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Deep Integration and Economic Growth: Counterfactual Evidence from Europe

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Deep Integration and Economic Growth: Counterfactual Evidence from Europe*

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Abstract: What are the net benefits from jointly economic and political ("deep") integration, and how do these vary across countries and over time? This paper addresses these questions by estimating synthetic counterfactuals for 17 countries that became full-fledged EU members in the 1973, 1980s, 1995 and 2004 enlargements. We estimate that growth and productivity effects from EU membership are large, significant and almost unanimously positive (they are negative only for Greece). Although they vary substantially across countries and over time, we calculate that without deep integration, per capita incomes would have been, on average, approximately 12 percent lower.

Keywords: economic growth, integration, European Union, synthetic control method, counterfactuals

JEL classification: C33, F15, F43, O52

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1. Introduction

One of the few issues that command widespread agreement among economists are the gains from trade. Yet what remains highly contentious is exactly how economic integration should develop. The issue is whether deep or shallow integration is more conducive to trade, productivity and welfare improvements. Deep integration is often defined as joint economic and political, while shallow is defined as purely economic integration. On the one hand, Alesina et al. (2000) argue that economic and political integration are substitutes. Once countries achieve a high degree of economic integration, there are less incentives for them to integrate politically. This is because benefits from economic integration are significant, while those from political integration are at best uncertain: "In a world of trade restrictions, the political boundaries of a country influence the size of the country's market, and therefore its productivity level. On the contrary, with free trade the size of countries is irrelevant for the size of the markets, so the *size* of a country is unrelated to its productivity" (Alesina et al. 2000 p. 1277). Accordingly, economic integration leads to the disintegration of existing political unions or nations. On the other hand, Martin et al. (2012) claim that economic and political integration are complements. A possible explanation is that "economic integration, when not accompanied by political integration, can lead to less innovation and slower growth as firms respond to increased competition in the economic market by focusing more on rent-seeking activity. When economic integration is accompanied by political integration innovation and growth will be stronger and welfare higher" (Brou and Ruta, 2011, p. 1143). According to this view, deep integration generates larger and more sustainable benefits than shallow integration.

European integration is widely considered an example of successful, albeit obviously imperfect, economic and political integration. Although the process started out mostly driven by political imperatives (a main objective was avoiding another war), considerations about economic benefits have always been central. European integration has since the 1950s deepened and broadened with substantial slowdowns but without major reversals. Yet, the

Great Recession and the Euro Crisis have dented consensus and scepticism is mounting about the economic benefits from European Union (EU) membership and, consequently, of deep integration as a preferred policy strategy.[1] Yet economic research still lags in quantifying the benefits from EU membership. The available evidence is disappointingly thin. This paper tries to address this gap.

There is a dearth of econometric estimates of the benefits from EU membership. Many believe, incorrectly, that there is a voluminous literature on the effects of EU membership and this may be because of the various contributions on the benefits from trade liberalization, from the Single Market, and from the Euro.[2] Not only studies about the benefits of EU membership are few,[3] but also the majority of these (few) studies openly lament the fragility of their own estimates (see among others, Henrekson et al., 1997, Badinger, 2005, and Crespo et al., 2008).

There are various important issues in assessing the benefits from European membership, but causality is key. Counterfactuals are at the heart of causal relations. But as Boldrin and Canova admonish, "historical counterfactuals (what would have happened if transfers had not taken place?) are hard to construct" (2001, p.7), while Boltho and Eichengreen remind us that "imagining the counterfactual is no easy task" (2008, p.13).

The objective of this paper is to estimate counterfactuals for the growth and productivity effects from European integration. We do so using the synthetic control method (or "synthetic control methods for causal inference in comparative case studies," SCM hereafter) pioneered by Abadie and Gardeazabal (2003).[4] The main research questions we address are the following. Are there sizable economic benefits from deep integration in Europe? What would be the level of per capita income in a given country had it not joined

[1] The term European Union (or EU for short) is used for convenience throughout, that is, even when referring to what was then the European Economic Community (up to 1967) or the European Communities (until 1992).
[2] See, among others, Baldwin (1989), Baldwin and Seghezza (1996), and Frankel (2010). The EU is presented as an engine for income convergence in leading economic growth textbooks (Barro and Sala-i-Martin, 1995).
[3] Badinger and Breuss (2011) and Sapir (2011) survey the literature.
[4] See Imbens and Wooldridge (2009) for a discussion of the synthetic control method in comparison to other recent program evaluation methods.

the EU? What would be productivity in a given country had it not joined the EU? Can growth and productivity differentials we estimate be causally attributed to EU membership?

We present new estimates of the net benefits from EU membership (per capita output and productivity effects) at country level for all main EU enlargements, that is for each of 17 countries that joined in the 1973, 1980s, 1995 and 2004 enlargements.[5] In order to construct counterfactuals, we take advantage of the binarity of membership in the EU, as well as of the fact that the EU has experienced four major increases in membership (enlargements) in the last four decades (1970s, 1980s, 1990s and 2000s). There are two important issues to bear in mind: (a) the complexity of integration, and (b) its timing. The first refers to the fact that although EU membership is ultimately binary (a country is or is not a full-fledged EU member), there is a continuum of degrees of economic integration, which simply cannot be fully captured by a dummy variable. The extent of integration can vary both across areas (e.g., goods, finance, services, technology, policies, etc.) and over time. The second issue refers to timing. Negotiations for EU membership tend to last for long periods and accession is announced in advance.[6] Anticipation effects may reduce the relevance of the official date of EU accession. Regarding complexity, note that the differences in the degree of integration among countries and enlargements are addressed with the case-study approach we use. For instance, joining the EU in 1973 is clearly different than joining it in 1995 (since the degree of integration among associated members is different). Similarly, the institutional and regulatory changes that countries have to make to become members are different: for instance, a country with a higher level of institutional development has to engage in a shallower reforming process than a less institutionally developed country. The case-study approach gives us a measure of the effect for each single country joining the EU

[5] There are at least two important reasons for focusing on enlargement episodes and excluding the experience of the six founders of the EU. One is that there are serious difficulties in building a reliable dataset on a pool of donor countries for the pre-1957 period, that is, for the immediate post-World War II period. Second, integration was initially gradual, with trade barriers reduced over a ten-year period. By contrast, countries involved in the subsequent enlargements joined an already largely liberalized trade area.

[6] Such anticipation effects are not uncommon. For instance, the effects of the Euro on bilateral trade are detected already for 1998, which is the year *before* the adoption of the common currency (see Frankel, 2010, pp.177-179 for a discussion).

(but its founding members) and, thus, the effects of the (binary) membership status are fully conditional on the country entering conditions and EU institutions at the time of enlargement. Traditional panel analyses cannot capture the complexity and the potential heterogeneity of membership experiences, as they attempt to estimate "the" (average) effect of EU membership and not the effect of EU membership on each individual country that joined the EU. Furthermore, although we consider EU accession as the treatment, while we address the different aspects of integration through an ex post analysis of the potential determinants of the effects of accession on per capita GDP and productivity.

We address the second issue, anticipation, directly and find it especially relevant for the countries that joined the EU with Eastern enlargement in 2004.

The main result is that the economic benefits from EU membership are large, positive and significant. There is, however, considerable heterogeneity across countries. Our estimates indicate that only one country experienced smaller GDP and productivity levels after EU accession: Greece. Overall, our estimates suggest that per capita European incomes in the absence of the economic and political integration process would have been (on average in the first ten years after joining the EU) about 12 percent lower. Although this figure varies across enlargements and over time, it is well within the range of existing estimates, which vary from a minimum of 5 percent (Boltho and Eichengreen, 2008) gains in per capita income from EU accession, to a maximum of 20 percent gains (Badinger, 2005). Our estimates are robust to random changes in the composition of the control group of non-EU countries that are used to construct the counterfactuals.

The paper is organized as follows. Section 2 discusses previous attempts at estimating the growth and productivity effects from EU membership. Section 3 presents the synthetic control method. Section 4 introduces our baseline results. Section 5 presents and discusses various robustness checks including evidence on anticipation effects and random donor samples. Section 6 investigates the potential reasons for the variation of the growth payoffs across countries and over time. Section 7 concludes.

2. European Integration: Growth and Productivity Effects

The massive destruction from World War II was followed by swift economic recovery. By the early 1950s, most European countries already register per capita GDPs above pre-war levels (Crafts and Toniolo, 2008). A period known as the Golden Age of European growth followed (Temin 2002) and between 1950 and 1973 Western and Eastern Europe grew at unprecedented rates (Eichengreen, 2007). Extensive and deep trade liberalization shore up this extraordinary economic expansion in the context of both EU-6 and EFTA.[7]

The process of European integration progressed over time in depth and extent. The deepening of trade liberalization in the 1960s was followed by the first EU enlargement in 1973 (with the accession of the UK, Ireland and Denmark). The 1980s saw further increases in EU membership (Greece in 1981 and Spain and Portugal in 1986), which were followed by deepening in terms of the Single Market. Next came another enlargement (Austria, Finland and Sweden in 1995) and then yet another deepening with the introduction of the common currency. This was finally followed by the largest of the enlargements in 2004 (and then Bulgaria and Romania in 2007 and Croatia in 2014).

The deepening and broadening of European integration generated substantial growth and productivity payoffs to the point that many scholars attach exceptionality to Europe. It is the only region showing evidence of unconditional beta and sigma convergences (Eichengreen, 2007). Per capita incomes in Europe did catch-up with the U.S., although the catching up reversed after 1995.[8] The early literature correctly argues that the effects of integration on growth worked mostly through the effects of trade integration.[9] Baldwin and Seghezza (1996) survey the evidence and conclude that European integration accelerated European growth because it boosted investment in physical capital.[10]

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[7] EFTA (European Free Trade Association) was established in 1960. The founding members were Denmark, United Kingdom, Portugal, Austria, Sweden, Norway and Switzerland (only the last two are still members today).

[8] Three important considerations have to be kept in mind: (a) these gaps behave very differently when considering per capita GDP or GDP per hour worked (Gordon 2011); (b) there is substantial cross-country variation within Europe, and (c) the Great Recession has had substantial impact on these trends.

[9] For a critical view see Slaughter (2001).

[10] An important issue with this earlier literature is that the evidence it generates focuses on the effects of international trade on growth and often assumes that all the increase in trade is driven purely by intra-European

Within the endogenous growth framework, Rivera-Batiz and Romer (1991) show that economic integration for countries at similar levels of per capita income lead to long-run growth when it accelerates technological innovation (mostly through R&D and/or new ideas).[11] Such effects can also be achieved through trade in goods if the production of ideas does not need the stock of knowledge as an input (this is the so-called "lab-equipment" model). In other words, the effects of economic integration on growth depend on specific channels leading to possible long-term benefits either through larger flows of goods or flows of ideas (Ventura, 2005). Further, the size of the growth dividend also depends on the similarity of per capita income levels. In view of the theoretical difficulties in deriving clear-cut effects of integration on growth (which includes a lack of debate on the type of integration, i.e., deep versus shallow), empirical analysis remains crucial.

There is large economic history scholarship on European integration.[12] It is closely supported by a growth accounting literature (e.g. O'Mahony and Timmer, 2009). There are also several studies that associate integration (for instance, in terms of Structural Funds) with economic growth at the regional level (see Becker et al., 2010). In addition, there have been various attempts at directly estimating the growth and productivity effects of EU membership, among them Henrekson et al. (1997), Badinger (2005), and Kutan and Yigit (2007).[13] These (relatively few) papers all warn about the fragility of their estimates. Henrekson et al. estimate the benefits from membership to be about 0.6 to 0.8 percent per year but note that such estimates are "not completely robust" (1997, p. 1551). Badinger (2005) estimates that "GDP per capita of the EU would be approximately one-fifth lower today if no integration had taken place since 1950" but cautions that these are "not completely robust" (p. 50). Crespo et al. (2008) find large growth effects from EU

integration efforts (for instance downplaying globalization).

[11] Note that Jones and Romer (2010) propose an updated list of Kaldor stylized facts, which stresses the importance of integration: "Fact 1: Increases in the extent of the market. Increased flows of goods, ideas, finance, and people—via globalization, as well as urbanization—have increased the extent of the market for all workers and consumers" (p. 229).

[12] See among others Boltho and Eichengreen (2008) and Crafts and Toniolo (2008).

[13] For a survey, see Badinger and Breuss (2010).

membership, but warn that country heterogeneity remains a severe concern.

One noteworthy approach is Ben-David (1993, 1996), who, within a more general analysis of trade integration, studies European integration as an engine for income per capita convergence. In his 1993 paper, Ben-David identifies the effects of trade integration by computing the income dispersion (standard deviation) of the six founders of the European Community, and subsequently of the three new members that joined in 1973, over a long time interval, from 1870 to 1980s, using data from the Maddison project. Comparing pre and post integration and contrasting the European Community with other samples, Ben-David concludes that there is a clear reduction of income dispersion associated to European trade integration. To overcome some of the identification problems of the approach of the 1993 paper, Ben-David (1996) introduces a new methodology. He shows that countries that are more closely integrated through trade tend to converge in income per capita, in line with the theory of comparative advantage. This result is identified by contrasting the "trade-integration club" with alternative random clubs of the same size, in terms of number of countries involved. Indeed, convergence is observed only for the trade integrated clubs.

Ben-David's view suggests that new entrants should display a lower dispersion of incomes per capita after accession. Although there is some evidence of such reduction in dispersion, the comparison of pre- and post-accession does not lead to clear-cut results. For the 1973 enlargement, dispersion starts to significantly decline only more than twenty years after accession. Following the 1980s enlargement no sign of reduction of income dispersion can be detected for Greece, Spain and Portugal. For the 1995 enlargement, the minimum dispersion is reached about seven years before accession. Finally, for the Eastern enlargement, one cannot detect any reduction in dispersion following the 2004 accession.[14]

In summary, there is an important literature that has attempted to directly address the issue of the growth dividends from deep integration's utmost example, namely EU

[14] These results are available upon request.

membership. Most of it uses panel data econometrics and information on the 1980s and 1990s enlargements to infer the size of these net benefits as well as to assess whether they are permanent or temporary. We echo Eichengreen and Boltho's (2008) concern that one main difficulty in these analyses is to identify a benchmark, a baseline country for comparison, or more plainly, a relevant counterfactual. The literature has clearly not yet addressed this issue satisfactorily. Therefore, the goal of this paper is to generate a set of counterfactual scenarios that can support statements about causality flowing from economic and political integration to economic and productivity payoffs.

3. Methodology and data

The aim of this paper is to empirically investigate the net benefits in terms of per capita income and labor productivity that can be causally associated to membership in the EU. In order to do that, we use a recently developed methodology, "synthetic control methods for causal inference in comparative case studies" or synthetic control method (SCM), developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2012).[15] We estimate what would have been the levels of per capita GDP in a given country if such country had not become a full-fledged member of the EU.

SCM estimates the effect of a given intervention (in this case, EU membership) by comparing the evolution of an aggregate outcome variable (e.g., per capita GDP and labor productivity) for a country affected by the intervention vis-à-vis the evolution of the same aggregate outcome for a synthetic control group. SCM answers questions such as "what would have been the level of per capita GDP in say Finland after 1995 if Finland had not become a full-fledged member of the EU as it did in 1995?" We answer similar questions for the countries that became EU members in the 1973, 1980s, 1995 and 2004.

[15] Imbens and Wooldridge (2009) discuss the SCM among other recent developments in the econometrics of program evaluation.

