator, as confirmed through a series of placebo tests; and second, the empirical foundation of our treatment variable, which draws on the International Monetary Fund's (IMF) comprehensive historical dataset on fiscal austerity.

The paper is structured as follows. Section 2 provides a review of the scholarly literature on the synthetic control method. Section 3 details the data series used and offers a descriptive analysis of the countries included in the study. Section 4 presents a comprehensive explanation of the methodology. Section 5 is dedicated to presenting the main results, while Section 6 assesses their robustness through a series of placebo tests. Finally, Section 7 concludes the paper.

2 Situating the Study: SCM in Economic Policy Evaluation

The methodological foundation of this analysis rests on the Synthetic Control Method, pioneered by [Abadie and Gardeazabal \(2003\)](#) and formally developed in [Abadie et al. \(2010\)](#), [Abadie et al. \(2015\)](#), and [Abadie \(2021\)](#). This approach provides a framework for causal inference in comparative case studies by constructing a data-driven counterfactual as a weighted combination of untreated units that closely matches the pre-treatment characteristics of the treated unit. The method has since become a gold standard in policy evaluation, particularly when dealing with a single or a few treated units, as it mitigates biases common in traditional regression approaches.

Our application of SCM to fiscal consolidation policies builds upon a growing body of economic literature that employs this method to assess macroeconomic policies and institutional changes.

Particularly relevant is the work of [Billmeier and Nannicini \(2013\)](#), who use SCM to evaluate the economic effects of liberalization episodes, demonstrating its power to identify structural breaks.

Another relevant and insightful precedent is the work of [Campos et al. \(2019\)](#) on "Institutional integration and economic growth in Europe". Their research objective connects directly to this paper as they investigate the economic growth effects stemming from different levels of European integration. Their methodological approach, which necessarily excludes founding EU members like Italy from the treatment groups to construct a valid counterfactual, provides a crucial template for analyzing continent-wide reforms. However, this very point of connection reveals a critical divergence in the results. Although Campos et al. find that institutional integration generally had positive growth effects (with the notable exception of Greece), our findings on the specific fiscal consolidation policies enacted as a result of deeper integration tell a different story for Italy.

In the specific context of fiscal policy and economic governance in Europe, the study by [Kraemer and Lehtimäki \(2024\)](#) on government debt and fiscal rules offers a direct precedent. Their work confirms the applicability of SCM to European fiscal frameworks, though our analysis distinguishes itself by focusing specifically on the Maastricht Treaty's austerity requirements and their unique impact on Italy's economic trajectory.

Moreover, [Koehler and König \(2015\)](#) explores how the frameworks of the Stability and Growth Pact aim to limit the accumulation of debt. Our study, in contrast, investigates the consequential economic trade-offs of adhering to those very rules, providing a crucial assessment of their potential growth cost.

This contribution fits into a broader scholarly effort to dissect the multifaceted consequences of European integration that use SCM, including studies of its impact on income inequality ([Bouvet \(2021\)](#)), the growth

effects of EU eastern enlargement (Cieřlik and Turgut (2021)) and the growth effects of the creation of a single market (Lehtimäki and Sondermann (2022)).

While Cignarella et al. (2025) demonstrate the versatility of SCM’s in evaluating microeconomic policy through their analysis of Italian tax incentives, our study returns to the macroeconomic roots of the method, addressing a question of broader structural significance.

The literature investigating the economic impact of fiscal austerity policies is deeply shaped by the seminal, yet controversial, contributions of Alesina and Ardagna (2010) and Alesina et al. (2015). By analyzing fiscal multipliers within a “narrative” identification framework, they advanced the thesis of “expansionary austerity”, arguing that fiscal consolidations, particularly those based on spending cuts, could bolster private sector confidence and stimulate growth.

A pivotal turning point in this debate, which firmly re-established the recessionary view, came from the work of Blanchard and Leigh (2013). Their analysis of growth forecast errors following the global financial crisis demonstrated that fiscal multipliers had been significantly underestimated, implying a much larger growth cost from austerity than previously believed. This finding was corroborated by subsequent robust empirical studies, such as Jordà and Taylor (2016), and was officially acknowledged by international institutions, most notably in the IMF’s World Economic Outlook (Leigh et al. (2010)) and the direct empirical challenge posed by Guajardo et al. (2014) using the IMF’s own narrative dataset. This paper aligns with the literature that recognizes the negative output effects of fiscal consolidation. However, it makes a distinct methodological contribution by employing the Synthetic Control Method. While the SCM, as developed by Abadie and Gardeazabal (2003), is explicitly designed for the causal evaluation of macroeconomic policies and institutional changes, its application to the specific case of post-Maastricht fiscal austerity in Italy remains novel.

Finally, within the Post-Keynesian and Comparative Political Economy literature, it is essential to cite the highly similar endeavor by Baccaro and D’Antoni (2020). In their work, they likewise employ a counterfactual reasoning to investigate whether the external constraints imposed by the European Union limited Italian growth. Their approach, however, is primarily qualitative and historical, constructing a narrative counterfactual to argue that alternative, more expansionary policies were feasible and would have led to superior economic outcomes. Our study enters into a direct and productive dialogue with their thesis. While Baccaro and D’Antoni provide a compelling theoretical and historical argument, this paper offers a rigorous quantitative test of a similar hypothesis. By applying the synthetic control method, we move from a plausible narrative to a statistically grounded causal estimate, thereby providing a complementary form of evidence for the argument that EU-mandated fiscal rules significantly hampered Italy’s economic performance.

3 Building the Counterfactual: Data Sources and Donor Pool Selection

This section is dedicated to describing the time series data used and the selection of countries for the construction of the control group, accompanied by a descriptive analysis of these countries.

To answer the research question, “What is the effect of the fiscal consolidation policies pursued to meet Maastricht adherence criteria on the Italian GDP?”, we applied the synthetic control method to the Italian case, utilizing the data on austerity policies provided by the International Monetary Fund (IMF). Specifically, we use the updated version of Adler et al. (2024) of Leigh et al. (2011) and Alesina et al. (2016). Through their meticulous work, they provide a dataset for 17 OECD economies from 1979 to 2020, with an additional 14 economies from Latin America and the Caribbean for 1978-2020, in which they identify discrete fiscal consolidation actions.

These studies identify fiscal consolidation actions using a historical approach, defined in the literature as the “narrative” approach (e.g., Ramey and Shapiro (1998), Ramey (2011), Romer and Romer (2010)). This method involves examining the intentions and actions of policy makers as described in official policy documents and identifying fiscal measures that were primarily motivated by the objective of deficit reduction.

The time series are constructed from budget reports, central bank reports, convergence programs, and stability programs provided by the European Commission, as well as IMF reports and OECD Economic

Surveys. These documents allow for the identification of the ultimate purpose of the implemented fiscal policies, along with their timing and budgetary impact.

Specifically, their analysis focuses on examining policymakers’ intentions, including in the dataset only those policies based on the introduction of taxes or reductions in spending that are motivated by the desire to reduce the budget deficit and that do not respond to the outlook for general economic conditions. Furthermore, the policy measure they provide is “cleaned” of other countercyclical policies activated during the same period that might limit or influence the fiscal shock¹.

For our purposes, this historical series is used to identify the significant fiscal austerity plan implemented by the Italian government to meet the demands of the Maastricht Treaty started in 1991, as well as to clearly identify countries eligible for the donor pool. The donor pool is specifically constructed to include OECD countries that did not implement their own fiscal consolidation policies in the five years preceding and following the 1991 policy shock. This criterion ensures that the control group consists of economies that were subject to similar global macroeconomic conditions but did not undergo the specific treatment being studied, thereby providing a valid counterfactual for the Italian case.

Based on this criterion, the initial eligible countries were Austria, Denmark, Portugal, Japan and Ireland. However, due to the difficulty in obtaining the necessary data for model construction for the last nation (Ireland), we are unable to include it in the final control group.

While the limited size of the donor pool in this experiment presents a constraint, the methodological choices underpinning its composition are justified by the robustness of the narrative approach employed. The credibility and interpretive power of the subsequent results are thereby anchored in the rigorous foundation of the fiscal consolidation data, which mitigates concerns related to the sample size.

The ultimate objective of this research is to examine the effect of austerity policies on GDP. To ensure comparability of this measure across countries, as suggested by the literature, we observe the effect of the fiscal policy shock on GDP per capita. The analysis period spans from 1980 to 2005; subsequent years are excluded to avoid the confounding effects of the Great Financial Crisis.