SCM focuses on the construction of a "synthetic control group" or of an "artificial control group" (Imbens and Wooldridge, 2009, p. 72), by searching for a weighted combination of other units unaffected by the intervention (control countries). These controls are chosen to match, before the intervention occurs, as close as possible the country affected by the intervention, given a set of predictors of the outcome variable. The evolution of the outcome for the synthetic control group is the counterfactual.[16]

Formally, the estimation of the average effect on the treated unit is represented by:

$$\tau_{it} = Y_{it}^{I} - Y_{it}^{C} \tag{1}$$

where Y_{it}^{I} is the outcome of a treated unit i at time t, while Y_{it}^{C} is country i's outcome at time t had it not been subjected to treatment (in this case, had it not become a full-fledged member of the European Union). We observe the outcome of the treated country Y_{it}^{I} after the treatment (with $t \geq T_0$), but we do not observe what the outcome of this country would be in the absence of treatment (i.e., the counterfactual, Y_{it}^{C}, for $t \geq T_0$). Abadie et al. (2010) propose a method to identify and estimate the dynamic treatment effect (τ_{it}) considering the potential outcome for the country's $i \in I$ under the following general model:

$$Y_{it}^{I} = \delta_t + \alpha_{it} D_{it} + \upsilon_{it} \tag{2}$$

$$Y_{it}^{C} = \delta_t + \upsilon_{it} \tag{3}$$

$$\upsilon_{it} = \theta_t Z_i + \lambda_t \omega_i + \varepsilon_{it} \tag{4}$$

where Z_i is a vector of independent variables (time-invariant or not); θ_t is a vector of parameters; λ_t is an unknown common factor; ω_i is a country specific unobservable term; ε_{it} is a zero-mean transitory shock, and $\alpha_{it} D_{it} = \tau_{it}$, where D_{it} is a dummy variable which takes value 1 when the country $i \in I$ is exposed to the treatment, and zero otherwise.

Suppose we observe the outcome Y_{it} and a set of determinants Z_{it} of the outcome for

[16] Abadie and Gardeazabal (2003) investigate "what would have been the levels of per capita GDP in the Basque country in Spain if it had not experienced terrorism?" Abadie et al. present two further examples: "what would have been cigarette consumption in California without Proposition 99?" (2010) and "what would have been the per capita GDP of West Germany without reunification?" (2014). Other recent papers using this method include Campos and Kinoshita (2010) on foreign direct investment, Lee (2011) on inflation targeting, Billmeier and Nannicini (2013) on trade liberalization, and Acemoglu et al. (2014) on political connections.

$N + 1$ countries, where $i = 1$ is the treated country and $i = 2, \dots, N + 1$ are the (untreated) control countries, for each period $t \in [1, T]$, with the intervention on country $i = 1$ occurring from time $T_0 \in (1, T)$. A counterfactual can be constructed when there is a weighted average of Y_{it} (with $i = 2, \dots, N + 1$, and $t < T_0$) such that it approximates Y_{1t} (for $t < T_0$), accounting for covariates Z. The set of weights is $W = (w_2, \dots, w_{n+1})$, with $w_i \geq 0$ (for $i = 2, \dots, N + 1$) and $\sum_{i=2}^{N+1} w_i = 1$. Thus, in the pre-treatment period:

$$\sum_{i=2}^{N+1} w_i Y_{it} = Y_{1t} \quad (5)$$

and

$$\sum_{i=2}^{N+1} w_i Z_i = Z_1 \quad (6)$$

For the choice of the optimal set of weights W^*, consider, in matrix notation, X_1 the $(k \times 1)$ vector of the treated country 1 characteristics in the pre-treatment period; X_C the $(k \times N)$ vector of the same characteristics for the control or "donor" countries; and, V a $(k \times k)$ symmetric and positive semi definite matrix, which measures the relative importance of the characteristics included in X. The optimal vector of weights W^* solves the following minimization problem:

$$\min(X_1 - X_C W)' V (X_1 - X_C W) \quad (7)$$

$$\text{s.t. } w_i \geq 0 \text{ (for } i = 2, \dots, N + 1) \text{ and } \sum_{i=2}^{N+1} w_i = 1.$$

W^* is chosen to minimize the mean squared error of pre-treatment outcomes. That is, the selected W^* minimizes the pre-treatment distance between the vector of the treated country characteristics and the vector of the potential synthetic control characteristics.[17]

The synthetic counterfactual is constructed using the optimal weights W^* so that $\sum_{i=2}^{N+1} w_i^* Y_{it}$ (with $t \geq T_0$) is the estimate of Y_{1t}^C. The treatment effects are estimated as:

$$\hat{\tau}_{it} = Y_{1t} - \sum_{i=2}^{N+1} w_i^* Y_{it} \qquad \text{for all } t \geq T_0. \quad (8)$$

The path of the weighted average of untreated countries (i.e. the synthetic control) mimics the path of the treated country in the absence of treatment. The accuracy of the

[17] In this paper we use the distance metric available in the STATA econometric software (the relevant command is *synth*). See Abadie et al. (2010) for further details.

estimation depends on the pre-treatment distance of the synthetic control with respect to the treated country. All else the same, the longer is the pre-treatment period, the more accurate is the synthetic control.

SCM requires two identification assumptions: (1) the choice of pre-treatment characteristics should include variables that can approximate the path of the treated country but it should not include variables that anticipate the effects of the intervention; and (2) the countries used to estimate the synthetic control (the "donor pool") must not be affected by the treatment.

The first assumption implies that the treatment effects are not anticipated, that is, that they start exactly at the date chosen for the treatment. In our case, the absence of anticipation effects means that the growth effects of EU membership are observed only after each candidate country effectively becomes a full-fledged member, not before. If agents anticipate these effects (for example, if foreign investors behave as if a given country is a EU member before it actually joins the EU) SCM will generate a lower-bound estimate of the true effect because part of the true or total effect occurs before the start of the treatment (EU accession in this case).[18]

The second assumption requires that countries selected for the synthetic control group should not be affected by the treatment. Although this assumption obviously holds when one defines the treatment as "full-fledged EU membership," one should keep in mind that integration is a continuum not a dummy variable.[19]

Our choice of pre-treatment characteristics is based upon the specification used by Abadie et al. (2003, 2014) and in line with the empirical growth literature (Levine and Renelt, 1992). The specification includes the investment share in GDP, population growth and pre-intervention income (all from Penn World Tables 7.0), share of agriculture and share

[18] In the synthetic counterfactuals below, we do find interesting evidence of anticipation. It is particularly noticeable in the 2004 enlargement. We discuss these issues in detail below.
[19] See Dorrucci et al. (2004) and Friedrich et al. (2013) for continuous indexes of economic integration in Europe, and König and Ohr (2012) for a review of recent efforts.

of industry in value added, secondary and tertiary gross school enrolment percentages (from the World Bank's World Development Indicators).[20] In order to avoid the inclusion of variables that are directly affected by the treatment (as suggested by Abadie et al., 2010, 2014), we deliberately exclude trade, foreign direct investment and financial integration variables (but we indirectly assess their role, see section 6 below.)

The synthetic control approach "allow(s) researchers to perform inferential exercises about the effects of the event or intervention of interest that are valid regardless of the number of available comparison units, the number of available time periods, and whether aggregate or individual data are used for the analysis" (Abadie et al., 2010). SCM addresses endogeneity and omitted variable concerns but one of its main drawbacks is that it "does not allow assessing the significance of the results using standard (large-sample) inferential techniques, because the number of observations in the control pool and the number of periods covered by the sample are usually quite small in comparative case studies" (Billmeier and Nannicini, 2013, p. 987). Here, we implement a simple yet novel solution to test the robustness of our findings to the composition of the donor sample. Namely, for each country affected by the treatment, we construct one thousand alternative donor samples that include countries randomly selected from the full donor pool sample.[21] We then compare our main estimations with those obtained with the random samples, both in terms of pre-treatment fit and estimated effects of the treatment.

This approach allows us to sharply reduce the dependence of the results on idiosyncratic shocks affecting countries in the donor pool. The occurrence of such idiosyncratic shocks in the post treatment period may be incorrectly interpreted as showing the effect of the treatment on the treated country.

[20] As in Nannicini and Billmeier (2013), we use these covariates only when they are available for at least one year in the pre-treatment period.

[21] The full donor sample we use is determined by data availability. It includes about one hundred developing and developed countries with a per capita income of at least 1,000 dollars PPP-adjusted during the period of analysis.

4. Main results

The baseline synthetic counterfactual results using the methodology and data discussed above are presented in Figures 1 to 2 (further details are provided in the On-line Appendix). The question guiding each one of these exercises is: What would have been the GDP per capita levels of the country in question if it had not become an EU member? The continuous line represents the actual per capita GDP of the country in question, while the dashed line shows the estimated synthetic counterfactual. The synthetic counterfactuals are estimated for each country in all four EU enlargements, namely for Denmark, Ireland and the UK in 1973, Greece, Portugal and Spain in the 1980s Southern enlargement, for Austria, Finland and Sweden in the 1995 Northern enlargement and for the Eastern European countries in the 2004 enlargement.[22]

The baseline results use a donor pool that excludes EU27 but includes OECD, EU neighbouring countries, Mediterranean and newly industrialized countries.[23] Note that, following Abadie et al. (2014), the donor pool does not have to include only countries having high probability of becoming EU members in the future. Indeed, the condition that cannot be violated is that countries in the control group are not subject to treatment. The specific donor pool selected is important for the point estimations but not critical and, as shown in the next section, our results are robust to random selection of the countries in the donor pool.

[Insert Figure 1 about here]

As an example, let us consider the case of Spain. Figure 1 shows the evolution of real per capita GDP in Spain between 1970 and 2008. Spain became a full-fledged member of the EU in 1986 and hence this assigned as the treatment year as indicated by the vertical

[22] We have excluded from our analysis Cyprus and Malta due to data availability and to their relative small size (and the difficulties this generate to find satisfactory matching countries) and Bulgaria, Croatia and Romania because the period post-EU membership is excessively short.

[23] This sample of countries is similar to the one originally used by Bower and Turrini (2010) and contains the following countries: Argentina, Australia, Brazil, Canada, Chile, China, Hong Kong, Colombia, Croatia, Egypt, Indonesia, Iceland, Israel, Japan, Korea, Morocco, Mexico, Macedonia, Malaysia, New Zealand, Philippines, Russia, Switzerland, Thailand, Tunisia, Turkey, Ukraine, and Uruguay. Beyond the countries excluded because of missing data, other excluded countries are Algeria and Libya among the Mediterranean Northern African countries (because of their OPEC membership), and Norway among the EU27 neighboring countries (being a natural resource based economy).

dashed line. The set of optimal weights for "synthetic Spain" are 0.358 to New Zealand, 0.373 to Brazil and 0.268 to Canada (and, for example, 0% for Albania or Japan; the appendix contains full details). The figure shows the actual Spanish per capita GDP levels between 1970 and 2008 and the synthetic counterfactual, that is, the estimated or hypothetical per capita GDP of a Spain that did not become a full-fledged EU member in 1986. The results suggest that per capita GDP in Spain would be considerably lower today had it not joined the EU in 1986. Indeed, they show it would have been lower in every single year since 1986. Before 1986, the actual and synthetic Spain series are reasonably close and move together, while they diverge around 1986, suggesting there was little delay of the effects from EU membership. Furthermore, the gap between actual and synthetic Spain seems to be constant, indicating that the benefits from EU membership in this case are likely to be permanent. The results for Portugal are similar, with sizeable benefits from EU membership. The main country donors to the construction of per capita GDP series of "synthetic Portugal" are Philippines and Chile (weights of 0.239 and 0.237 respectively; appendix has further details).

Overall, these results show substantial increases in per capita GDP for all countries that joined the EU in the 1980s, with Greece as the only exception. Indeed, Greece is the only of the 17 countries we consider for which net benefits seem to be negative (not positive). So the results for Greece deserve further attention. The estimates show that Greek per capita GDP would have been higher if Greece had not become a full-fledged EU member in 1981. Notice that the gap shrinks over time, suggesting that this latter statement weakens after say 1995.[24] Further, this does not imply Greece would be better off leaving today the EU. From 1981 to 1995, growth rates in the EU were relatively higher and Greece experienced divergence (Vamvakidis, 2003). The opening up of a clearly uncompetitive domestic industry may have been too sudden.[25] Yet entry into the economic and monetary

[24] Note that the accuracy of the counterfactual estimation reduces overtime as it might be driven by important changes in the donor countries.

[25] In 1976, the Council of Ministers extraordinarily rejected the European Commission's view that was against

union represents a turnaround, with growth rates faster than in the EU for 1996-2008, driven by telecommunications, tourism and the financial sector. Interestingly, the latter is one of the few sectors in which structural reforms were implemented (Mitsopoulos and Pelagidis, 2012). Before the Crisis, integration delayed a broad range of structural reforms in Greece; afterwards signs of acceleration in the implementation of structural reforms are noted (OECD, 2015, and Fernández-Villaverde et al., 2013).

In the summer of 1961, Denmark, Ireland and the UK submitted official applications for accession to the European Communities.[26] When France vetoed the UK application, the other candidates withdrew (Bache et al., 2011). Applications were resubmitted and accepted in 1969, with accession in 1973. The results in Figure 1 suggest that per capita GDP would be considerably lower in these countries had they not joined the EU in 1973. The actual and the synthetic series are reasonably close before 1973 (even more so for labour productivity than per capita GDP), while they since diverge.[27] The dynamics of these benefits is noteworthy. For example, the benefits from EU membership for the UK (although substantial throughout) may have slowed down in later years while for Ireland they seem to have accelerated instead. This would suggest that perhaps the UK benefited more from the Single Market while Ireland benefited more from the common currency.

In 1995, Austria, Finland and Sweden joined the EU. The results for Austria and Finland suggest that EU membership generated positive dividends in terms of per capita GDP. The results for Sweden suggest the effects from EU membership may be stronger in terms of labour productivity than in terms of per capita GDP. Overall, the estimated payoffs from EU membership for Sweden, and to a lesser extent Austria and Finland, seem small compared to those in the 1973 enlargement. One possible interpretation is that when these

opening accession negotiations with Greece and in favor of delaying entry until Greek producers were deemed able to compete in the Common Market.

[26] Recall that these three countries were founding members of the European Free Trade Area (EFTA). EFTA was successful at increasing trade among its members, but not as successful as the European Community. Also note that at the time of entry, Denmark was the richest of the three, with Ireland's per capita GDP comparable to (slightly higher than) the UK's. In terms of GDP size, the UK was and remains the (much) larger economy.

[27] The pre-treatment match between the actual and synthetic is generally good for all analyzed countries, with the exception of Finland's per capita GDP but this is mostly due to the Finnish banking crisis of 1991-1993.

countries joined the EU in 1995 they already had a relatively high level of per capita income.[28] We do not believe this interpretation exhausts the puzzle.

Another factor is the possibility that the 1973 countries designed, implemented and benefited from the Single Market (1986-1992) and, Ireland especially, from the common currency and attendant financial integration. The main impediment for the 1995 countries to join was political (the Cold War) and their benefits from EU membership seem mostly in terms of labour productivity and less in terms of per capita GDP (detailed results are provided in the appendix). Future research should investigate fully the reasons for the relatively worse performance of the 1995 class. One possible line of inquiry could focus on institutions. If the benefits the EU provide is to encourage institutional change than one would expect smaller potential gains from membership in the case of Austria, Finland and Sweden in 1995, as they had already relatively high levels of institutional development.

Let us now focus on the results for the Eastern European countries that joined the EU in 2004. Given the shorter data series, we must be more cautious when considering the Eastern with respect to the three other earlier enlargements.