The variables considered as predictors of output and thus used as covariates in the model were selected based on their theoretical relevance to aggregate demand and macroeconomic dynamics. These covariates capture fundamental components that determine the path of GDP per capita. The model includes exports (expressed in per capita terms) to account for external demand; the Supermultiplier (a combination of the propensity to import, the investment propensity of private firms, and the consumption propensity of households)² to model induced demand components and growth dynamics; the employment rate and the unemployment rate to reflect labor market conditions; and the short-term interest rate and the inflation rate to control for monetary policy and the overall price environment.

All variables enter the model as their mean over the pre-intervention, or better during the *training* period (1980-1988), with the exception of GDP, for which the linear trend is used³. By matching Italy to its synthetic counterpart on these predictors in the pre-treatment period, we ensure that the control unit replicates not just the level of GDP but the underlying economic structure and cyclical conditions from which Italy’s post-1991 trajectory diverged.

Furthermore, to rule out the possibility that the estimated effect is driven by the competitive devaluation of the Lira rather than by fiscal consolidation, we conducted a robustness check that explicitly controlled for the real exchange rate. The results of this check confirmed our main findings. The decision to ultimately exclude the exchange rate from the final set of covariates is twofold. First, its informational content regarding international price competitiveness is already largely captured by the export variable, which is expressed in US dollars. Second, and decisively, the clear onset of the negative divergence in 1991, preceding the major Lira devaluations of 1992, temporally dissociates the captured effect from the currency crisis, strengthening the interpretation that the fiscal shock is the primary causal mechanism.

¹For further details on the dataset’s construction, see pages 3-4 of [Adler et al. \(2024\)](#) and pages 4-6 of [Leigh et al. \(2011\)](#). Regarding the timing of fiscal measures, the methodology specifies that, when available, data are compared with retrospective estimates to account for anticipatory effects; further, if subsequent official reports indicate that certain announced policies were not actually implemented, these are excluded from the dataset.

²For the construction of the Supermultiplier, see [Serrano \(1995\)](#), and for the application to real data [Freitas and Dweck \(2013\)](#).

³Alternative formulations for these variables were tested (e.g., median, different time periods, trends), but the chosen specification provided the best pre-intervention fit. For further details on the variables considered, please refer to Annex A.1. For the full descriptive statistics of the covariates, see Annex A.2.

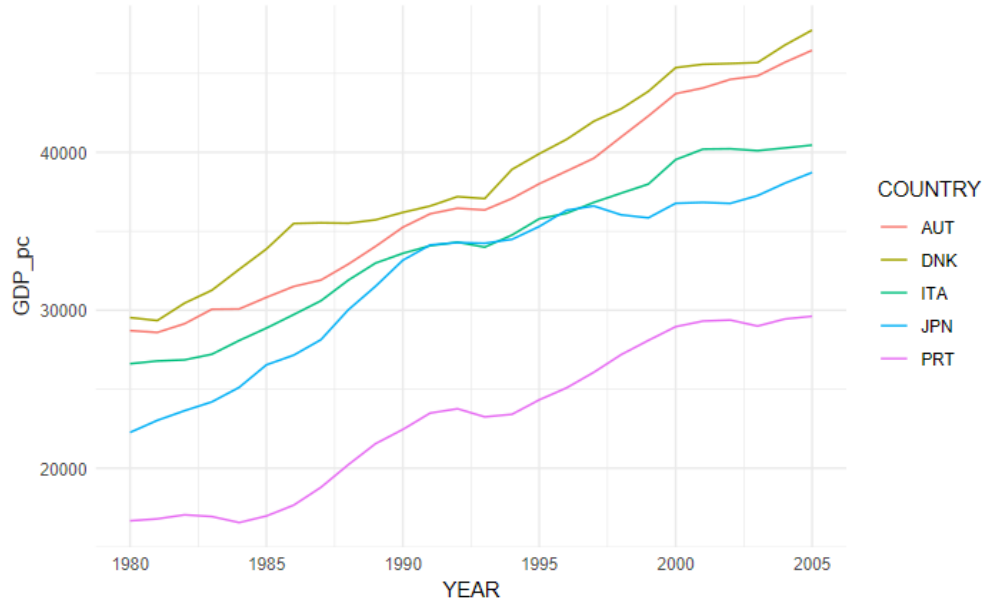


Figure 1: Gross Domestic Product per capita expressed in US dollars, PPP converted, using chain-linked volumes (base year 2021), for Italy (ITA), Denmark (DNK), Japan (JPN), Portugal (PRT) and Austria (AUT) from 1980 to 2005, data from OECD Economic Outlook 117.

Figure 1 illustrates the evolution of Gross Domestic Product (GDP) per capita from 1980 to 2005 for five advanced economies: Austria (AUT), Denmark (DNK), Italy (ITA), Japan (JPN), and Portugal (PRT). A longitudinal analysis of these trends reveals several key insights into the economic dynamics and convergence patterns within the developed world during this period.

First, despite the overall growth, a clear and persistent hierarchy of economic performance is evident. Denmark and Austria consistently maintained the highest GDP per capita throughout the period, establishing themselves as the top performers within this group. Italy and Japan formed a middle tier. Japan's trajectory is particularly noteworthy: it experienced a rapid ascent during the 1980s, but its growth momentum decelerated markedly in the subsequent years, visually corroborating the era often referred to as Japan's "Lost Decade" of economic stagnation. Portugal started from a significantly lower base and, despite demonstrating substantial growth, remained at the lower end of the spectrum, indicating a continuing, though narrowing, income gap.

Second, the data suggest a nuanced story of economic convergence for Portugal. As the lowest-income country in the group, Portugal displayed a catch-up growth, visibly reducing the gap with Italy and Japan by 2005.

3.1 A Comparative Analysis of Macroeconomic Policy Mixes (1980 - 2005): Divergent Paths and Shared Challenges

Let us now look at an analysis of the historical situation and the policy mix of individual countries⁴. The period from 1980 to 2005 was a defining era for advanced economies, shaped by disinflation, European integration, and the management of boom-bust cycles. An analysis of Italy, Austria, Denmark, Japan, and Portugal reveals distinct national approaches and policy mixes, yet also underscores surprising points of convergence, particularly with the Italian experience.

⁴To develop this section, the OECD Economic Surveys of the countries under consideration were analyzed. In particular for Austria [OECD \(1991a\)](#), [OECD \(1999a\)](#), [OECD \(2005a\)](#); for Denmark [OECD \(1991b\)](#), [OECD \(1999b\)](#), [OECD \(2005b\)](#); for Italy [OECD \(1991c\)](#), [OECD \(1992\)](#), [OECD \(1995\)](#), [OECD \(2003a\)](#); for Japan [OECD \(1991d\)](#), [OECD \(1999c\)](#), [OECD \(2005c\)](#); for Portugal [OECD \(1991e\)](#), [OECD \(2003b\)](#).

Italy's trajectory was one of profound transformation. Throughout the 1980s, the economy was propelled by a growth model reliant on public spending and exports, while simultaneously undergoing a gradual convergence with mainstream economic orthodoxy. This was marked by Italy's entry into the European Monetary System (EMS) and the pivotal 1981 "divorce" between the Bank of Italy and the Treasury, which curtailed the monetary financing of public deficits. This shift culminated in 1991 with an unprecedented fiscal consolidation drive, described by the OECD as the most significant in nearly two decades, made to meet the Maastricht criteria. This fierce austerity, however, coincided with a downturn and was accompanied by the 1992 attack on the Lira. The consequent devaluation proved to be a critical, compensatory demand shock. It provided a vital lifeline by boosting exports, without which the effects of fiscal tightening would have been far more severe. This episode created a temporary duality: severe fiscal contraction alongside a competitiveness-driven demand boost. Post-2000, with the flexibility of devaluation lost to the Euro, the policy mix narrowed exclusively to restrictive fiscal policy and supply-side reforms, leading to a prolonged period of structural stagnation, characterized by a loss of export market share and difficult adaptation of R&D, similar to Austria and Portugal.

Portugal shared Italy's Southern European context and the challenge of high inflation. Crucially, both nations were necessarily export-led, manufacturing-based economies that found it difficult to adapt their exports and R&D to new markets. While Portugal entered the 1990s with lower public debt, its post-2001 policy prescription converged with Italy's, emphasizing pro-cyclical fiscal tightening and wage restraint.

The core European experience was exemplified by Austria. Its policy mix was characterized by stability, built on a monetary anchor to the Deutsche Mark, which allowed fiscal policy to remain largely neutral for much of the period, avoiding the severe consolidation pressures faced elsewhere. From the the analysis of OECD reports, Austria's monetary policy, irrevocably anchored to the Deutsche Mark, imported credibility and low interest rates, eliminating a risk premium on public debt. This peg enforced automatic wage and price discipline through competition with Germany, curbing inflation without requiring active fiscal tightening. Consequently, fiscal policy was not forced into a primary stabilizing or credibility-seeking role, allowing it to remain largely neutral. However, similar to Italy, Austria was an export-led, manufacturing-based economy with Germany as a key commercial partner, facing its own challenges in adapting to global competition.

Denmark charted a distinct European path, defined by its strategic choice to remain outside the Economic and Monetary Union (EMU). In the early 1990s, it shared Italy's challenge of high unemployment. Its initial policy mix, anchored to the Deutsche Mark with a non-expansive fiscal stance, focused on external rebalancing. It was precisely Denmark's opt-out from the euro, however, that granted it the policy flexibility to engineer a successful transition in the late 1990s. This autonomy allowed monetary policy to remain accommodative without the constraint of a single interest rate, supporting a domestic demand-led boom, featuring 2% growth, falling unemployment, and surging private consumption, while fiscal policy could be actively used to moderate economic overheating. By 2005, this flexible framework had delivered a robust labour market without major imbalances. By 2005, Denmark's successful policy mix had delivered high living standards, though it faced new challenges of welfare sustainability in a "low-tech" economic structure. So Denmark presented a different model, successfully using the policy mix to transition to domestic demand-led growth. Yet, in the early 1990s, it shared a key similarity with Italy: a high unemployment rate, which its flexible model later successfully resolved.

Outside of Europe, Japan's policy mix represented a radical departure. Following its asset bubble collapse, it pioneered unconventional policies, using zero interest rates and large fiscal stimulus to fight deflation. This created a stark parallel with Italy: by the early 2000s, both countries were grappling with the highest public debt burdens in the OECD, presenting a severe policy dilemma between short-term demand support and long-term fiscal sustainability.

In conclusion, the period highlights a clear dichotomy. Italy's experience was unique in its scale of fiscal effort and the role of devaluation. The analysis reveals that Italy was not alone in its structural challenges; its reliance on manufacturing exports and difficulties with innovation were shared by both Austria and Portugal, while its debt burden was mirrored in Japan. Furthermore, Italy's initial conditions were echoed elsewhere: it shared the challenge of high inflation with Portugal throughout the 1980s and early 1990s, and, like Denmark, contended with persistently high unemployment at the start of the period. This suggests that while policy mixes diverged, the underlying vulnerabilities of export-led models and the constraints of high debt were common threads linking otherwise distinct economies.

4 Methodology: Constructing an Italy Without Austerity

This section outlines the synthetic control method employed in our analysis. The methodology, initially developed by [Abadie and Gardeazabal \(2003\)](#), extended in [Abadie et al. \(2010\)](#), and well explained in [Abadie \(2021\)](#), provides a robust framework for evaluating macroeconomic policies and establishing the causality of their effects.

The core of the method involves constructing a counterfactual scenario, a "synthetic" unit, created as a weighted combination of countries in a donor pool. This synthetic unit represents the trajectory of the treated country in the absence of the policy intervention. In the context of this study, the model constructs a synthetic Italy that did not experienced austerity policies post-1991. This counterfactual is built by optimally matching on pre-treatment GDP per capita and the other identified economic determinants from the control group. The difference between the synthetic Italy's projected path and the actual, observed GDP per capita series represents the estimated causal effect of the policy. Evaluating this effect over the decade following the policy's implementation allows us to assess its medium and long term economic consequences.

From a methodological standpoint, we observe a panel of $J + 1$ countries $j = 1, 2, \dots, J + 1$, over T periods. Country $j = 1$, Italy, receives the treatment, Fiscal Consolidation Policies, at period T_0 , where $T_0 < T$, while the remaining J countries $j = 2, \dots, J + 1$ do not undergo the policy. For each unit j a set k of predictors of the outcome Y_{jt} is observed, denoted as $X_{1j}, \dots, X_{kj}$. These predictors may include pre-intervention values of the outcome variable Y itself and are assumed to be unaffected by the intervention.

The $k \times 1$ vector X_1 contains the values of the predictor variables for the treated unit. The $k \times J$ matrix X_0 represents the values of the predictors for each untreated unit j in the donor pool. The causal effect of the treatment for country $j = 1$ at time t (for $t > T_0$), denoted as τ_{1t} , is formally defined by Equation (1):

$$\tau_{1t} = Y_{1t}^I - Y_{1t}^N \quad (1)$$

Here, Y_{1t}^I is the observed GDP per capita, while Y_{1t}^N represents the potential GDP per capita for the counterfactual Italy in the absence of the policy, and Y_{jt}^I and Y_{jt}^N their generalizations. The task of the synthetic control model is to construct a credible estimate of Y_{1t}^N , the counterfactual trajectory, which is then used to estimate the treatment effect τ_{1t} , vector of $T - T_0$ periods $(\tau_{1,T_0+1}, \dots, \tau_{1,T})$.

The core principle of the synthetic control method is that a weighted combination of units in the donor pool can approximate the characteristics of the treated unit more accurately than any single unit alone. The synthetic control is defined as a weighted average of the units in the donor pool. The potential outcome is formally described by Equation (2):

$$Y_{1t}^N = \sum_{j=2}^{J+1} w_j Y_{jt}, \quad (2)$$

$\mathbf{W} = (w_2, \dots, w_{J+1})'$ is a $J \times 1$ vector of non-negative weights that sum to one. This specific characteristic allows for a direct interpretation of the weights assigned to each untreated unit. That is, each weight can be explicitly interpreted as the measure of that specific unit's contribution to the construction of the synthetic counterfactual.

The weights $w_2, \dots, w_{J+1}$ are chosen such that the synthetic control best reproduces the pre-intervention values of the predictors and the outcome variable for the treated country. Given a set of non-negative constants $v_1, \dots, v_k$, which reflect the relative importance of each predictor, the optimal weight vector $\mathbf{W}^*$ is selected to minimize the following objective function:

$$\|\mathbf{X}_1 - \mathbf{X}_0 \mathbf{W}\| = \left(\sum_{h=1}^k v_h (X_{h1} - w_2 X_{h2} - \dots - w_{J+1} X_{h,J+1})^2 \right)^{1/2} \quad (3)$$

subject to the constraints that the weights w_j are non-negative and sum to one. In this framework, the treatment effect $\hat{\tau}_{1t}$ for the post-treatment period $t > T_0$ is then estimated as:

$$\hat{\tau}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}. \quad (4)$$

The parameters $v_1, \dots, v_k$ represent the relative importance assigned to each predictor in the synthetic control's effort to replicate the values of the treated unit, $X_{11}, \dots, X_{k1}$. For a given vector of predictor weights $\mathbf{V}$, the minimization of the objective function, Equation (3), is achieved through constrained quadratic optimization. That is, each potential choice of $\mathbf{V}$ yields a corresponding set of country weights $\mathbf{W}(\mathbf{V})$, which is calculated by minimizing the objective function subject to the constraints that the weights are non-negative and sum to one.

The selection of the optimal $\mathbf{V}^*$ itself is performed such that the resulting synthetic control $\mathbf{W}(\mathbf{V}^*)$ minimizes the mean squared prediction error (MSPE) of the outcome Y_{1t}^N variable during a pre-intervention period:

$$\sum_{t \in \tau_0} (Y_{1t} - w_2(\mathbf{V})Y_{2t} - \dots - w_{J+1}(\mathbf{V})Y_{J+1t})^2 \quad (5)$$

for a subset $\tau_0 \subseteq \{1, 2, \dots, T_0\}$ of pre-intervention periods. Specifically, the selection of the optimal predictor weight vector, $\mathbf{V}^*$, is conducted through a two-stage process to ensure the robustness of the counterfactual. First, for a given $\mathbf{V}$, the unit weight vector $\mathbf{W}(\mathbf{V})$ is calculated to minimize the discrepancy between the predictors of the treated unit and the synthetic control. Second, the definitive $\mathbf{V}^*$ is chosen such that the corresponding synthetic control $\mathbf{W}(\mathbf{V}^*)$ minimizes the prediction error for the outcome variable Y_{1t}^N during a dedicated *validation* period. This *validation* period is a distinct subset of the pre-intervention period that consecutively follows the *training* period used in the first stage, thereby simulating a genuine out-of-sample forecast for determining the model's final parameters.