[Insert Figure 2 about here]

Overall, there seems to be a satisfactory pre-treatment matching. However, for some countries the benefits are large, while for others that is not the case. Countries in the first group include Estonia, Latvia, Lithuania, while in the latter group are the Czech Republic, Poland, Slovakia, and Slovenia. Notice that Hungary and Poland display negative payoffs from membership. Yet once one account for anticipation effects (discussed in the next sub-section below), benefits from EU membership become positive. Indeed, the Eastern enlargement provides interesting evidence on anticipation effects. Divergence between the

[28] The "per capita income gap at entry" is the percentage difference between the per capita income average of existing members and that of candidate countries, in USD PPP, for the official accession year. We calculate that candidate countries in 1973 had on average 96% of the per capita income of existing members, in the 1980s this was 63%, in 1995 this was 103%, while in 2004 it was 45%. Interestingly, the actual figure for Greece in 1981 and Portugal and Spain in 1986 is the basically the same (63%) and that for East Germany in 1990 is surprisingly close (64%).

actual and synthetic series started to appear few years before the actual accession date.

In summary, results from the synthetic control method suggests that the dividends in terms of per capita GDP and productivity from EU membership are positive, substantial and long lasting in spite of heterogeneity across countries (we discuss differences in the magnitude of these effects in more detail in the next sub-section). Per capita GDP or productivity levels seem to significantly increase with EU membership in Denmark, Ireland, United Kingdom, Portugal, Spain, Austria, Finland, Estonia, Latvia and Lithuania.[29] The effects are smaller but still positive, for Sweden, Czech Republic, Slovakia, and Slovenia. Finally, and surprisingly, the evidence suggests that after EU accession only one country (Greece) experienced lower per capita GDP or productivity compared to its counterfactual.

Because the time horizon over which we can reasonably attribute to EU accession the dynamics of per capita GDP or productivity relative to a control group varies, we provide summary statistics for the effects at different points in time after accession: five years, ten years and for all available years (Table 1). Interestingly, results do not change as dramatically as one would expect, which may indicate a high degree of persistence of these net benefits. Moreover, countries involved in the 1973 and 1980s enlargements experienced deepening of EU integration after their accession because of the Single Market. Using a medical metaphor, one may be worried that the treatment was strengthened after a given period. As we find substantial effects at the five and ten years interval, such strengthening of the treatment does not seem to crucially affect the results. Although increased integration over time may caution against statements on the duration of the accession effects, the finding that they actually vary little minimizes such criticisms.

5. Sensitivity analyses

The objective of this section is to further probe the robustness of baseline results discussed

[29] See Appendix Figures A.1, A.2 and A.3 for synthetic counterfactual results for labor productivity, and Appendix Tables A.1, A.2, A.3 and A.4 for full estimation details.

above. Below we present "placebos in time" for Eastern European countries in order to assess whether anticipation effects matter for our baseline results, estimates using randomly-generated donor samples so as to address concerns that the estimates above may be driven by the specific composition of a sample of donor countries, and we further assess the net benefits testing whether the average post-treatment difference between the actual and synthetic series are statistically different.

5.1. Anticipation effects

First, we carry out a robustness exercise to examine possible "anticipation effects," by checking whether economic agents anticipate the growth and productivity net benefits from membership or, in more practical terms, whether one observes growth effects from membership before official membership starts. We focus on the 2004 Eastern enlargement because it involved a lengthy process, mainly due to the substantial institutional change it required, both from entrants and the EU itself (see Elvert and Kaiser, 2004, and Bache et al 2011).[30] In order to assess these effects we re-estimate the synthetic counterfactuals using 1998 as the treatment year, rather than the official accession date (2004).

The baseline results suggest that the deviation between actual and synthetic per capita GDP starts before 2004. These new results in Figure 3 show that the benefits from EU membership are positive and large across these New Member States with the exception of the Slovak Republic. One can of course speculate about this exceptionality but one thing that is clear is that the 2004 enlargement is heterogeneous in terms of "preparedness": some countries seem to have been "ready to join" much earlier than others (contrast say the Czech Republic with Lithuania).

[Insert Figure 3 about here]

Taking these anticipated treatments for Eastern European countries into account,

[30] Kutan and Yigit (2007) present econometric evidence supporting the view that the 1980s and 1990s enlargements did not suffer from severe anticipation effects. They estimate structural breaks in GDP and productivity series and report that they occur substantially close to the "official" accession dates.

Table 1 reports a simple calculation of the differences between before and after EU accession (that is, the differences between their actual and their levels predicted by SCM), for each country, in percentage terms (in the case of GDP per capita) and in percentage points (in terms of per capita GDP growth). It reports the average difference for the whole post-accession period, the average difference for the first ten and for the first five years after accession to the EU.

[Insert Table 1 about here]

Focusing on per capita GDP (columns 1 to 3 in Table 1), there is little evidence that the difference (which is our estimate of the causal effect of EU accession) decreases over time after each enlargement. Actually, our evidence indicates that for the 1973 enlargement effects increase over time, even if estimations after ten years from the treatment should be taken with cautions. Column 1 shows that the 1970s enlargement has the largest estimated net benefits, while the 1986 enlargement (Spain and Portugal) and the Eastern enlargement have higher dividends than those from the 1995 enlargement. However, the 1970s, 1980s (excluding Greece), and the Eastern enlargement (considering anticipation effects) have similar net benefits over the first ten years after accession. These are the preferred estimates and they suggest that on average per capita incomes would have been around 12 per cent lower today if European Integration after 1973 had not happened.[31]

For the countries that joined the EU in the 1980s and for the Eastern enlargement (anticipation-adjusted) there is not a large difference between the results for the whole post accession period compared to its first ten years.[32] Ireland is an exception in that the benefits from membership accrue later. We speculate that structural funds and increased capital mobility may explain this pattern. Focusing on the more comparable "first ten years after

[31] These conclusions are broadly similar when focusing on growth rates. On average, without European integration after 1973 growth rates would have been 1.2 percentage points lower over the period and the one country that clearly stands out is again Latvia, for which the benefits from being an EU member amount to additional four percentage points in its average GDP growth rate.
[32] Note that for the countries in the 2004 enlargements, the results for the whole post accession period (1998-2008) coincide with the results for the first 10 years (1998-2008). Yet, the results remain very similar if we focus on the first 5-years instead.

accession," one can identify Latvia, Lithuania and Estonia as the countries that have benefited the most and Greece as the one that has benefited the least (to a lesser extent, the others are Sweden, Finland and the Czech and Slovak Republics).

5.2. Random donor samples

The second concern we address is that estimates could be affected by the specific composition of the donor sample. If countries in the donor sample were affected by spill-over effects, such as trade diversion effects induced by the EU membership on a non-EU trade partner country, this would bias our results upwards. Similarly, if a country in the donor sample experiences an idiosyncratic shock during the years of treatment, this would again bias our results.

Abadie et al. (2010) propose to run placebo experiments on the donor countries and then compare the placebo effects against the treatment effect on the treated. On the same line, Acemoglu et al. (2013) apply this intuition in a context where there are multiple units that are treated at the same time. These placebo tests assess the "exceptionality" of the treatment effect on the treated unit, relative to the shocks hitting the economies considered (i.e. the placebo effects). Their interpretation is based on the fact that when the effect on the treated unit is exceptionally large respect to the idiosyncratic shocks on the control units, then we can consider the former effect as statistically different from zero. This is an informative exercise which, however, does not insure against spurious results driven by idiosyncratic shocks in the donor countries, and in particular to countries receiving positive weights. In fact, suppose some countries in the donor pool have large idiosyncratic shocks during the post-treatment period but they do take weights equal to zero for the construction of the synthetic counterfactual of the treated country. The placebo test would signal shocks on these control countries are much larger than the treatment effect on the treated country. Accordingly, the interpretation of the placebo test would indicate that the treatment effect is not extreme with respect to other idiosyncratic shocks observed in the donor countries. Actually, this indicates that the treatment effect on the treated is not large with respect to other shocks, but it does not mean that the treatment does not have an effect nor that the estimated effect is spurious (i.e., influenced by the shocks on the donors, since these countries take zero weight for the construction of the synthetic country under analysis). This is an extreme example, but we would reach similar conclusions when donor countries receiving idiosyncratic shocks take small positive weights for the construction of the synthetic.

In contrast, suppose that only one donor country receives a large idiosyncratic and that this country has large weight in the construction of the synthetic unit. When we look at the distribution of the placebo effect and we compare it with the effect on the treated unit, we would conclude that there is only one country with a larger shock than the treated. If there is a sufficiently large number of donor countries, we will tend to interpret the effect of the treatment as extreme, and thus highly significant, with respect to most of the other countries. However, in this case the effect on the treated is clearly spurious as it is driven by the shock on the donor country with large weight. Again, this is an extreme example but intermediate circumstances would lead to similar conclusion.

In summary, placebo tests are informative, as they can detect the presence of idiosyncratic shocks on the donors and their impact on the results. However, they do not tell us how sensitive our results are to the shocks on the donor units.[33]

In order to assess whether the estimation results are influenced by the presence of a specific country in the donor pool Abadie et al. (2010, 2014) suggest to exclude each time a country from the counterfactual and compare the estimations obtained after these exclusions. Building on this idea, and taking into account also the uncertainty of the

[33] In cross-country studies based on long periods of analysis and on macroeconomic outcome, it is often not surprising that countries follow idiosyncratic shocks. Testing for the presence of shocks on the donor is informative but it does not solve the problem. One might actually choose to include in the donor pool only countries not affected by shocks (and check with the fake experiments the actual absence of these shocks), but this could lead to doubts about the arbitrary choice of these countries. The real challenge is therefore to find a way to measure their actual influence on the estimated effect of interest.

goodness of the choice of the countries composing the main donor pool,[34] we propose a new and systematic way to check the sensitivity of the results to the shocks on the donor pools.

We construct alternative donor samples and compare the obtained results with our baseline estimates. More precisely, for each treated country, we iteratively re-estimate the synthetic counterfactual using one thousand alternative donor samples. Each donor sample includes the same number of countries used for our main estimation randomly drawn from the largest set of countries for which we have available data.[35] Each alternative donor sample has a (randomly assigned) probability of being affected by idiosyncratic shocks, which would lead to spurious results. If (i) the interval of estimations obtained with alternative donor samples is systematic different from zero, (ii) a very large share of alternative estimations indicates effects that are of the same sign of the baseline estimate, and (iii) the baseline estimation is not extreme respect to these alternative estimations, then we can attach much more confidence to the estimation obtained with the preferred donor sample.

[Insert Figure 4 about here]

Figure 4 displays these results while Tables 2.A-C summarizes them. Table 2.A compares our estimated effects after 10 years from EU accession with those obtained with the random donor samples.[36] In column 1 of Table 2.A we report our main estimation effects. Columns 2 and 3 show the median and the mean, respectively, of the estimation effects obtained with the one thousand alternative donor samples. Column 4 and 5 show the percentages of the estimations for the alternative donor samples with a negative or positive (respectively) sign of the effects. Despite various interesting differences, these results are reassuring. For four countries (Denmark, Ireland, United Kingdom, Austria, and Czech Republic) our baseline estimates clearly overestimate the effects, while for the other four

[34] In other words, we want also to test whether the specific choice we made to build our donor sample drives our results.

[35] Note that we excluded observations with GDP per capita less than 1,000 euros during the period of analysis to avoid the inclusion of very poor countries typically characterized by very high income volatility.

[36] In Figures 4 and 5), we report graphs on the differences between our main estimation and those obtained with the random sample that have comparable pre-treatment RMSPE (i.e. lower than 3 times the RMSPE of our estimation).

countries (Finland, Estonia, Poland and Slovakia) our baseline estimates are clearly lower than the median or average effect obtained with the alternative donor samples. For all countries (with the exception of Denmark and Ireland) most random donor samples estimates have the same sign as our main estimated effects.

[Insert Table 2.A, 2.B and 2.C about here]

These statistics do not take into account the goodness of pre-treatment fit of the estimations obtained with the alternative donor samples. This is an important element to correctly compare these results. To this end, in column 6 we focus on the effects, for each country, obtained with the donor sample that, among the one thousands alternatives, has the best pre-treatment fit. Results in columns 6 show that for twelve countries our estimates are similar to those obtained with the alternative donor samples that perform better in the pre-treatment period. Based on the estimations with the best pre-treatment fit (or smallest RMSPE), the average actual GDP per capita computed during the first ten years from the membership with respect to the average of its synthetic counterfactual computed over the same period is about 9% higher (see column 6 of Table 2.A). When we consider the difference between the actual GDP per capita and its synthetic after ten years from the membership, this is 13% (see column 6 of Table 2.B).

For most countries, the first ten years after accession seem to generate clear robust, positive and significant net benefits either in terms of higher per capita income levels and/or higher levels of labour productivity (see Appendix Table A.6). The ten-year interval is clearly arbitrary, as we cannot a priori identify the relevant horizon for long-run effects of accession to the EU. Therefore, Table 2.C. summarizes the effects over the entire post-entry period. The main difference with the ten-year horizon is that Ireland now displays very large positive effects, which are determined by large gains occurring in the 1990s and especially the 2000s.

It is clear that for a handful of countries further tailoring of econometric modelling choices would result in substantially more precise estimates of net benefits. But it is also clear to us, that the overall effects are substantial, positive and long-lasting.

In summary, results provide strong support on our claim on the crucial role of case-studies, as the effects of integration are highly heterogeneous both across countries and over time. Nevertheless, the approach allows us to infer an average effect by simply averaging the country-level gains from EU integration. The statistical significance of these average effects can then be estimated through a difference-in-differences approach.

5.3. Average difference between actual and synthetic series

Finally, we estimated difference-in-differences for the actual and synthetic series of each country in order to assess the level of statistical significance of their average difference.[37] Our use of this approach have clear limitations as it compares only two series of data resulting in a low number of observations entering the regression. The results (Appendix Table A.5) show that, for average effects, the economic benefits from EU membership estimated above are substantial. That is, they show that the differences between the synthetic counterfactual series and the actual series are statistically significantly different from zero.

6. Determinants of the benefits from accession

Given the heterogeneity we find in terms of our estimates of the net benefits from EU membership, it may be worth try to shed some light on it. Why do some countries benefit so much while others benefit little? Has the introduction of the common currency (the Euro) and the extensive preparations that preceded it, affected the growth payoffs from EU membership? In addition to its policy importance, this is a crucial research topic. It is important to understand the variation across countries and over time of the new benefits from EU membership, here defined by the difference between their actual levels and those

[37] See Bertrand et al. (2004) for a more general critique of the differences-in-differences approach.

predicted by the synthetic counterfactuals. Following a recent study by Friedrich et al. (2013), we focus on the relative roles of institutional quality, financial development, financial globalization, in addition to the traditional channel of trade integration.[38] More financially developed countries are expected to be better able to exploit (and distribute) the benefits of integration. This is a complex relationship that may depend on the level of development achieved by domestic political institutions (Campos and Coricelli, 2012). By the same token, this reasoning holds for those countries that are better integrated internationally (the latter would involve not only deeper but also different types of linkages, for example, foreign direct investment and cross-border banking).

What explains the variation in net benefits across countries and over time? Table 3 presents a set of panel OLS estimates in which the dependent variable is the percentage difference between the actual levels of per capita GDP and those estimated from the synthetic counterfactuals. These specifications include inertia ("lagged gap") and allow an evaluation of various different potential determinants: trade openness, international financial integration, adoption of the common currency (a dummy variable for the adoption of the Euro) and economic and political institutions. Further, two key structural reforms are captured by measures of labour market flexibility (EPL, employment protection legislation) and economic regulation (ECTR, competition regulation in utilities industries).[39] The two reported measures of political institutions are a general index of democracy (from Polity IV) and an index of political constraints on the executive (POLCON).[40] All specifications include the number of years of EU membership and country and year fixed-effects.