This heuristic procedure is valid as long as it produces a vector $\mathbf{V}^*$ such that:

$$Y_{1t} \approx \tilde{w}_2(\mathbf{V}^*)Y_{2t} + \dots + \tilde{w}_{J+1}(\mathbf{V}^*)Y_{J+1t} \quad (6)$$

for $t = t_0 + 1, \dots, T_0$, and $\mathbf{X}_1 \approx \mathbf{X}_0 \mathbf{W}^*$ for the set of predictors used to calculate $\mathbf{W}^*$.

In summary, this study applies the synthetic control model to construct a counterfactual "synthetic Italy", representing the economic trajectory Italy would have followed in the absence of the fiscal consolidation policies initiated in 1991. The difference in GDP per capita between the actually observed Italy and this synthetic unit constitutes the estimated policy effect.

The donor pool from which the synthetic counterfactual is constructed, and to which the country weights $\mathbf{W}$ are assigned, comprises the following countries: Denmark, Austria, Japan, and Portugal.

The predictor variables, to which the importance weights $\mathbf{V}$ are assigned, are: the Supermultiplier, the GDP trend, Exports expressed in per capita, the employment rate, the unemployment rate, the inflation rate, and the short-term interest rate.

The model's *training* period spans from 1980 to 1989, followed by a *validation* period from 1990 to 1991, which is used to select the final model specification and ensure its out-of-sample predictive power.

5 Main Findings: The Persistent Scars of Fiscal Consolidation

This section presents the empirical application of the synthetic control methodology, as detailed in the previous chapter, to estimate the causal effect of the fiscal consolidation policies started in 1991 on the Italian economy.

We begin by implementing the optimization procedure defined by Equations (3) and (5) to calculate the optimal country weights, $\mathbf{W}$, for the donor pool and the predictor weights, $\mathbf{V}$. The results of this optimization are presented in Figure 2.

A central finding, consistent with the conventions of this literature, is that the optimization algorithm selects a sparse combination of donor countries, even from an initially restricted pool. A key strength of the synthetic control method lies in the transparency of this weighting process; the non-negative and summing-to-one constraints allow for a direct and intuitive interpretation of the country weights as their respective contributions to the synthetic counterfactual. As shown in Figure 2, the synthetic Italy is primarily composed of Denmark $\approx 60\%$, Japan $\approx 27\%$, and Portugal $\approx 13\%$.

Notably, Austria, despite being geographically proximate to Italy, receives a zero weight and thus does not contribute to the constructed counterfactual. This outcome underscores that the method prioritizes economic similarity, as captured by the pre-treatment predictors, over geographical or institutional proximity.

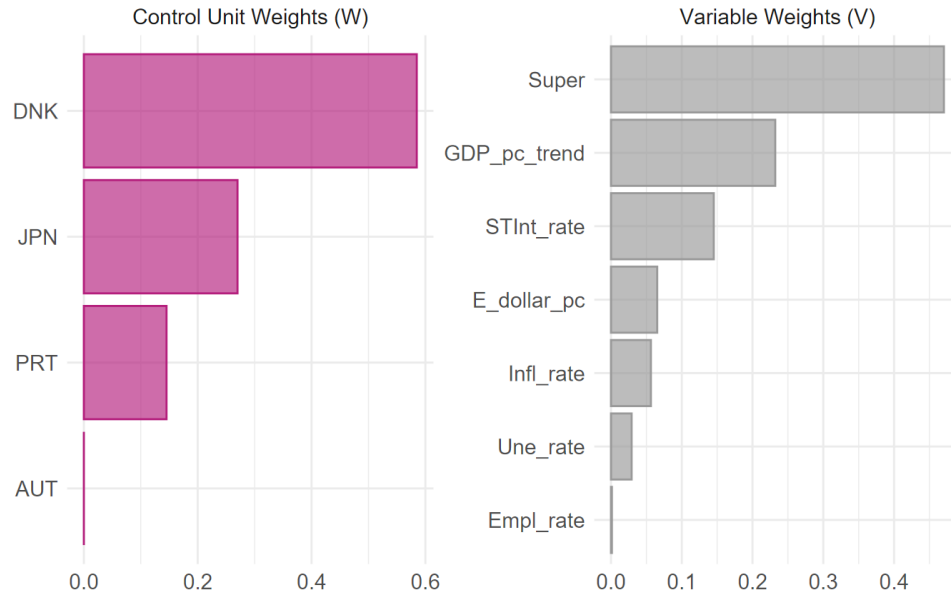


Figure 2: Synthetic Control Weights. This table displays the weights used to construct the counterfactual Italy. The first column (Weights **W**) shows the country contributions, with Denmark, Japan, and Portugal forming the synthetic control. The second column (Weights **V**) shows predictor importance, where the Supermultiplier, the GDP trend, and Short-Term Interest Rate received the highest weights in determining the outcome.

Regarding the predictor weights, **V**, our results indicate that the variables with the greatest importance in constructing the synthetic control are the Supermultiplier (approximately 45%) and the GDP per capita trend (approximately 23%). These are followed by the short-term interest rate (around 15%), while exports per capita, the inflation rate, the unemployment rate, and the employment rate appear to play negligible roles, each with weights below 5%.

For the model estimation, the average value over the pre-treatment period is used for each predictor variable, with the exception of GDP per capita, for which the linear trend is considered to capture the underlying growth path.

For the calculation of these weights, the period from 1980 to 1989 is designated as the *training* period, while the period from 1990 to 1991 is used as the *validation* period.

Variable	Groups		
	ITA	Synthetic ITA	Donor Sample
E_dollar_pc	3764.03	6920.94	5688.30
Empl_rate	0.39	0.50	0.47
GDP_pc_trend	481.07	648.10	814.49
Infl_rate	53.55	68.45	65.76
STInt_rate	12.22	10.73	11.16
Super	2.43	2.10	2.08
Une_rate	8.53	6.03	4.74

Table 1: Balance Table Comparison. This table reports mean values for predictor variables: Exports per capita (USD), Employment rate, Inflation Rate, Short-Term Interest Rate, Supermultiplier, and Unemployment Rate. For GDP per capita, the linear trend is reported. Columns show values for actual Italy, the synthetic control, and the donor pool average.

The application of the optimized weights $\mathbf{W}$ and $\mathbf{V}$ results in the pre-treatment characteristics summarized in Table 1. This table is fundamental for assessing the validity of the synthetic control, as it demonstrates how closely the synthetic unit matches the treated unit on the predictor variables prior to the intervention.

The table reveals a mixed but ultimately defensible pre-treatment fit, with key strengths and one notable weakness:

- Strong fit on key predictors: The model performs well on the variables assigned the highest weights under $\mathbf{V}$. The Supermultiplier and GDP per capita trend are closely aligned between actual and synthetic Italy. The core drivers in the model are thus well-replicated in the counterfactual.
- Reasonable fit on monetary conditions: The short-term interest rate is also reasonably matched, suggesting a comparable monetary policy environment in the synthetic unit. It remains substantially similar to the mean value of the donor group, which already provided a reasonable approximation of the variable.
- Improved fit on GDP trend: A key strength of the synthetic control is its superior performance in replicating the GDP per capita trend of Italy. The synthetic unit captures the growth trajectory of actual Italy far more accurately than the simple donor pool average.
- Notable deviations in lower-weight variables: The most pronounced discrepancies occur in exports per capita and the inflation rate, both of which deteriorate relative to the simple donor pool average. However, given their low predictor weights, their influence on the outcome trajectory is limited. Meanwhile, labor market variables (the employment and unemployment rates) perform reasonably well despite their minimal weight, suggesting that the synthetic control captures labor market dynamics adequately.

Overall, despite some mismatches in less influential predictors, the synthetic control achieves a strong balance on the variables deemed most important by the data-driven optimization process, namely, the Supermultiplier and GDP per capita trend. The close pre-treatment alignment of the outcome variable, GDP per capita, as shown in Figure 3, supports the validity of the synthetic control and suggests that the model provides a credible counterfactual for causal inference.

The application of these optimized weights yields the central findings of this study. Figures 3 and 4 present the results, depicting the trajectory of the synthetic Italy under the counterfactual scenario of no fiscal consolidation shock from 1991 and the resulting estimated treatment effect, so the estimated difference between them respectively.