[Insert Table 3 about here]

[38] Note that their context is different in that they examine why Emerging Europe are the only countries with robust growth effects from financial integration.

[39] ETCR is the measure constructed by the OECD (2011) summarizing indicators of regulation in energy, transport and communications. It actually reflects the breadth and stringency of regulatory provisions in seven sectors: telecoms, electricity, gas, post, rail, air passenger transport, and road.

[40] POLCON is described in detail in Henisz (2000) and the source for the democracy variable is the Polity IV dataset.

The results in Table 3 suggest that three chief factors contribute to our understanding of the variations of net benefits from EU membership across countries and over time: trade openness, financial integration and the adoption of the Euro. These factors are closely associated with the magnitude of the overall, average net benefit from membership in the EU. It should be clear from this exercise that we are simply highlighting association and not a causal relationship. With this in mind, the coefficient for Euro membership suggests that countries that (later on) adopted the Euro, have on average approximately 2 percentage points larger pay-offs from EU membership (recall the average payoff is approximately 12%). In other words, everything else constant, countries that have adopted the Euro have differences between actual and synthetic levels of per capita GDP that are approximately 2 percentage points larger, on average, than for those countries that have not yet adopted the Euro. Similar statements apply to both trade openness and financial integration.[41]

A second set of results refers to employment protection legislation and utilities regulation. As it can be seen from Table 3, the effects of employment protection legislation are ambiguous. Yet the results for the stringency of utilities regulation (ECTR) suggest that countries that have successfully converged to the EU policy framework seem to benefit more fully from EU membership. It should be noted that the source of these two reform variables is the OECD and that data are available exclusively for OECD members during the period of analysis. The fact that various countries that joined the EU in 2004 are not OECD members explains the discrepancy between the number of observations of the first two columns and the remainder of the Table. Thus, we consider the EPL and ECTR results in column 6 useful mainly for checking for possible non-linearities and to assess whether the fullest specification would affect the results for what we consider the three key factors (namely, trade openness, financial integration and the Euro). We find that controlling for EPL and ECTR does not qualitatively affect these main conclusions.

[41] Note that taken together the linear and the squared term of the effect of how financially integrated a country is into the world economy is on average positive.

Table 3 also presents results addressing the role of political institutions. None of the relevant coefficients are statistically significant at conventional levels (except for democracy, Polity 2, in the full specification of column 6, but this may be capturing unduly the effects of the smaller sample size). Perhaps, this is because of two related reasons: one is that most of the institutional catch-up may take place before EU accession and, second, that there is very little variation among EU members regarding levels of development of political institutions (and thus we should not expect it to be a key factor in explaining cross-country variation). Nevertheless, we believe a fruitful avenue for future research would be to extend the set of political institutions and to investigate further the pre and post accession dynamics of these various institutions and how they affect differently the pace and magnitude of the net benefits we estimate. We suspect this should be particularly useful in illuminating the experiences of countries such as Denmark and Greece.

7. Conclusions

This paper tried to provide a novel and more satisfactory answer to the important question of whether there are significant and substantial net benefits from "deep integration," that is whether the combination of economic and political integration (in the context of EU membership) generated higher per capita GDP and higher labor productivity. The main finding is that there seems to be strong evidence of positive net benefits from EU membership, despite considerable heterogeneity across countries. More specifically, focusing on the 1973, 1980s, 1995 and 2004 enlargements, we find that per capita GDP and labor productivity increase with EU membership in Ireland, United Kingdom, Portugal, Spain, Austria, Estonia, Hungary, Latvia, Slovenia and Lithuania. The effects tend to be smaller, albeit still mostly positive, for Finland, Sweden, Poland, Czech Republic and Slovakia. Finally, and to our surprise, the evidence shows that only one country (Greece) experienced lower per capita GDP and labour productivity after EU accession than its counterfactual.

We identify three main directions for further research. First, we think research is needed to provide a fuller understanding of why Greece turned out to have such an exceptionally negative economic growth performance since EU accession. The returns we expect from such research are high as they can throw light on the current Greek situation and hopefully suggest ways out of it. Second, further research should focus on the specific mechanisms and channels through which EU membership seems able to support faster GDP and productivity growth rates, as these mechanisms, and their effectiveness, may have changed over time and particularly after the Great Recession. Finally, future research should focus on disentangling the various aspects of the integration process, including the political economy dimension. Future analysis could focus not only on trade and financial integration but also on transparency and political support for European integration, which may ultimately affect reform policies in the EU member states. These issues are relevant in light of the tensions that arose within the EU and especially within the Euro area as a result of the Great Recession.

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Notes for Figures 1 to 3:

There are two series plotted in each graph: the continuous line represents the actual per capita GDP levels of the country in question; the dashed line plots the synthetic counterfactual results answering the following question: What would have been the GDP of the country in question if it had NOT become an EU member in the year it did? The synthetic counterfactuals are presented for each country in the last four EU enlargements: Denmark, Ireland, and United Kingdom in the 1973 EU Enlargement, Greece; Spain and Portugal in the 1980s EU Enlargements; Austria, Finland and Sweden in the 1995 EU Enlargement; and Eastern European countries in the 2004 EU Enlargement. Results are presented for a donor pool of non-EU27 countries including OECD member states, neighbours countries of the EU27, and Mediterranean Northern Africa countries. The pool is composed by the following countries: Argentina, Australia, Brazil, Canada, Chile, China, Hong Kong, Colombia, Croatia, Egypt, Indonesia, Iceland, Israel, Japan, Korea, Morocco, Mexico, Macedonia, Malaysia, New Zealand, Philippines, Russia, Switzerland, Thailand, Tunisia, Turkey, Ukraine, and Uruguay.

Figure 1: Real GDP per capita in the Northern and Southern enlargements

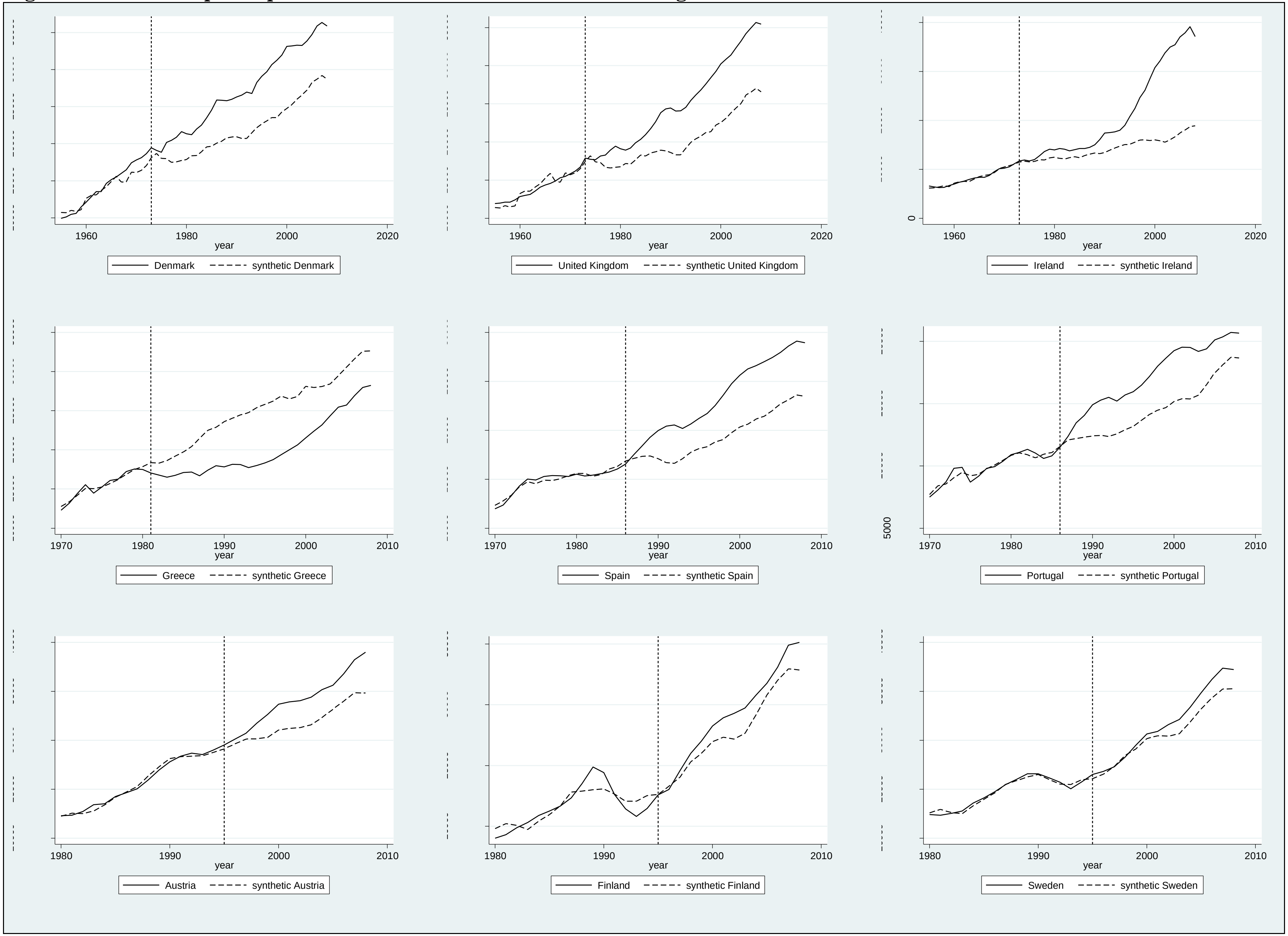


Figure 2: Real GDP per capita in the Eastern enlargement

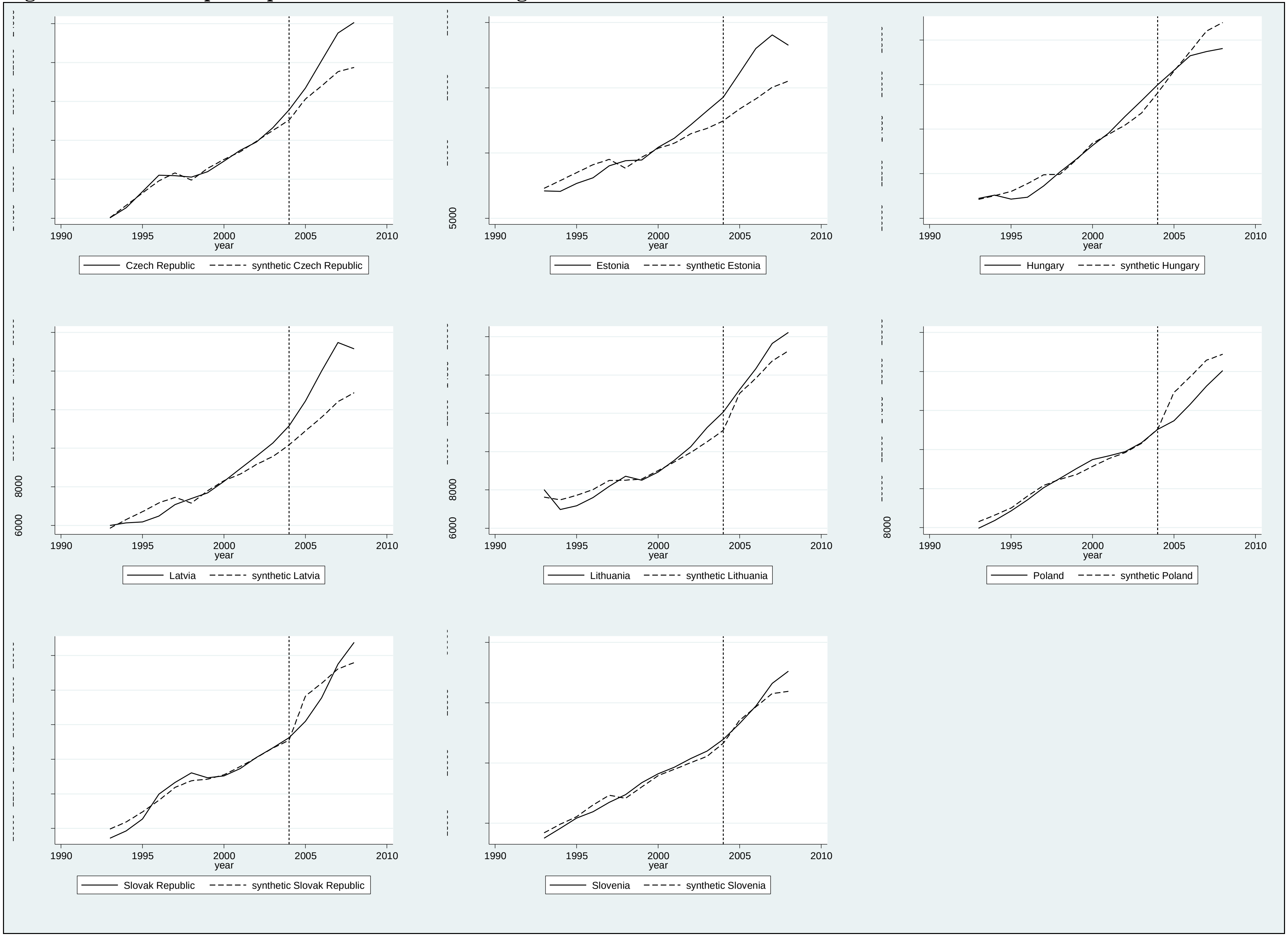
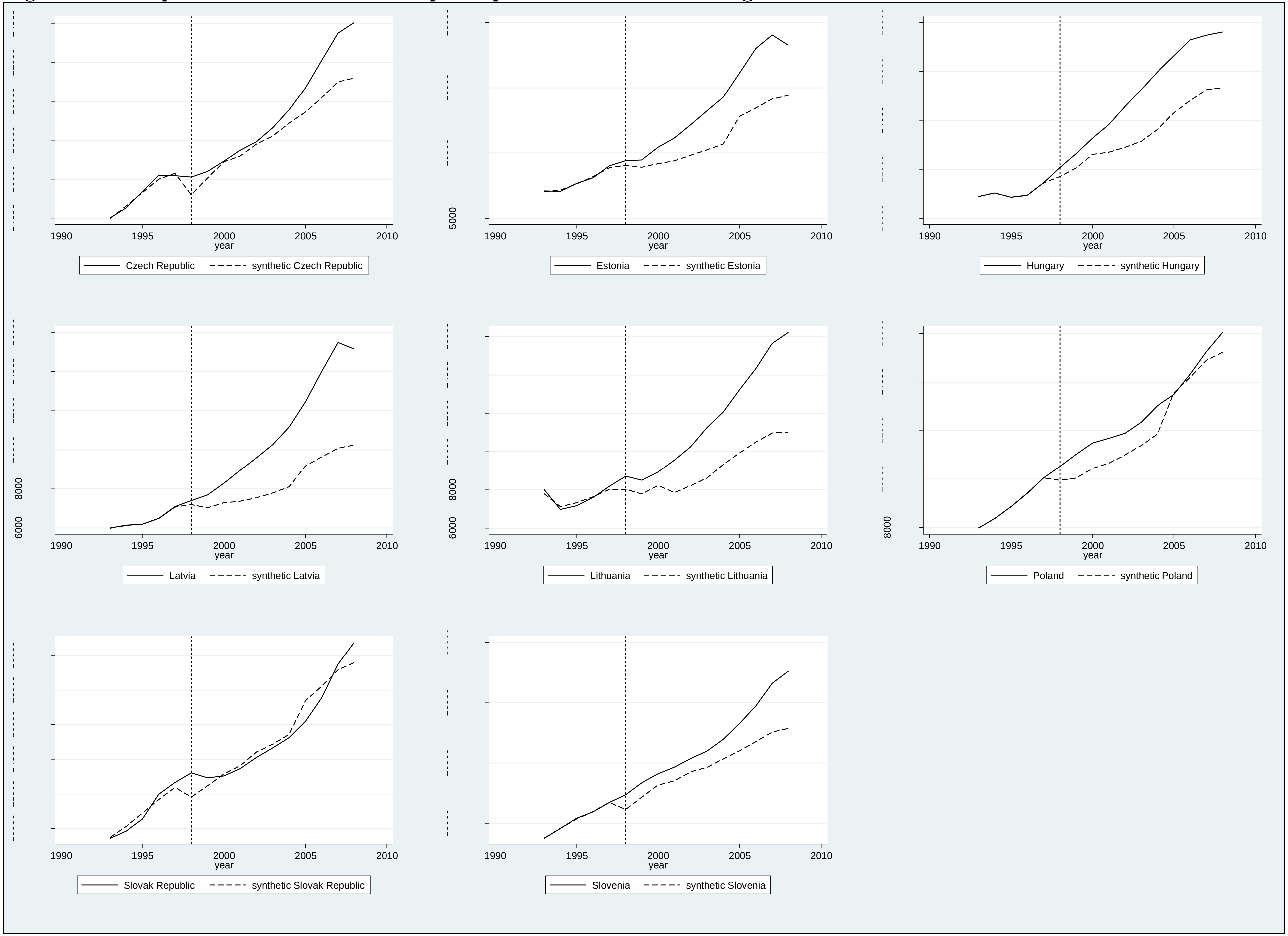


Figure 3: Anticipation effects in real GDP per capita in the Eastern enlargement



Notes for Figure 4

The black line represents the difference between the actual GDP per capita levels of the country in question and its synthetic counterfactual reported in Figure 1 for Northern and Southern enlargements and in Figure 3 for the Eastern enlargement. The grey lines represent the difference between the actual GDP per capita of the country in question and its synthetic counterfactual obtained using 1,000 alternative, and randomly chosen, donor samples. Each donor sample includes the same number of countries than the main estimation (i.e. the one represented with the black line).