Figure 3 demonstrates that the synthetic control provides a strong pre-intervention fit, closely tracking the actual path of Italy's GDP per capita. The only notable deviations occur in 1981 and 1986; however, the difference in these years remains contained within a band of approximately \$1,000. This validates the SCM model, confirming that the "Synthetic Italy" serves as a reliable approximation for what Italy's growth path would have been in the absence of the austerity shock.

The most significant result emerging from this analysis is the clear and persistent negative impact of the fiscal consolidation. Beginning with the austerity measures adopted for Maastricht Treaty compliance in 1991, the actual GDP per capita remains consistently lower than its synthetic counterpart for all 14 subsequent years observed. This provides compelling evidence of a sustained, long-run effect.

The magnitude of this effect intensifies over time. By the fifth year post-policy, the annual shortfall in GDP per capita exceeds \$1,000. This gap widens considerably, reaching a real GDP per capita reduction of over \$2,000 by 2005. The cumulative loss from these annual deviations offers further, stark indication of the profoundly negative economic consequences of the fiscal consolidation policy. The magnitude and endurance of this negative gap suggest that the austerity policy did not merely induce a short-term recession but resulted in a permanent scar on the level of Italy's economic output.

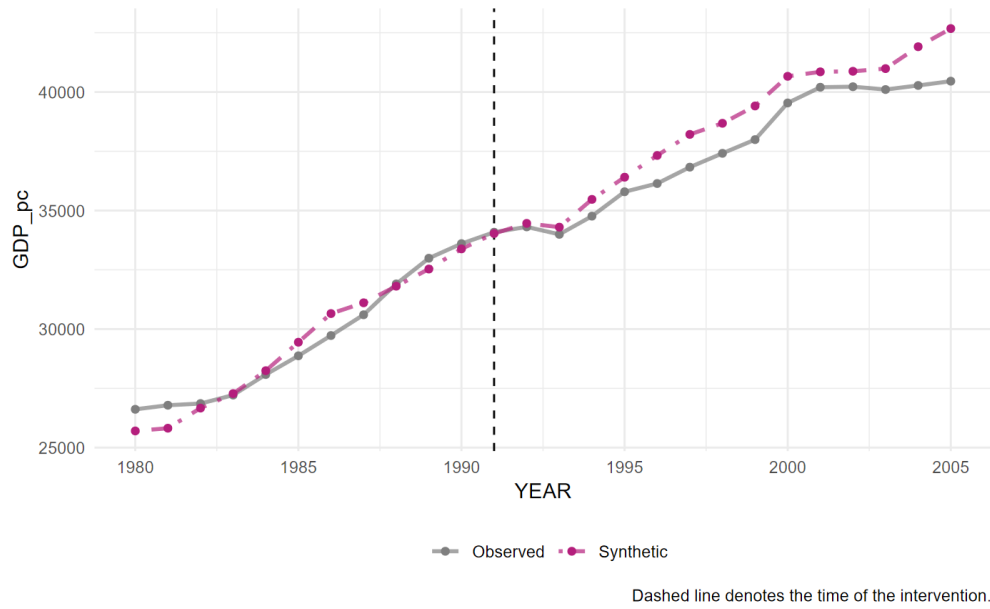


Figure 3: Synthetic Control Estimation for the Italian fiscal consolidation shock of 1991. The figure plots the trajectories of actual Italy (grey line) and synthetic Italy (pink line) from 1980 to 2005. The vertical dashed line marks the 1991 fiscal consolidation shock. The sustained and widening gap between the two lines represents the estimated causal treatment effect, revealing a significant and persistent reduction in GDP per capita attributable to the austerity policies.

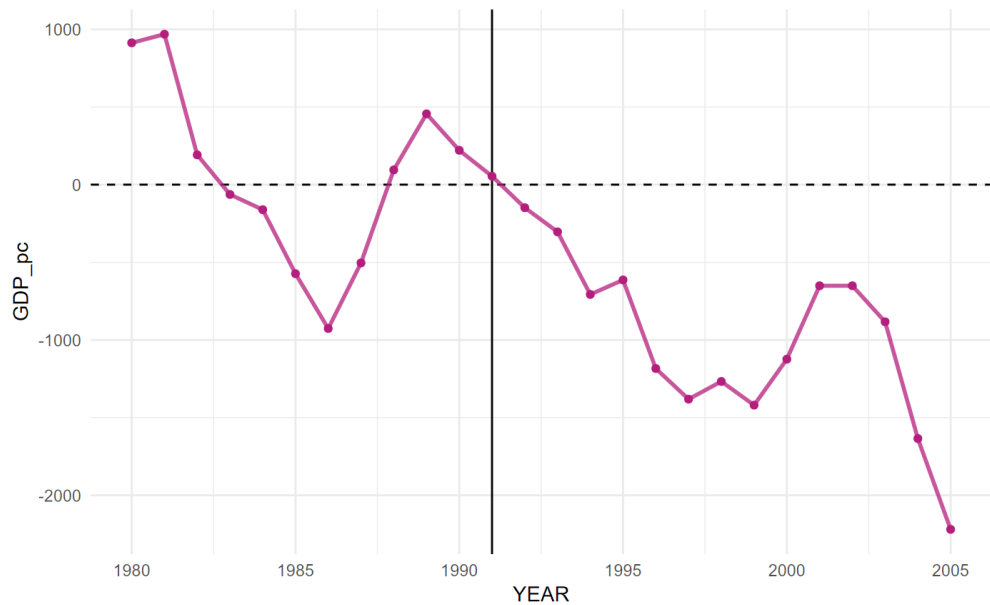


Figure 4: Estimated Treatment Effect of Fiscal Consolidation This figure displays the difference in GDP per capita between Actual Italy and Synthetic Italy following the 1991 fiscal consolidation shock. The pre-shock difference fluctuates within a \$1,000 range, while a clear negative trend emerges from 1991 onward, widening consistently almost every year and demonstrating the persistent negative impact of austerity policies.

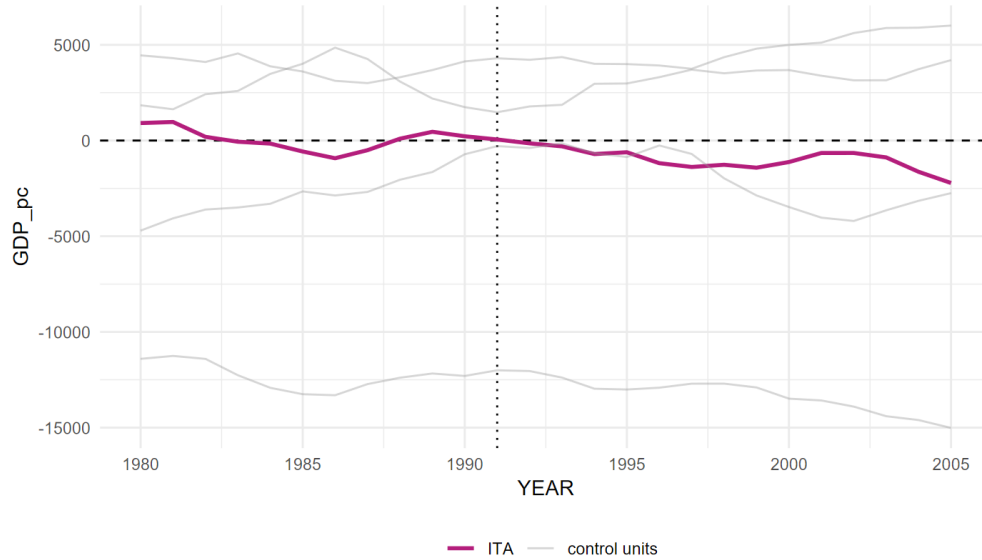


Figure 5: In-Space Placebo Test. The solid pink line shows the estimated treatment effect for Italy. The grey lines represent placebo effects from iteratively applying the synthetic control method to other countries, considering them as treated. The clear and sustained negative divergence for Italy after 1991 contrasts with the absence of systematic effects in the placebo paths, supporting a causal interpretation of the fiscal consolidation policy.

6 Testing for Causality: Placebo Tests and Robustness Checks

This final technical section is arguably the most critical component of the analysis. It employs a series of placebo tests and an examination of the Root Mean Squared Prediction Error (RMSPE) to verify the reliability of the negative post-consolidation policy effect identified earlier and to gauge its significance, given the impossibility of direct statistical inference.

6.1 In-Space Placebo Test

We begin with Figure 5. This placebo test involves iteratively applying the synthetic control method to each country in the donor pool as if it had received the treatment in 1991. The interpretation of these results strongly corroborates our main finding. Specifically, this test, together with the RMSPE analysis, helps validate the actual policy impact. The grey lines in the figure, which represent the estimated "treatment effects" for these placebo-treated countries, do not lie precisely on the zero line, as the optimization of the $\mathbf{W}$ and $\mathbf{V}$ weights is naturally sub-optimal for them. Crucially, however, these placebo paths do not exhibit any pronounced or systematic deviations starting in 1991, the year of the actual policy shock. This contrast underscores that the significant and persistent negative gap observed for Italy is a distinctive phenomenon, likely attributable to the treatment rather than to artifacts of the methodology. This indicates that the estimated effect is unlikely to be due to chance or common shocks affecting all countries. For Italy, however, it is quite evident that the negative trend commences precisely in 1991, thereby coinciding with the implementation of the policy.

6.2 Mean Squared Prediction Error Ratio

The robustness analysis is further strengthened by examining the Ratio of the Post-intervention Mean Squared Prediction Error (RMSPE) to the Pre-intervention RMSPE in Figure 6. This ratio serves as a key metric for assessing the significance of the estimated policy impact.

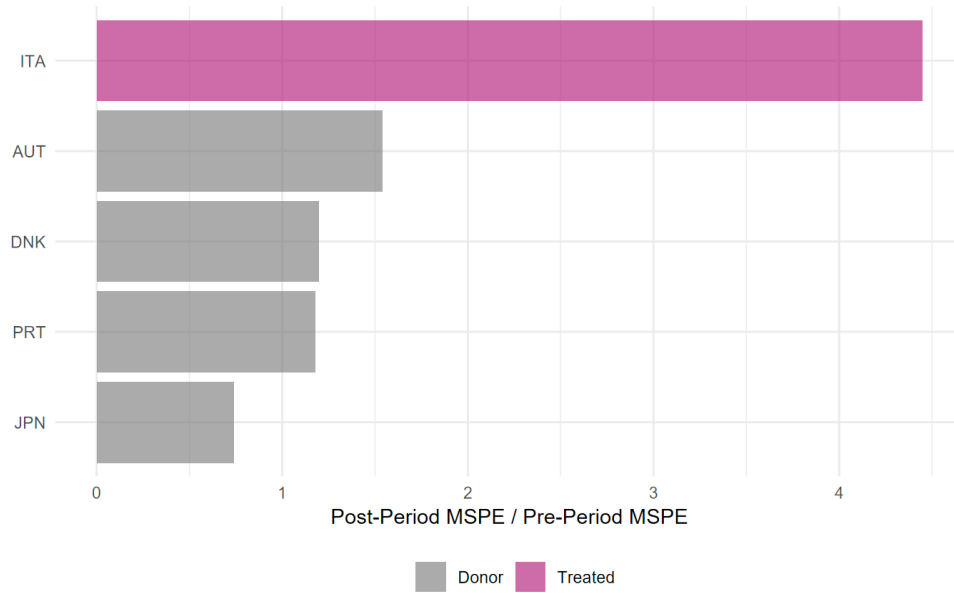


Figure 6: Ratio of Post-Period Mean Square Prediction Error and Pre-Period Mean Square Prediction Error. This figure shows the distribution of the Root Mean Square Prediction Error (RMSPE) ratio for Italy and placebo countries. The RMSPE ratio measures the relative deterioration in model fit after the policy intervention, serving as a test of statistical significance. Italy's position as the highest value in this distribution indicates that the observed negative effect is highly unlikely to have occurred by chance, thereby confirming the result's robustness.

Unit	Type	Pre MSPE	Post MSPE	Ratio	Rank	p-value	z-score
ITA	Treated	295 663.32	1 315 034.33	4.4477	1	0.2	1.76
AUT	Donor	15 220 641.90	23 444 923.90	1.5403	2	0.4	−0.19
DNK	Donor	9 004 847.81	10 789 053.49	1.1981	3	0.6	−0.42
PRT	Donor	151 317 555.51	178 390 706.53	1.1789	4	0.8	−0.43
JPN	Donor	8 740 796.12	6 485 817.51	0.7420	5	1	−0.72

Table 2: Analysis of Root Mean Square Prediction Error. This table provides a detailed breakdown of pre- and post-intervention RMSPE values. Notably, Italy achieves the best (lowest) pre-intervention RMSPE, indicating a good synthetic control fit. This results in the highest RMSPE ratio in the distribution. Columns 7 and 8 report the associated p-values and z-scores, respectively, for assessing statistical significance.

Formally, the ratio relates the post-intervention prediction error (the numerator) to the pre-intervention error (the denominator). A high ratio results from a high numerator and/or a low denominator. A high numerator indicates a substantial policy impact, as it signifies a large and sustained deviation between the synthetic control's projection and the actually observed values of Italy after the treatment. A low denominator, conversely, confirms the model's quality in the pre-intervention period, demonstrating that the synthetic control accurately replicates the historical path of Italy, thus providing a reliable counterfactual baseline.

Therefore, a high RMSPE ratio is desirable, as it signals both a strong treatment effect and a credible counterfactual.

As clearly illustrated in Figure 6, Italy's RMSPE ratio is by far the highest among all countries in the analysis. This provides compelling evidence for the singular importance of the fiscal consolidation policy in the Italian case. The detailed breakdown in Table 2 of the individual MSPE components further corroborates this conclusion.

Italy demonstrates a dominant RMSPE ratio of 4.45, which is substantially higher than that of any other country in the distribution. The second-highest ratio (Austria) is only 1.54, indicating that the post-treatment divergence for Italy is more or less three times larger than that of any placebo unit. This establishes Italy as a clear outlier and suggests an effect uniquely associated with the 1991 treatment.

Crucially, Italy also exhibits the lowest pre-intervention MSPE (295 663), confirming that its synthetic control was the most accurate in replicating the country's economic trajectory prior to the fiscal shock. This good pre-fit lends greater credibility to the counterfactual, making the subsequent post-1991 divergence more compelling.

Regarding statistical inference, the small donor pool size inherently limits the minimum achievable p-value to $1/(4+1) = 0.2$. Italy's result, with a p-value of 0.2 and a rank of 1, represents the strongest statistically possible outcome under this constraint. The combination of the highest possible rank, a vastly superior RMSPE ratio, and the best pre-treatment fit provides powerful evidence that the observed negative effect is a genuine causal impact of the fiscal consolidation policy and not a spurious finding.

6.3 In-Time Placebo Test

An In-Time placebo test, which artificially reassigns the treatment year to 1990, is conducted to investigate potential anticipation effects of the fiscal policy. This test examines whether financial markets, firms, or households began adjusting their behavior in expectation of the forthcoming Maastricht-driven consolidation, which would manifest as an economic deviation prior to the official 1991 implementation. The results, presented graphically in Figure 7, provide important insights into the credibility of our main specification and the timing of the policy impact.

First the synthetic control constructed under this false 1990 treatment date exhibits a solid pre-treatment fit that remains closely aligned with Italy's observed trajectory through the 1980s and up to the placebo intervention year. The stability of the pre-intervention path in this test reinforces the robustness of our synthetic control methodology and suggests that the model maintains strong predictive validity even when the treatment year is shifted.

Second, and more importantly, the test helps refine our understanding of the policy's temporal impact. A small but noticeable negative gap begins to emerge around 1991 coinciding with the actual implementation of fiscal measures, and widens gradually thereafter. This suggests that some anticipatory adjustment or early effect may have been at play, even if limited. However, the most pronounced and sustained divergence occurs later, around 1995, aligning with the period of stringent fiscal consolidation under the Maastricht criteria leading up to European Monetary Union.

This delayed yet persistent widening of the gap underscores that the adverse effects of fiscal consolidation were cumulative and long-term rather than immediate. The results are consistent with a theoretical framework in which austerity measures, through channels such as suppressed investment, labor market hysteresis, and weakened aggregate demand, compound over time, leading to a gradually deepening negative impact on GDP per capita.