Figure 4. Random donor samples (1,000 replications) – Real GDP per capita in the Northern and Southern enlargements

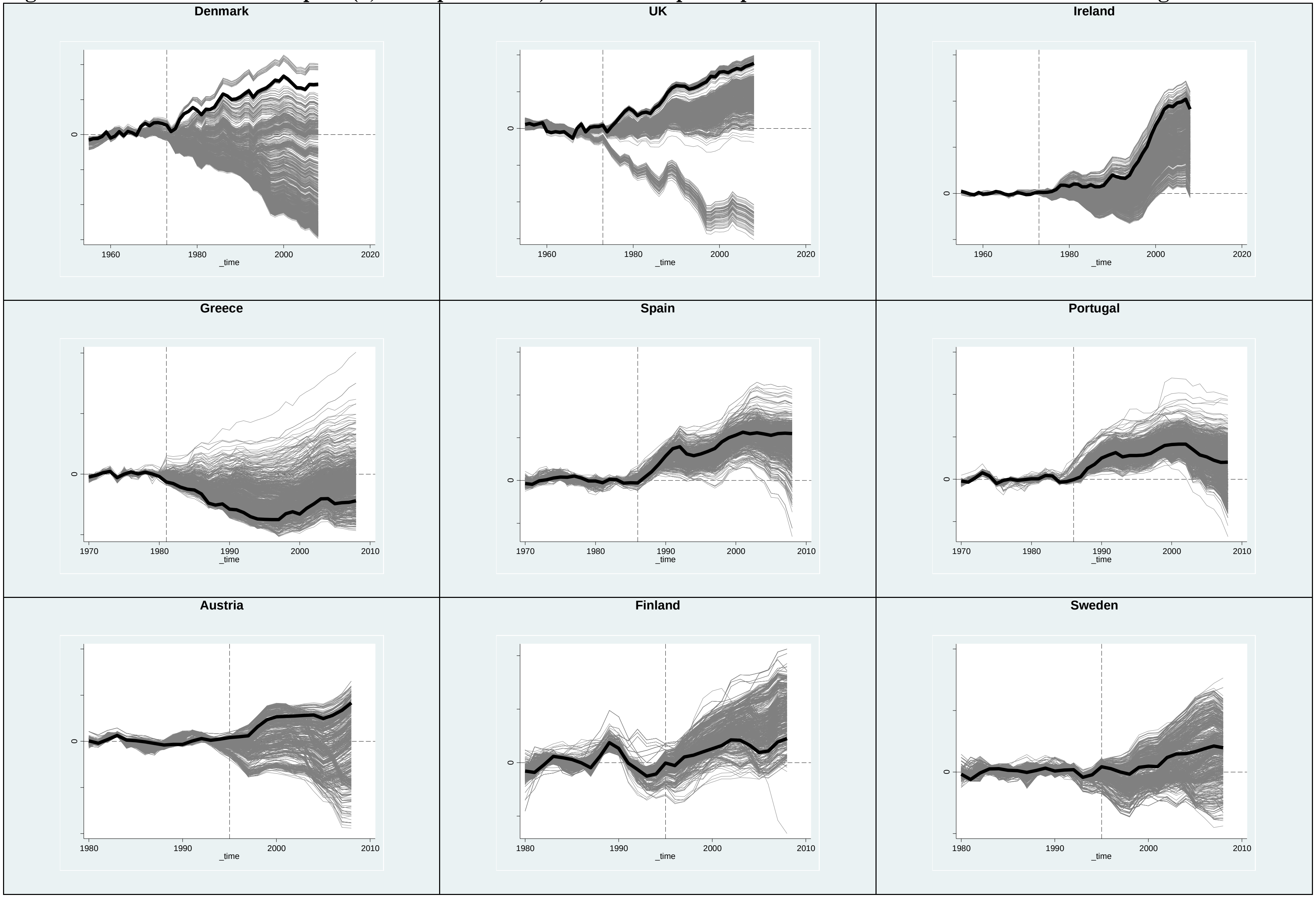


Figure 5. Random donor samples (1,000 replications) - Real GDP per capita in the Eastern enlargement (anticipation effects)

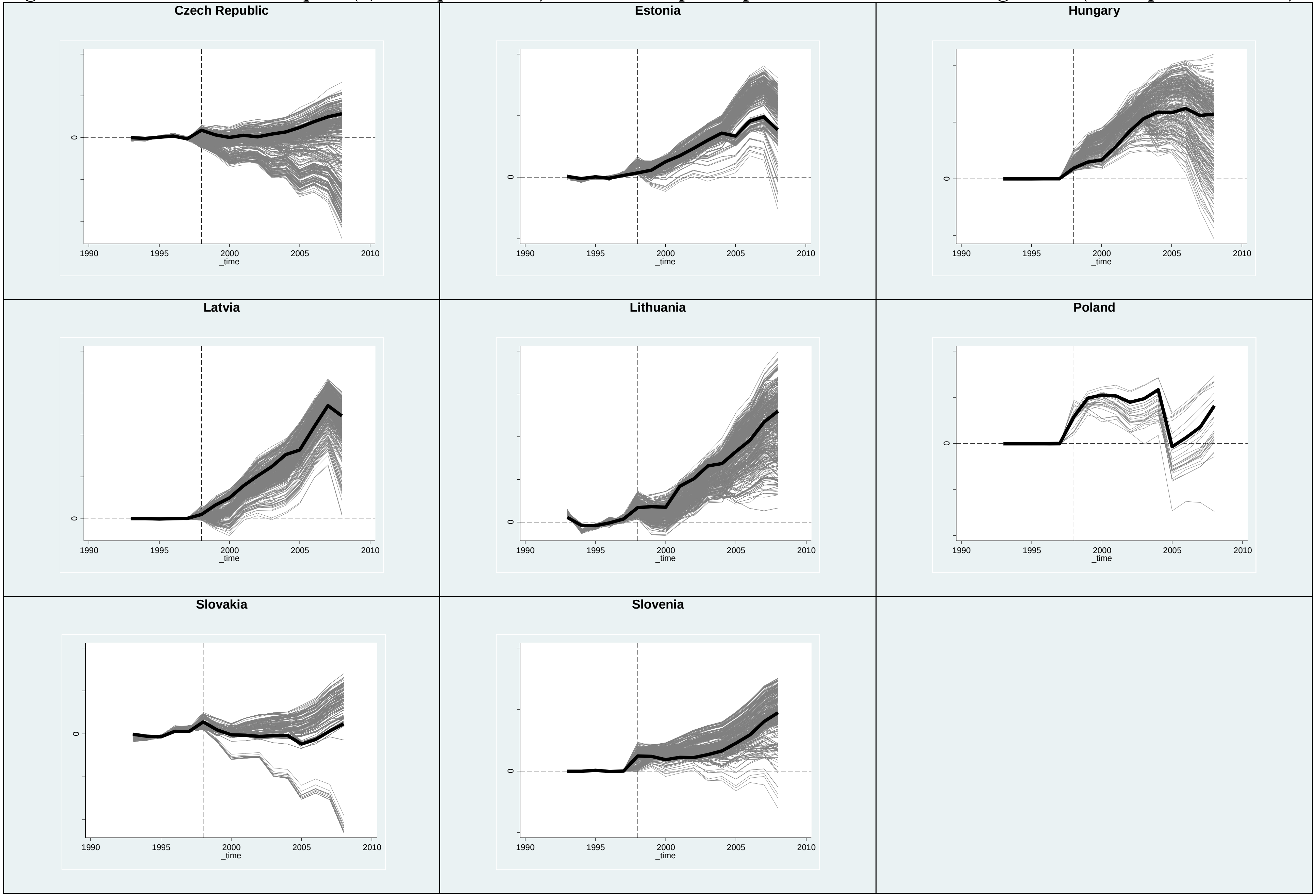


Table 1.
Difference between country's Actual and Synthetic Per Capita GDP paths

	DIFFERENCE (%) in post-treatment average GDP pc LEVEL between ACTUAL and SYNTHETIC			DIFFERENCE (pp) in post-treatment compounded annual GDP pc GROWTH RATE between ACTUAL and SYNTHETIC		
	All post-treatment	10 years after treatment	5 years after treatment	All post-treatment	10 years after treatment	5 years after treatment
Denmark	23.863	14.298	10.292	0.441	1.038	2.038
United Kingdom	23.694	8.586	4.824	0.763	0.951	2.118
Ireland	48.900	9.395	5.242	1.915	0.883	2.348
Greece	-19.758	-17.336	-11.591	-0.271	-2.111	-2.037
Portugal	18.351	16.537	11.733	0.498	1.988	4.355
Spain	19.806	13.662	9.348	1.054	1.910	4.463
Austria	7.208	6.364	4.467	0.778	0.589	1.393
Finland	4.365	4.017	2.185	0.541	0.335	1.012
Sweden	3.174	2.353	0.823	0.299	0.329	-0.016
Czech Republic	5.615	5.615	2.110	0.711	0.711	-0.717
Estonia	24.153	24.153	16.342	2.110	2.110	4.591
Hungary	12.299	12.299	8.734	1.108	1.108	2.452
Latvia	31.692	31.692	18.016	3.839	3.839	5.209
Lithuania	28.082	28.082	17.352	3.191	3.191	3.825
Poland	5.930	5.930	8.670	-0.045	-0.045	0.518
Slovak Republic	0.302	0.302	1.315	-0.563	-0.563	-2.597
Slovenia	10.350	10.350	6.327	1.206	1.206	-0.141
Northern enlargement 1973	32.152	10.760	6.786	1.040	0.957	2.168
Southern enlargement 1981&1986	6.133	4.288	3.164	0.427	0.596	2.260
Southern enlargement 1986	19.078	15.099	10.541	0.776	1.949	4.409
Northern enlargement 1995	4.915	4.244	2.491	0.540	0.418	0.796
Eastern enlargement 1998 (anticipation)	14.803	14.803	9.858	1.445	1.445	1.642

For instance: for each treated country i the *Effect* after 10 years from the treatment year (t=0) is computed as follows: $\left[\left(\frac{\frac{\sum_{t=0}^{10} Actual_{it}}{11} - \frac{\sum_{t=0}^{10} Synthetic_{it}}{11}}{\frac{\sum_{t=0}^{10} Synthetic_{it}}{11}}\right) * 100\right]$.

Table 2.A Summary statistics of the per capita GDP effects after 10 years from the treatment using 1,000 alternative and randomly selected donor samples

	(1)	(2)	(3)	(4)	(5)	(6)
Country	% effect (our main estimation)	Median % effect across 1,000 random samples	Average % effect across 1,000 random samples	% of estimations with negative effects (out of 1,000 random samples)	% of estimations with positive effects (out of 1,000 random samples)	% effect using the best pre-treatment fit
Denmark	14.30	-4.41	-8.01	78.50	21.50	-3.07
United Kingdom	8.59	0.34	0.92	41.00	59.00	2.04
Ireland	9.39	1.96	1.01	44.30	55.70	4.24
Greece	-17.34	-11.82	-13.66	94.20	5.80	-16.28
Spain	13.66	14.40	13.69	0.10	99.90	13.70
Portugal	16.54	20.52	19.32	0.00	100.00	18.26
Austria	6.36	3.70	2.55	38.60	61.40	3.55
Finland	4.02	7.90	6.63	5.10	94.90	12.50
Sweden	2.35	2.46	-0.38	53.60	46.40	4.47
Czech Republic	5.62	-1.36	1.17	41.90	58.10	2.51
Estonia	24.15	29.97	30.56	0.10	99.90	21.42
Hungary	12.30	15.29	15.47	0.10	99.90	16.41
Latvia	31.69	31.49	30.87	0.00	100.00	26.26
Lithuania	28.08	24.98	27.02	0.00	100.00	28.08
Poland	5.93	7.56	8.09	7.50	92.50	2.43
Slovak Republic	0.30	7.30	6.64	3.70	96.30	0.30
Slovenia	10.35	12.41	12.59	5.30	94.70	16.06

Note: For each treated country i the *Effect* after 10 years from the treatment year (t=0) is: $\left[\left(\frac{\frac{\sum_{t=0}^{10} Actual_{it}}{11} - \frac{\sum_{t=0}^{10} Synthetic_{it}}{11}}{\frac{\sum_{t=0}^{10} Synthetic_{it}}{11}}\right) * 100\right]$.

Table 2.B Summary statistics of the per capita GDP effects after 10 years from the treatment using 1,000 alternative and randomly selected donor samples

	(1)	(2)	(3)	(4)	(5)	(6)
Country	% effect (our main estimation)	Median % effect across 1,000 random samples	Average % effect across 1,000 random samples	% of estimations with negative effects (out of 1,000 random samples)	% of estimations with positive effects (out of 1,000 random samples)	% effect using the best pre-treatment fit
Denmark	19.05	-4.54	-9.77	74.70	25.30	-2.62
United Kingdom	12.64	3.09	3.55	18.40	81.60	7.29
Ireland	11.51	-0.24	-2.14	58.10	41.90	2.65
Greece	-24.46	-15.45	-18.54	91.30	8.70	-25.90
Spain	18.57	17.29	15.86	0.70	99.30	17.48
Portugal	20.74	26.03	24.28	0.00	100.00	24.43
Austria	7.42	0.83	-1.10	58.10	41.90	4.93
Finland	3.13	11.46	10.07	8.10	91.90	19.99
Sweden	4.98	5.76	2.43	31.90	68.10	6.11
Czech Republic	13.51	0.87	6.18	36.00	64.00	5.50
Estonia	26.75	39.22	43.90	1.60	98.40	23.86
Hungary	14.89	12.30	13.61	12.10	87.90	15.78
Latvia	47.88	48.02	47.78	0.00	100.00	42.14
Lithuania	47.13	42.74	44.29	0.00	100.00	47.13
Poland	5.36	9.99	11.71	15.60	84.40	0.21
Slovak Republic	5.98	18.86	18.72	2.70	97.30	5.98
Slovenia	20.76	21.07	22.37	6.50	93.50	26.09

Note: For each treated country i the cumulative *Effect* after 10 years from the treatment year (t=0) is: $\left(\frac{Actual_{i,t=10} - Synthetic_{i,t=10}}{Synthetic_{i,t=10}}\right) * 100$.

Table 2.C Summary statistics of the per capita GDP effects for the whole post-treatment period using 1,000 alternative and randomly selected donor samples

	(1)	(2)	(3)	(4)	(5)	(6)
Country	% effect (our main estimation)	Median % effect across 1,000 random samples	Average % effect across 1,000 random samples	% of estimations with negative effects (out of 1,000 random samples)	% of estimations with positive effects (out of 1,000 random samples)	% effect using the best pre-treatment fit
Denmark	23.86	-14.39	-7.59	75.80	24.20	-4.42
United Kingdom	23.69	7.62	7.54	10.90	89.10	12.60
Ireland	48.90	15.87	19.31	10.30	89.70	30.72
Greece	-19.76	-14.47	-11.97	91.00	9.00	-18.24
Spain	19.81	18.47	19.73	0.00	100.00	21.46
Portugal	18.35	19.69	21.42	0.00	100.00	11.11
Austria	7.21	1.94	3.17	40.20	59.80	4.57
Finland	4.36	8.22	9.50	4.70	95.30	14.92
Sweden	3.17	0.94	3.49	42.30	57.70	4.55
Czech Republic	5.62	1.17	-1.36	41.90	58.10	2.51
Estonia	24.15	30.56	29.97	0.10	99.90	21.42
Hungary	12.30	15.47	15.29	0.10	99.90	16.41
Latvia	31.69	30.87	31.49	0.00	100.00	26.26
Lithuania	28.08	27.02	24.98	0.00	100.00	28.08
Poland	5.93	8.09	7.56	7.50	92.50	2.43
Slovak Republic	0.30	6.64	7.30	3.70	96.30	0.30
Slovenia	10.35	12.59	12.41	5.30	94.70	16.06

Note: For each treated country i the *Effect* from the treatment year (t=0) to 2008 is: $\left[\left(\frac{\frac{\sum_{t=0}^{2008} Actual_{it}}{(2008-T_0)+1} - \frac{\sum_{t=0}^{2008} Synthetic_{it}}{(2008-T_0)+1}}{\frac{\sum_{t=0}^{2008} Synthetic_{it}}{(2008-T_0)+1}}\right) * 100\right]$.

Table 3. Determinants of the growth dividends from EU membership

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Lag percentage gap	0.88652***	0.87666***	0.86106***	0.87993***	0.84658***	0.85974***
	(0.035)	(0.034)	(0.042)	(0.036)	(0.046)	(0.047)
Trade openness	0.16355***	0.14280***	0.15345***	0.14225***	0.15448***	0.13401***
	(0.031)	(0.026)	(0.028)	(0.027)	(0.029)	(0.032)
Financial integration	-0.00072	0.01238***	0.01210***	0.01236***	0.01246***	0.01153**
	(0.002)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
Financial integration (sq)		-0.00045***	-0.00037***	-0.00045***	-0.00037***	-0.00036***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Euro	0.01391*	0.01440*	0.01127	0.01389*	0.01321*	0.02557***
	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.010)
EPL			-0.00399		-0.00301	-0.07847***
			(0.007)		(0.007)	(0.025)
EPL (sq)						0.01633***
						(0.005)
ETCR			0.01353**		0.01465**	0.02218*
			(0.005)		(0.006)	(0.011)
ETCR (sq)						-0.00009
						(0.002)
Polity2				0.00292	-0.00729	-0.68723*
				(0.004)	(0.007)	(0.376)
Polity2 (sq)						0.03728*
						(0.021)
Political constraints				0.00728	-0.00715	-0.06330
				(0.027)	(0.034)	(0.256)
Political constraints (sq.)						0.04525
						(0.321)
Year of membership	0.00222***	0.00286***	0.00368***	0.00284***	0.00398***	0.00256**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	295	295	239	295	239	239
R-squared	0.986	0.987	0.991	0.987	0.991	0.992

NOTES: OLS estimation with robust standard errors in parentheses. Inference: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable (*Percentage gap*) is the percentage difference between the actual and the synthetic series of per capita GDP for each country and each year post treatment (i.e., after the country joined the EU). The covariates are: *Lag Percentage gap*: the (1-year) lag of the dependent variable; *Trade openness* is openness at 2005 constant prices from Penn World Tables. *Fin.Integr.*: an indicator of financial integration computed as the sum between total assets and total liabilities over GDP (source: Lane and Milesi-Ferretti, 2007); *Euro*: a dummy variable that takes value 1 if the country has joined the Euro area, the value 0 otherwise; *EPL*: an indicator of employment protection legislation (source: OECD; missing values were interpolated using data from Allard, 2005); *ETCR*: an indicator of regulation in non-manufacturing sectors (source: OECD; missing values for 1973, 1974 and 2008); *Polity2* from the Polity IV project is a measure of a country's political regime; *Political constraints* is a measure for "the feasibility of policy change (the extent to which a change in the preferences of any one actor may lead to a change in government policy)" (POLCON_2005 codebook); *Year of membership* is a count variable that indicates the years the country has been member of EU. In each model we introduce country and year fixed effects. Note that the number of observations change because both EPL and ETCR are *missing* for non-OECD countries or because we do not have information for some countries.

ON-LINE APPENDIX

Not For Publication

Unit weights, predictor balance

Notes on Tables A.1 to A.2

Tables A.1 to A.2 complement Figures 1 and 3 in the text. For each country we report i) the codes of the donor countries (*Co_No*) and their computed weight (*Unit_Weight*); ii) the predictor balance (i.e. for each predictor used for the construction of the counterfactual, we report the pre-treatment average of the *treated* country and the pre-treatment average of the *synthetic* region).

The predictors used are: the pre-treatment (year by year) GDP per capita (PPP Converted at 2005 constant prices, *rgdpch*), the pre-treatment average of the investment share of per capita GDP (PPP Converted at 2005 constant prices, *ki*) and population growth (*popgr*), all from Penn World Tables 7.0; share of agriculture in value added (*agr*), share of industry in value added (*ind*), secondary gross school enrollment (percentage; *sec*), tertiary gross school enrollment (*ter*), all from the World Bank's World Development Indicators. Note that for some countries some variables are not used because of missing data.

Table A.1: Unit weights and predictor balance – Real GDP per capita in the Northern and Southern enlargements

Denmark

Co_No	Unit_Weight		Treated	Synthetic
ARG	0	rgdpch	14128.42	13715.86
BRA	0	ki	18.5992	19.34605
CHL	0	popgr	.0069574	.0175966
CHN	0	agr	6.466325	11.31778
COL	0	ind	32.06628	36.44318
EGY	0	ter	20.46352	19.17851
JPN	.152	sec	93.00705	79.04821
KOR	0			
MEX	0			
NZL	.848			
PHL	0			
THA	0			
TUR	0			

United Kingdom

Co_No	Unit_Weight		Treated	Synthetic
ARG	.075	rgdpch	13913.92	13957.56
BRA	0	ki	14.05553	18.59248
CHL	0	popgr	.0055475	.0186561
CHN	0	ind	41.54506	36.1229
COL	0	ter	14.88007	18.97952
EGY	0	sec	75.38967	75.17975
JPN	0			
KOR	0			
MEX	0			
NZL	.925			
PHL	0			
THA	0			
TUR	0			

Ireland

Co_No	Unit_Weight		Treated	Synthetic
ARG	.644	rgdpch	8184.698	8188.563
BRA	0	ki	18.71273	22.50874
CHL	0	popgr	.0016572	.0151851
CHN	0	agr	16.31194	9.384988
COL	0	ind	33.95729	44.41534
EGY	0	ter	11.62031	16.37865
JPN	.23	sec	74.38157	59.25307
KOR	0			
MEX	0			
NZL	.126			
PHL	0			
THA	0			
TUR	0			

Greece

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpch	15438.97	15445.26
ARG	0	ki	30.68624	26.87622
AUS	0	popgr	.00864	.0181887
BRA	0	ter	15.91807	26.01254
CAN	.252	sec	74.83133	75.14615
CHE	0			
CHL	0			
CHN	0			
COL	0			
EGY	0			
HKG	.221			
IDN	0			
ISL	0			
ISR	.188			
JPN	.274			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	.065			
URY	0			

Spain

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpch	14801.19	14780.81
ARG	0	ki	22.62071	19.86132
AUS	0	popgr	.0086683	.0163446
BRA	.373	agr	8.557283	9.15769
CAN	.268	ind	37.63268	37.68521
CHL	0	ter	19.69726	25.4617
CHN	0	sec	76.32417	69.50057
COL	0			
EGY	0			
IDN	0			
ISL	0			
JPN	0			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	.358			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Portugal

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpch	9851.037	9839.439
ARG	0	ki	23.66904	22.8606
AUS	0	popgr	.0053315	.0183125
BRA	.142	agr	21.99968	13.75143
CAN	0	ind	30.77487	37.72525
CHL	.237	ter	10.57806	17.55639
CHN	0	sec	49.59153	66.35256
COL	0			
EGY	0			
IDN	0			
ISL	.19			
JPN	.066			
KOR	0			
MAR	0			
MEX	.008			
MYS	.001			
NZL	.116			
PHL	.239			
THA	0			
TUN	0			
TUR	0			
URY	0			

Austria

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpch	25563.83	25551.33
ARG	.052	ki	22.20473	26.66651
AUS	.123	popgr	.004114	.0075227
BRA	0	agr	3.673481	3.230476
CAN	0	ind	33.66779	35.16515
CHE	.253	ter	28.9203	29.54835
CHL	0	sec	98.79195	98.41011
CHN	0			
COL	0			
EGY	0			
IDN	0			
ISL	0			
JPN	.513			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	.059			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Finland

Co_No	Unit_Weight		Treated	Synthetic
ALB	.231	rgdpch	21584.77	21599.32
ARG	0	ki	24.05991	25.55782
AUS	0	popgr	.0043612	.0110536
BRA	0	agr	7.022083	14.56591
CAN	.209	ind	33.98596	34.68863
CHE	.14	ter	40.84694	33.28412
CHL	0	sec	108.2998	91.49715
CHN	0			
COL	0			
EGY	0			
IDN	0			
ISL	.42			
JPN	0			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Sweden

Co_No	Unit_Weight		Treated	Synthetic
ALB	.047	rgdpch	24649.82	24639.28
ARG	0	ki	17.55956	23.51533
AUS	0	popgr	.0042008	.0115728
BRA	0	agr	4.035902	8.297258
CAN	.268	ind	30.62535	32.90153
CHE	.315	ter	32.59351	39.22676
CHL	0	sec	93.11866	91.62445
CHN	0			
COL	0			
EGY	.095			
IDN	0			
ISL	.273			
JPN	.002			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Table A.2: Unit weights and predictor balance –Real GDP per capita in the Eastern enlargement (1998 anticipation)

Czech Republic

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	.122	MKD	0	rgdpch	15261.36	15245.73
ARG	0	MYS	0	ki	22.16795	39.41265
AUS	0	NZL	0	agr	4.379421	10.73313
CAN	0	PHL	0	ind	39.11301	36.93623
CHE	0	RUS	0	popgr	-.0002905	.0082671
CHL	0	THA	.218	ter	20.00378	36.85858
CHN	0	TUN	0	sec	91.85799	84.45196
COL	0	TUR	0			
HRV	0	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	.227					
KOR	.432					
MAR	0					
MEX	0					

Estonia

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpch	7783.545	7774.22
ARG	0	MYS	0	ki	21.63741	20.45693
AUS	0	NZL	0	agr	5.447488	10.8869
CAN	0	PHL	0	ind	30.93909	32.53939
CHE	0	RUS	0	popgr	-.0155585	.0028441
CHL	0	THA	0	ter	31.60026	24.30222
CHN	0	TUN	0	sec	97.77231	75.53982
COL	.067	TUR	.181			
HRV	.751	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	0					
MAR	0					
MEX	0					

Hungary

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	.007	MKD	.016	rgdpch	11035.94	11031.31
ARG	.013	MYS	.006	ki	17.06667	21.21435
AUS	.003	NZL	.009	agr	7.661829	10.11796
CAN	.209	PHL	.087	ind	29.88529	33.89415
CHE	0	RUS	.015	popgr	-.0020179	.011994
CHL	.005	THA	.011	ter	21.69764	37.94748
CHN	.011	TUN	.008	sec	90.97069	77.22188
COL	.129	TUR	.004			
HRV	.005	UKR	.168			
IDN	.011	URY	.013			
ISL	.001					
JPN	.002					
KOR	.004					
MAR	.013					
MEX	.25					

Latvia

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpch	6377.258	6368.917
ARG	0	MYS	0	ki	12.20334	22.6986
AUS	0	NZL	0	agr	8.570762	12.13391
CAN	0	PHL	0	ind	30.94961	32.57686
CHE	0	RUS	0	popgr	-.0141436	.0124907
CHL	0	THA	0	ter	26.20963	18.36713
CHN	0	TUN	0	sec	88.03888	62.15458
COL	.301	TUR	.1			
HRV	.271	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	0					
MAR	.173					
MEX	.154					

Lithuania

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpch	7586.694	7580.469
ARG	0	MYS	0	ki	10.7057	19.09069
AUS	0	NZL	0	agr	11.93879	14.79921
CAN	0	PHL	0	ind	33.79772	33.79529
CHE	0	RUS	.149	popgr	-.001948	.013848
CHL	0	THA	0	ter	27.86827	24.68696
CHN	0	TUN	0	sec	85.83955	65.48563
COL	0	TUR	.804			
HRV	0	UKR	.046			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	0					
MAR	0					
MEX	0					

Poland

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	.003	MKD	.005	rgdpch	8928.349	8932.186
ARG	.01	MYS	.176	ki	15.95067	26.73821
AUS	.007	NZL	.006	agr	7.705172	10.16112
CAN	.006	PHL	.002	ind	35.08608	34.60948
CHE	.005	RUS	.004	popgr	.0014776	.0068009
CHL	.013	THA	.005	ter	31.51719	24.74599
CHN	.003	TUN	.006	sec	95.1625	75.88725
COL	.078	TUR	.006			
HRV	.545	UKR	.003			
IDN	.005	URY	.033			
ISL	.008					
JPN	.005					
KOR	.052					
MAR	.003					
MEX	.01					

Slovak Republic

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpch	10898.34	10913.11
ARG	0	MYS	0	ki	21.37569	29.76794
AUS	0	NZL	0	agr	5.898311	8.169727
CAN	0	PHL	0	ind	36.99884	36.02151
CHE	0	RUS	0	popgr	.0030041	.001949
CHL	0	THA	0	ter	18.68862	35.51481
CHN	0	TUN	0	sec	89.35838	88.13896
COL	0	TUR	0			
HRV	.624	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	.376					
MAR	0					
MEX	0					

Slovenia

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpch	15292.52	15291.48
ARG	0	MYS	0	ki	23.12446	32.18352
AUS	0	NZL	0	agr	4.509592	6.889536
CAN	.209	PHL	0	ind	36.90792	37.06688
CHE	0	RUS	0	popgr	.001238	.012122
CHL	.245	THA	.001	ter	31.49545	49.93082
CHN	0	TUN	0	sec	89.73037	91.77994
COL	.111	TUR	0			
HRV	0	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	.434					
MAR	0					
MEX	0					

Labor productivity: Synthetic counterfactual, unit weights, and predictor balance

Notes on Figures A.1, A.2, and A.3 and Tables A.3 and A.4
Figures A.1, A.2 and A.3 report the synthetic counterfactual using as outcome variable the real GDP per worker (PPP Converted at 2005 constant prices) from Penn World Tables 7.0.
In Tables A.3 and A.4, for each country we report i) the codes of the donor countries (*Co_No*) and their computed weight (*Unit_Weight*); ii) the predictor balance (i.e. for each predictor used for the construction of the counterfactual, we report the pre-treatment average of the *treated* country and the pre-treatment average of the *synthetic* region).
The predictors used are: the pre-treatment (year by year) GDP per worker (PPP Converted at 2005 constant prices, *rgdpwok*), the pre-treatment average of the investment share of per capita GDP (PPP Converted at 2005 constant prices, *ki*) and population growth (*popgr*), all from Penn World Tables 7.0; share of agriculture in value added (*agr*), share of industry in value added (*ind*), secondary gross school enrollment (percentage; *sec*), tertiary gross school enrollment (*ter*), all from the World Bank's World Development Indicators. Note that for some countries some variables are not used because of missing data.