In summary, the In-Time placebo test confirms the robustness of our main specification while clarifying the timeline of the policy's impact. It indicates that while some early effect may be detectable from 1991 onward, the most statistically and economically significant damage materialized in the mid-1990s, highlighting

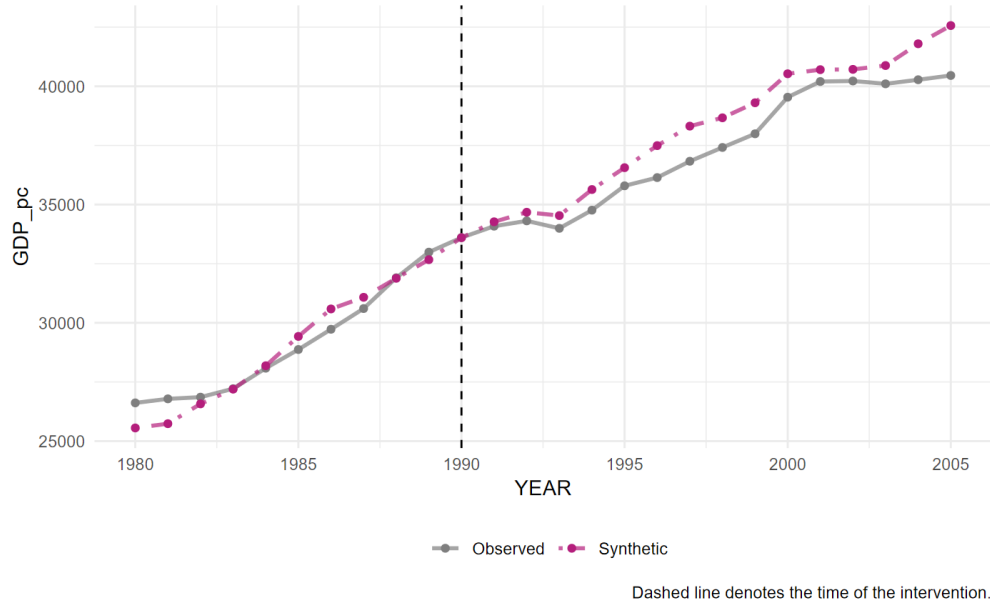


Figure 7: In-Time Placebo Test. This figure displays the synthetic control estimation when the fiscal consolidation shock is artificially backdated to 1990. The pre-intervention fit remains solid throughout the 1980s. A modest negative gap begins to emerge around the time of the actual 1991 consolidation, widening more substantially in the mid-1990s. This pattern aligns with the actual policy timeline and underscores the delayed, cumulative nature of the fiscal consolidation's negative impact on Italy's GDP per capita.

the persistent and protracted nature of the economic consequences of fiscal consolidation in Italy.

6.4 Leave-One-Out Placebo Test

This final robustness section considers another standard test in the synthetic control literature: the Leave-One-Out analysis. In this experiment, the synthetic control is re-estimated by sequentially excluding each country from the donor pool. If the estimated synthetic control and the resulting treatment effect vary substantially with the exclusion of any single country, the main result is considered less robust.

In our specific case, the exclusion of Austria from the donor pool, unsurprisingly, does not alter the synthetic estimate, as it received a zero weight in the original construction. Similarly, the exclusion of Denmark, Portugal and Japan does not fundamentally change the qualitative results presented in previous sections. While the pre-intervention fit deteriorates without these countries, the post-treatment gap remains, and in some specifications, the estimated negative effect appears even more pronounced.

The Leave-One-Out test demonstrates a high degree of robustness in our synthetic control construction. When each donor country, Denmark, Japan, and Portugal, is sequentially excluded from the donor pool, the resulting synthetic Italy trajectories remain remarkably close to the main synthetic control (which includes all donors). All counterfactual paths continue to track each other closely throughout the pre-treatment period and follow a similar post-treatment divergence pattern from actual Italy. In particular:

- **No single donor drives the results:** The consistency across all specifications indicates that no single donor country is disproportionately influencing the synthetic control. This strengthens the validity of our main model, as the results are not dependent on the inclusion or exclusion of any particular country.
- **Stable pre-treatment fit:** All alternative synthetic controls maintain a strong pre-treatment alignment with actual Italy, suggesting that the model is not overfitting to any specific donor and that the weighting scheme is stable.

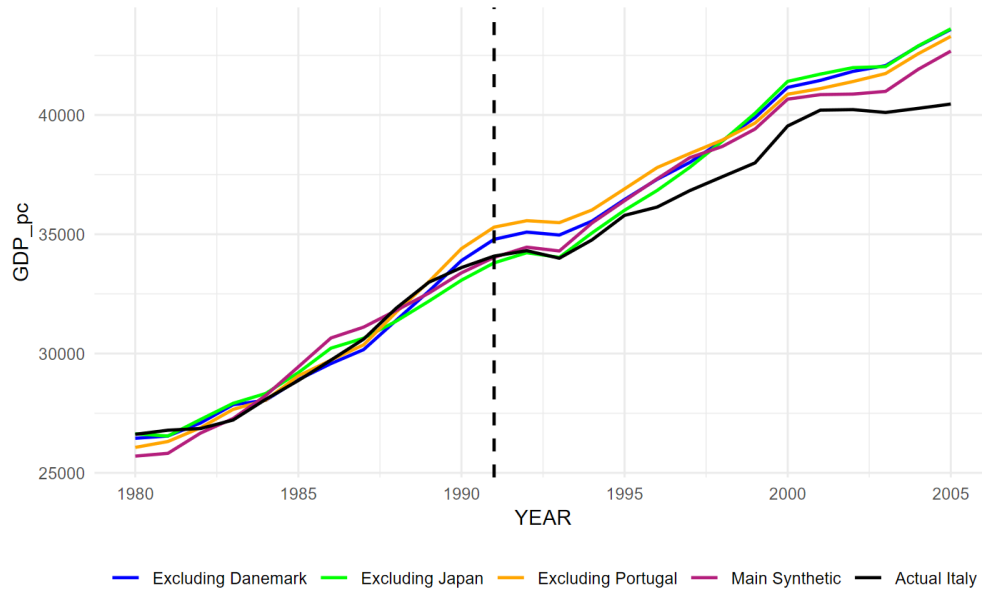


Figure 8: Leave-One-Out Placebo Test. This figure shows the results of sequentially excluding each country from the donor pool. The estimated treatment effect remains robust and consistent across the specifications.

- Consistent treatment effect: The post-1991 divergence between actual Italy and all synthetic versions remains evident across all specifications. This consistency reinforces the finding that the fiscal consolidation had a negative impact on Italy's GDP per capita trajectory, regardless of which donor is excluded.

The leave-one-out test provides strong evidence that our synthetic control model is robust and not sensitive to the exclusion of individual donor countries. The consistent pre-treatment fit and post-treatment divergence patterns across all specifications lend credibility to our main findings regarding the negative impact of fiscal consolidation on Italy's economic performance.

7 Conclusions and Implications: The Lasting Legacy of Austerity

This article completes a tripartite analysis of Italian economic growth. The first study decomposed Italy's post-war growth using the Supermultiplier model, revealing a critical historical pattern: periods of highest growth were consistently associated with the most important contribution to the growth of public spending, whereas the post-1992 era of stagnation coincided with a dominant reliance on exports as the primary contributor.

These findings were extended in the second article, which established the plausible long-run causal direction from autonomous demand to output and demonstrated the inherent weakness of export-led growth, showing exports to be the autonomous demand component with the lowest multiplier effect.

With this final article, we complete the causal analysis of Italian stagnation by examining the role of austerity policies implemented for Maastricht Treaty compliance. The application of the synthetic control method, though uncommon in heterodox economics, proves to be particularly powerful for causal policy evaluation. By constructing a counterfactual "synthetic Italy" that never experienced the austerity measures begun in 1991 - based on OECD countries without austerity policies in the five years preceding and following the policy shock, using the established narrative approach of [Adler et al. \(2024\)](#) for identifying fiscal consolidation - we identify clear, persistent negative effects that amplify over time.

The results are unequivocal: austerity policies caused significant and lasting damage, with the synthetic Italy consistently outperforming actual Italy from 1991 onward, demonstrating the substantial GDP loss attributable to these policies. This conclusion is robustly confirmed by conventional placebo tests.

This analysis provides powerful quasi-experimental evidence on the high economic cost of rapid fiscal consolidation, challenging narratives that overlook the potential for long-term scarring effects on economic potential, and provides compelling causal evidence that Italy's prolonged stagnation cannot be fully understood without acknowledging the severe and persistent demand shock inflicted by the Maastricht-driven austerity regime.

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., and 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., Diamond, A., and Hainmueller, J. (2015). Comparative politics and the synthetic control method. *American Journal of Political Science*, 59(2):495–510.
- Abadie, A. and Gardeazabal, J. (2003). The economic costs of conflict: A case study of the basque country. *American economic review*, 93(1):113–132.
- Adler, G., Allen, M. C., Ganelli, M. G., and Leigh, M. D. (2024). *An updated action-based dataset of fiscal consolidation*. International Monetary Fund.
- Alesina, A. and Ardagna, S. (2010). Large changes in fiscal policy: taxes versus spending. *Tax policy and the economy*, 24(1):35–68.
- Alesina, A., Azzalini, G., Favero, C., Giavazzi, F., and Miano, A. (2016). Is it the" how" or the" when" that matters in fiscal adjustments? Technical report, National Bureau of Economic Research.
- Alesina, A., Favero, C., and Giavazzi, F. (2015). The output effect of fiscal consolidation plans. *Journal of International Economics*, 96:S19–S42.
- Arena, F. (2025). Beyond supply-side explanations: Italy's growth trajectory in post-keynesian and cpe frameworks. *Working Paper Series of the Department of Economics and Statistics of the University of Siena*, (930/2025).
- Baccaro, L. and D'Antoni, M. (2020). Has the" external constraint" contributed to italy's stagnation? a critical event analysis. Technical report, MPIfG Discussion Paper.
- Billmeier, A. and Nannicini, T. (2013). Assessing economic liberalization episodes: A synthetic control approach. *Review of Economics and Statistics*, 95(3):983–1001.
- Blanchard, O. J. and Leigh, D. (2013). Growth forecast errors and fiscal multipliers. *American Economic Review*, 103(3):117–120.
- Bouvet, F. (2021). Regional integration and income inequality: a synthetic counterfactual analysis of the european monetary union. *Oxford Review of Economic Policy*, 37(1):172–200.
- Campos, N. F., Coricelli, F., and Moretti, L. (2019). Institutional integration and economic growth in europe. *Journal of Monetary Economics*, 103:88–104.
- Cieřlik, A. and Turgut, M. B. (2021). Estimating the growth effects of 2004 eastern enlargement of the european union. *Journal of Risk and Financial Management*, 14(3):128.
- Cignarella, C., D'Imperio, P., et al. (2025). The effects of tax incentives for dwelling renovations: the case of italy. *WORKING PAPERS*.
- Freitas, F. N. and Dweck, E. (2013). The pattern of economic growth of the brazilian economy 1970–2005: a demand-led growth perspective. In *Sraffa and the Reconstruction of Economic Theory: Volume Two: Aggregate Demand, Policy Analysis and Growth*, pages 158–191. Springer.
- Guajardo, J., Leigh, D., and Pescatori, A. (2014). Expansionary austerity? international evidence. *Journal of the European Economic Association*, 12(4):949–968.
- Jordà, Ò. and Taylor, A. M. (2016). The time for austerity: estimating the average treatment effect of fiscal policy. *The Economic Journal*, 126(590):219–255.

- Koehler, S. and König, T. (2015). Fiscal governance in the eurozone: How effectively does the stability and growth pact limit governmental debt in the euro countries? *Political Science Research and Methods*, 3(2):329–351.
- Kraemer, R. and Lehtimäki, J. (2024). Government debt, european institutions and fiscal rules: a synthetic control approach. *International Tax and Public Finance*, 31(4):1112–1157.
- Lehtimäki, J. and Sondermann, D. (2022). Baldwin versus cecchini revisited: the growth impact of the european single market. *Empirical Economics*, 63(2):603–635.
- Leigh, D., Devries, P., Freedman, C., Guajardo, J., Laxton, D., Pescatori, A., Omoev, M., Song, M. K., and Yang, J. (2010). Will it hurt? macroeconomic effects of fiscal consolidation. *World Economic Outlook*, pages 93–125.
- Leigh, M. D., Pescatori, M. A., Devries, M. P., and Guajardo, M. J. (2011). *A new action-based dataset of fiscal consolidation*. International Monetary Fund.
- OECD (1991a). *OECD Economic Surveys: Austria 1991*. OECD Publishing, Paris.
- OECD (1991b). *OECD Economic Surveys: Denmark 1991*. OECD Publishing, Paris.
- OECD (1991c). *OECD Economic Surveys: Italy 1991*. OECD Publishing, Paris.
- OECD (1991d). *OECD Economic Surveys: Japan 1991*. OECD Publishing, Paris.
- OECD (1991e). *OECD Economic Surveys: Portugal 1991*. OECD Publishing, Paris.
- OECD (1992). *OECD Economic Surveys: Italy 1993*. OECD Publishing, Paris.
- OECD (1995). *OECD Economic Surveys: Italy 1995*. OECD Publishing, Paris.
- OECD (1999a). *OECD Economic Surveys: Austria 1999*. OECD Publishing, Paris.
- OECD (1999b). *OECD Economic Surveys: Denmark 1999*. OECD Publishing, Paris.
- OECD (1999c). *OECD Economic Surveys: Japan 1999*. OECD Publishing, Paris.
- OECD (2003a). *OECD Economic Surveys: Italy 2003*. OECD Publishing, Paris.
- OECD (2003b). *OECD Economic Surveys: Portugal 2003*. OECD Publishing, Paris.
- OECD (2005a). *OECD Economic Surveys: Austria 2005*. OECD Publishing, Paris.
- OECD (2005b). *OECD Economic Surveys: Denmark 2005*. OECD Publishing, Paris.
- OECD (2005c). *OECD Economic Surveys: Japan 2005*. OECD Publishing, Paris.
- Ramey, V. A. (2011). Identifying government spending shocks: It's all in the timing. *The quarterly journal of economics*, 126(1):1–50.
- Ramey, V. A. and Shapiro, M. D. (1998). Costly capital reallocation and the effects of government spending. In *Carnegie-Rochester conference series on public policy*, volume 48, pages 145–194. Elsevier.
- Romer, C. D. and Romer, D. H. (2010). The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks. *American economic review*, 100(3):763–801.
- Serrano, F. (1995). Long period effective demand and the sraffian supermultiplier. *Contributions to Political Economy*, 14(1):67–90.

Annex

A.1 Data Sources

- Gross Domestic Product, Volume, US dollars, PPP converted, Chain linked volume, 2021 - OECD, Economic Outlook 117
- Gross Domestic Product, Nominal Value, Market Prices - OECD, Economic Outlook 117
- Population (Persons), Total - OECD Database
- Short Term Interest Rate, Points - OECD, Economic Outlook 117
- Total Emoloyment, labour force survey basis - OECD, Economic Outlook 117
- Unemployment Rate, Percentage of labour force - OECD, Economic Outlook 117
- Exports of goods and services, Nominal value - OECD, Economic Outlook 117
- Gross fixed capital formation, Nominal value - OECD, Economic Outlook 117
- Private final consumption expenditure, Nominal Value - OECD Economic Outlook 117
- Imports of goods and services, Nominal Value - OECD, Outlook 117
- General government final consumption expenditure, Nominal Value, Appropriation Account - OECD, Economic Outlook 117
- General government fixed capital formation, Nominal Value, Appropriation Account - OECD, Economic Outlook 117
- Consumer Price Index, 2015 = 100, COICOP 1999 - OECD Database
- Exchange rate, USD per national currency - OECD, Outlook 117

A.2 Descriptive Statistics

Variable	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
GDP_pc	16554.00	28253.00	34065.00	32950.00	37376.00	47742.00
Empl	2339642.00	3283347.00	4332702.00	18740451.00	21932683.00	65569167.00
Empl_rate	0.36	0.39	0.46	0.45	0.49	0.52
Une_rate	1.86	3.78	5.54	6.02	8.26	11.37
STInt_rate	0.05	3.46	6.55	7.89	11.29	24.90
Infl_rate	9.40	51.75	68.65	65.37	81.08	100.08
C_share	0.47	0.53	0.55	0.56	0.59	0.71
I_share	0.17	0.21	0.24	0.25	0.27	0.35
E_share	0.09	0.19	0.27	0.27	0.35	0.49
G_share	0.17	0.21	0.23	0.23	0.24	0.31
Super	0.93	1.34	1.62	2.02	2.38	4.19
E_dollar_pc	631.30	2625.00	4036.10	5624.20	7646.50	23181.50
Exc_rate	0.25	0.80	1.06	31.68	8.04	249.08

Table 3: Statistical Summary of Variables. GDP per capita in USD (GDP_pc); Employment (Empl); Employment Rate (Empl_rate); Unemployment Rate (Une_rate); Short Term Interest Rate (STInt_rate); Consumer Price Index (Infl_rate); Consumption share on GDP (C_share); Invesments share on GDP (I_share); Supermultiplier (Super); Exports per capita in USD; Exchange Rate (Exc_rate). YEAR: 1980-2005. COUNTRY: Italy, Austria, Japan, Denmark, Portugal. 130 observations.