Figure A.1: Labor productivity in the Northern and Southern enlargement

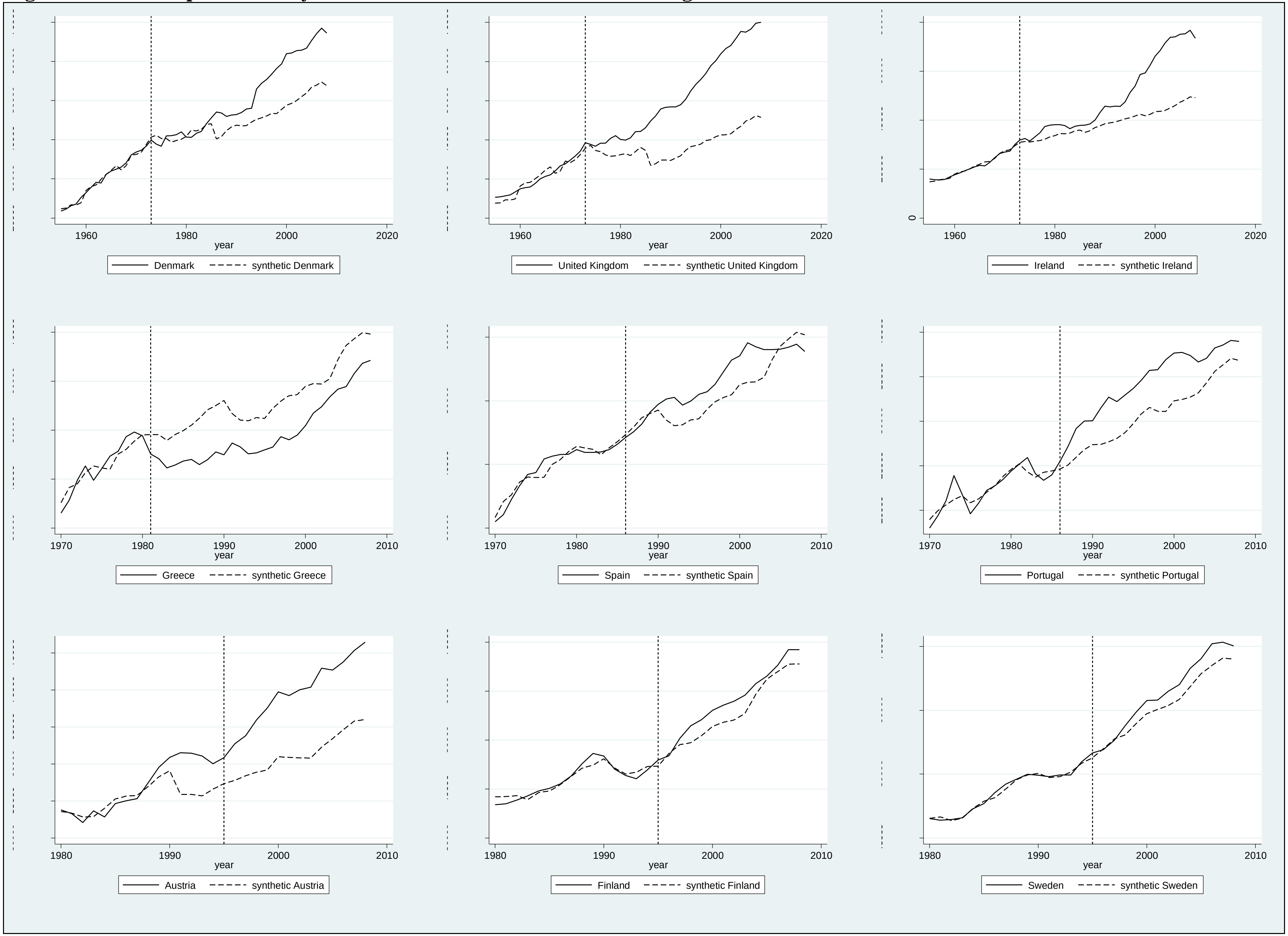


Table A.3: Unit weights and predictor balance – Labor productivity in the Northern and Southern enlargements

Denmark

Co_No	Unit_Weight		Treated	Synthetic
ARG	0	rgdpwok	30005.19	29958.43
BRA	0	ki	18.5992	20.88045
CHL	0	popgr	.0069574	.0173858
CHN	0	agr	6.466325	9.848524
COL	0	ind	32.06628	37.26454
EGY	0	ter	20.46352	17.5887
JPN	.337	sec	93.00705	75.02637
KOR	0			
MEX	.104			
NZL	.559			
PHL	0			
THA	0			
TUR	0			

United Kingdom

Co_No	Unit_Weight		Treated	Synthetic
ARG	.28	rgdpwok	29986.85	29877.12
BRA	0	ki	14.05553	20.25511
CHL	0	popgr	.0055475	.0171049
CHN	0	ind	41.54506	39.39063
COL	0	ter	14.88007	18.01397
EGY	0	sec	75.38967	69.79232
JPN	.119			
KOR	0			
MEX	0			
NZL	.601			
PHL	0			
THA	0			
TUR	0			

Ireland

Co_No	Unit_Weight		Treated	Synthetic
ARG	.168	rgdpwok	20962.44	2153.21
BRA	0	ki	18.71273	21.58469
CHL	0	popgr	.0016572	.0172691
CHN	0	agr	16.31194	11.78385
COL	.044	ind	33.95729	38.29303
EGY	0	ter	11.62031	15.38267
JPN	.391	sec	74.38157	65.97542
KOR	.105			
MEX	.071			
NZL	.221			
PHL	0			
THA	0			
TUR	0			

Greece

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpwok	42784.13	42607.48
ARG	0	ki	30.68624	31.10311
AUS	0	popgr	.00864	.0099159
BRA	0	ter	15.91807	17.97886
CAN	0	sec	74.83133	86.55425
CHE	.124			
CHL	0			
CHN	0			
COL	0			
EGY	0			
HKG	0			
IDN	0			
ISL	.522			
ISR	0			
JPN	.353			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Spain

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpwok	39388.36	39401.23
ARG	0	ki	22.62071	26.70512
AUS	0	popgr	.0086683	.0131326
BRA	.17	agr	8.557283	7.886132
CAN	.196	ind	37.63268	38.18269
CHL	0	ter	19.69726	24.83127
CHN	0	sec	76.32417	81.45984
COL	0			
EGY	0			
IDN	0			
ISL	.316			
JPN	.318			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	.001			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Portugal

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpwok	22494.05	22474.43
ARG	0	ki	23.66904	23.75019
AUS	0	popgr	.0053315	.017672
BRA	.125	agr	21.99968	10.94082
CAN	0	ind	30.77487	38.30749
CHL	.335	ter	10.57806	15.50493
CHN	0	sec	49.59153	64.14865
COL	0			
EGY	0			
IDN	0			
ISL	.053			
JPN	.216			
KOR	0			
MAR	0			
MEX	.046			
MYS	.126			
NZL	.044			
PHL	.054			
THA	0			
TUN	0			
TUR	0			
URY	0			

Austria

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpwok	56832.47	55443.56
ARG	0	ki	22.20473	27.7675
AUS	0	popgr	.004114	.006737
BRA	0	agr	3.673481	2.219902
CAN	0	ind	33.66779	33.68628
CHE	.659	ter	28.9203	25.49545
CHL	0	sec	98.79195	95.78221
CHN	0			
COL	0			
EGY	0			
IDN	0			
ISL	0			
JPN	.341			
KOR	0			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Finland

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpwok	41699.93	41755.06
ARG	0	ki	24.05991	29.30964
AUS	0	popgr	.0043612	.0106858
BRA	0	agr	7.022083	10.67676
CAN	0	ind	33.98596	36.05689
CHE	0	ter	40.84694	27.06009
CHL	0	sec	108.2998	92.9372
CHN	0			
COL	0			
EGY	0			
IDN	0			
ISL	.58			
JPN	.098			
KOR	.323			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Sweden

Co_No	Unit_Weight		Treated	Synthetic
ALB	0	rgdpwok	47167.41	47110.41
ARG	0	ki	17.55956	24.50249
AUS	.219	popgr	.0042008	.0110923
BRA	0	agr	4.035902	5.79541
CAN	.303	ind	30.62535	34.97968
CHE	0	ter	32.59351	47.85545
CHL	0	sec	93.11866	103.366
CHN	0			
COL	0			
EGY	0			
IDN	0			
ISL	.147			
JPN	.199			
KOR	.131			
MAR	0			
MEX	0			
MYS	0			
NZL	0			
PHL	0			
THA	0			
TUN	0			
TUR	0			
URY	0			

Figure A.2: Labor productivity in the Eastern enlargement

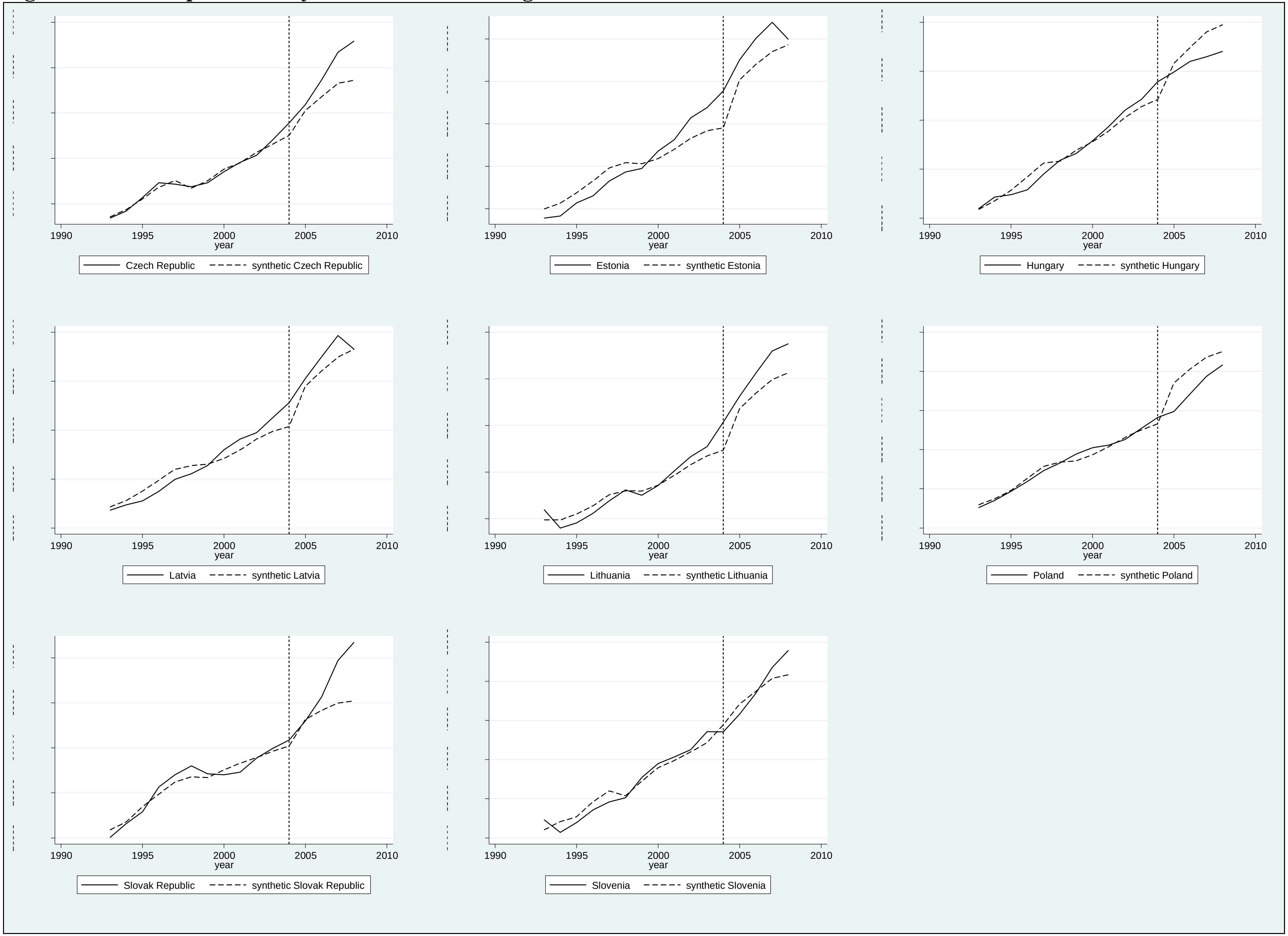


Figure A.3: Anticipation effects in labor productivity in the Eastern enlargement

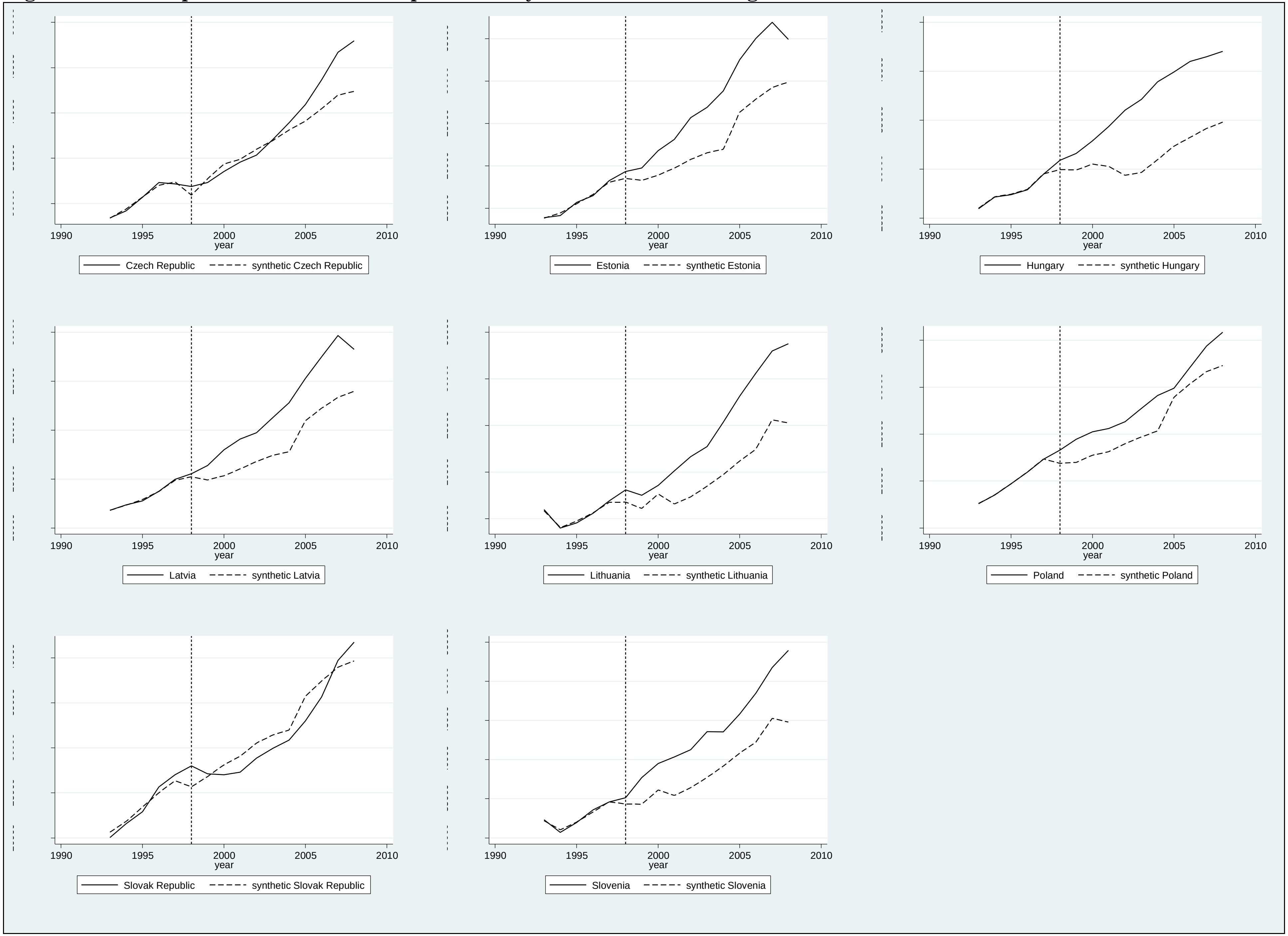


Table A.4: Unit weights and predictor balance – Labor productivity in the Eastern enlargement (1998 anticipation)

Czech Republic

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	.272	MKD	0	rgdpwok	30558.09	30585.27
ARG	0	MYS	0	ki	22.16795	33.44191
AUS	0	NZL	0	agr	4.379421	16.20451
CAN	0	PHL	0	ind	39.11301	33.83641
CHE	0	RUS	0	popgr	-.0002905	.0081393
CHL	.079	THA	0	ter	20.00378	35.60215
CHN	0	TUN	0	sec	91.85799	88.71507
COL	0	TUR	0			
HRV	0	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	.229					
KOR	.421					
MAR	0					
MEX	0					

Estonia

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpwok	15708.13	15711.97
ARG	0	MYS	0	ki	21.63741	24.14885
AUS	0	NZL	0	agr	5.447488	11.26522
CAN	0	PHL	0	ind	30.93909	35.07494
CHE	0	RUS	0	popgr	-.0155585	.0028613
CHL	.066	THA	0	ter	31.60026	22.17182
CHN	.148	TUN	0	sec	97.77231	74.32336
COL	.083	TUR	.015			
HRV	.688	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	0					
MAR	0					
MEX	0					

Hungary

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpwok	27574.6	27615.1
ARG	0	MYS	0	ki	17.06667	21.53174
AUS	0	NZL	0	agr	7.661829	8.681773
CAN	.236	PHL	0	ind	29.88529	30.52076
CHE	0	RUS	0	popgr	-.0020179	.0110238
CHL	0	THA	0	ter	21.69764	41.15283
CHN	0	TUN	0	sec	90.97069	83.66887
COL	.295	TUR	0			
HRV	0	UKR	0			
IDN	0	URY	.393			
ISL	.027					
JPN	0					
KOR	.05					
MAR	0					
MEX	0					

Latvia

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpwok	13127.59	13131.66
ARG	0	MYS	0	ki	12.20334	25.81074
AUS	0	NZL	0	agr	8.570762	13.23515
CAN	0	PHL	0	ind	30.94961	34.859
CHE	0	RUS	0	popgr	-.0141436	.006848
CHL	0	THA	0	ter	26.20963	18.35985
CHN	.155	TUN	0	sec	88.03888	64.82799
COL	.157	TUR	.005			
HRV	.489	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	0					
MAR	.194					
MEX	0					

Lithuania

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpwok	15402.28	15406.01
ARG	0	MYS	0	ki	10.7057	25.18903
AUS	0	NZL	0	agr	11.93879	17.11018
CAN	0	PHL	0	ind	33.79772	36.53243
CHE	0	RUS	0	popgr	-.001948	.0153339
CHL	0	THA	0	ter	27.86827	15.76316
CHN	.286	TUN	0	sec	85.83955	57.38386
COL	0	TUR	.705			
HRV	0	UKR	.009			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	0					
MAR	0					
MEX	0					

Poland

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	.003	MKD	.004	rgdpwok	19815.68	19829.04
ARG	.007	MYS	.272	ki	15.95067	28.07786
AUS	.005	NZL	.005	agr	7.705172	10.5396
CAN	.006	PHL	.003	ind	35.08608	35.24841
CHE	.004	RUS	.003	popgr	.0014776	.0081809
CHL	.006	THA	.006	ter	31.51719	22.48028
CHN	0	TUN	.004	sec	95.1625	73.31941
COL	.06	TUR	.003			
HRV	.544	UKR	.002			
IDN	.004	URY	.026			
ISL	.005					
JPN	.003					
KOR	.018					
MAR	.004					
MEX	.004					

Slovak Republic

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpwok	23441.75	23456.3
ARG	0	MYS	0	ki	21.37569	29.08896
AUS	0	NZL	0	agr	5.898311	8.144991
CAN	0	PHL	0	ind	36.99884	36.1896
CHE	0	RUS	0	popgr	.0030041	.0035192
CHL	.123	THA	0	ter	18.68862	34.71839
CHN	0	TUN	0	sec	89.35838	86.90541
COL	0	TUR	0			
HRV	.547	UKR	0			
IDN	0	URY	0			
ISL	0					
JPN	0					
KOR	.33					
MAR	0					
MEX	0					

Slovenia

Co_No	Unit_W	Co_No	Unit_W		Treated	Synthetic
ALB	0	MKD	0	rgdpwok	32639.39	32634.2
ARG	0	MYS	0	ki	23.12446	23.4991
AUS	.124	NZL	0	agr	4.509592	11.1224
CAN	0	PHL	0	ind	36.90792	32.81937
CHE	0	RUS	0	popgr	.001238	.0133657
CHL	0	THA	0	ter	31.49545	32.70706
CHN	0	TUN	0	sec	89.73037	80.74009
COL	0	TUR	.605			
HRV	0	UKR	0			
IDN	0	URY	0			
ISL	.004					
JPN	.175					
KOR	.092					
MAR	0					
MEX	0					

Difference between actual and synthetic series

Table A.5: Difference-in-differences estimates of EU membership

	Real GDP per capita		Labor productivity	
	DID estimate and std error	R-square and Number of obs	DID estimate and std error	R-square and Number of obs
Denmark	4810.919	0.646	5675.021	0.625
	1393.184***	108	2530.716**	108
United Kingdom	4822.042	0.572	12549.3	0.622
	1245.701***	108	2301.925***	108
Ireland	6960.705	0.483	11110.04	0.601
	1680.262***	108	3146.443***	108
Greece	-4973.705	0.557	-7109.328	0.451
	1294.363***	78	2697.609**	78
Portugal	2636.639	0.700	3565.105	0.723
	842.104***	78	1356.720**	78
Spain	3825.030	0.656	2074.394	0.676
	1052.929***	78	1963.093	78
Austria	2271.567	0.709	6780.129	0.731
	1296.521*	58	1806.187***	58
Sweden	962.307	0.625	1720.407	0.733
	1409.562	58	2438.039	58
Finland	1224.518	0.610	2411.818	0.667
	1515.423	58	2922.211	58
Czech Republic	1016.033	0.433	1386.160	0.430
	1211.366	32	2333.453	32
Hungary	1655.230	0.611	5594.308	0.684
	744.837**	32	1583.882***	32
Poland	721.775	0.536	2462.964	0.539
	960.806	32	2102.260	32
Estonia	2671.465	0.509	4712.617	0.546
	1378.483*	32	2620.998*	32
Latvia	2626.301	0.518	3597.256	0.535
	1014.959**	32	1989.464*	32
Lithuania	2559.155	0.485	4765.042	0.469
	987.010**	32	2237.021**	32
Slovak Republic	61.484	0.475	-552.678	0.473
	1407.638	32	2706.944	32
Slovenia	2045.426	0.574	4950.848	0.555
	1418.580	32	2344.542**	32
Northern enlargement	5531.222	0.474	9778.12	0.569
1973	1056.741***	324	1759.902***	324
Southern enlargement	123.6832	0.386	-915.9599	0.247
1981&1986	1018.358	234	2758.41	234
Southern enlargement	3230.834	0.467	2819.75	0.245
1986	1089.213***	156	3205.809	156
Northern enlargement	1486.131	0.552	3637.451	0.490
1995	966.6537	174	2056.951*	174
Eastern enlargement	1669.609	0.186	3364.564	0.189
(1998-anticipation effect)	992.2974*	256	2043.261*	256

NOTES: These results assess the statistical significance of the differences between the average difference pre-treatment (between actual and synthetic) and the average difference post-treatment (between country and synthetic) estimated by the synthetic counterfactuals in Figures 1, 3 (and A.1 and A.3 in Appendix). Robust standard errors are reported. Inference: *** p<0.01; ** p<0.05; * p<0.1

Alternative donor samples

Table A.6.a Summary statistics of the productivity effects after 10 years from the treatment using 1,000 alternative and randomly selected donor samples

	(1)	(2)	(3)	(4)	(5)	(6)
Country	% effect (our main estimation)	Median % effect across 1,000 random samples	Average % effect across 1,000 random samples	% of estimations with negative effects (out of 1,000 random samples)	% of estimations with positive effects (out of 1,000 random samples)	% effect using the best pre-treatment fit
Denmark	-0.56	-1.41	-2.87	83.40	16.60	-2.94
United Kingdom	8.54	6.60	6.76	6.60	93.40	9.09
Ireland	8.55	12.17	9.91	0.00	100.00	13.51
Greece	-14.14	-6.03	-8.91	74.60	25.40	-10.94
Spain	3.72	8.49	5.99	7.20	92.80	3.62
Portugal	12.32	23.54	23.26	0.00	100.00	17.07
Austria	12.90	3.91	0.49	47.20	52.80	2.88
Finland	4.47	12.65	11.61	0.00	100.00	11.76
Sweden	2.62	6.48	4.47	5.10	94.90	2.69
Czech Republic	3.66	3.78	3.91	22.10	77.90	2.64
Estonia	20.46	33.98	36.37	0.00	100.00	20.13
Hungary	17.70	15.68	16.14	1.30	98.70	19.57
Latvia	19.37	29.26	28.33	0.00	100.00	17.72
Lithuania	24.11	27.32	26.82	0.00	100.00	26.03
Poland	9.39	13.48	12.21	5.10	94.90	11.73
Slovak Republic	-1.76	7.53	7.21	22.30	77.70	-1.76
Slovenia	12.78	14.18	13.60	0.00	100.00	13.97

Note: For each treated country i the *Effect* after 10 years from the treatment year (t=0) is: $\left[\left(\frac{\frac{\sum_{t=0}^{10} Actual_{it}}{11}-\frac{\sum_{t=0}^{10} Synthetic_{it}}{11}}{\frac{\sum_{t=0}^{10} Synthetic_{it}}{11}}\right)*100\right]$

Table A.6.b Summary statistics of the productivity effects after 10 years from the treatment using 1,000 alternative and randomly selected donor samples

	(1)	(2)	(3)	(4)	(5)	(6)
Country	% effect (our main estimation)	Median % effect across 1,000 random samples	Average % effect across 1,000 random samples	% of estimations with negative effects (out of 1,000 random samples)	% of estimations with positive effects (out of 1,000 random samples)	% effect using the best pre-treatment fit
Denmark	-1.34	-0.69	-4.08	80.80	19.20	-4.33
United Kingdom	13.74	13.80	12.96	2.10	97.90	21.26
Ireland	5.30	12.80	7.91	1.10	98.90	15.30
Greece	-11.28	3.42	-4.59	56.90	43.10	-11.13
Spain	5.66	9.06	5.06	18.90	81.10	4.14
Portugal	12.27	32.17	32.31	0.00	100.00	23.01
Austria	14.61	0.84	-1.91	59.90	40.10	2.43
Finland	1.01	15.72	14.37	2.30	97.70	12.88
Sweden	3.59	8.07	6.09	6.30	93.70	3.16
Czech Republic	13.12	12.57	14.56	17.00	83.00	11.58
Estonia	16.81	40.75	46.12	0.00	100.00	16.61
Hungary	20.76	15.58	16.82	5.00	95.00	20.81
Latvia	17.87	35.56	36.79	0.10	99.90	14.96
Lithuania	33.66	43.72	42.54	0.00	100.00	38.09
Poland	10.95	20.55	20.25	6.70	93.30	14.37
Slovak Republic	5.22	22.77	26.84	1.40	98.60	5.22
Slovenia	20.47	24.80	22.68	0.00	100.00	23.55

Note: For each treated country i the *Effect* after 10 years from the treatment year (t=0) is: $\left(\frac{Actual_{i,t=10} - Synthetic_{i,t=10}}{Synthetic_{i,t=10}}\right) * 100$.

Table A.6: Countries acronyms and abbreviations

Country	*Co_No*	*Country*	*Co_No*	*Country*	*Co_No*	*Country*	*Co_No*	*Country*	*Co_No*
Afghanistan	AFG	Comoros	COM	Iceland	ISL	Moldova	MDA	Solomon Islands	SLB
Albania	ALB	Congo, Dem. Rep.	ZAR	India	IND	Mongolia	MNG	Somalia	SOM
Algeria	DZA	Congo, Republic of	COG	Indonesia	IDN	Montenegro	MNE	South Africa	ZAF
Angola	AGO	Costa Rica	CRI	Iran	IRN	Morocco	MAR	Spain	ESP
Antigua and Barbuda	ATG	Cote d`Ivoire	CIV	Iraq	IRQ	Mozambique	MOZ	Sri Lanka	LKA
Argentina	ARG	Croatia	HRV	Ireland	IRL	Namibia	NAM	St. Kitts & Nevis	KNA
Armenia	ARM	Cuba	CUB	Israel	ISR	Nepal	NPL	St. Lucia	LCA
Australia	AUS	Cyprus	CYP	Italy	ITA	Netherlands	NLD	St.Vincent & Grenadines	VCT
Austria	AUT	Czech Republic	CZE	Jamaica	JAM	New Zealand	NZL	Sudan	SDN
Azerbaijan	AZE	Denmark	DNK	Japan	JPN	Nicaragua	NIC	Suriname	SUR
Bahamas	BHS	Djibouti	DJI	Jordan	JOR	Niger	NER	Swaziland	SWZ
Bahrain	BHR	Dominica	DMA	Kazakhstan	KAZ	Nigeria	NGA	Sweden	SWE
Bangladesh	BGD	Dominican Republic	DOM	Kenya	KEN	Norway	NOR	Switzerland	CHE
Barbados	BRB	Ecuador	ECU	Kiribati	KIR	Oman	OMN	Syria	SYR
Belarus	BLR	Egypt	EGY	Korea, Republic of	KOR	Pakistan	PAK	Taiwan	TWN
Belgium	BEL	El Salvador	SLV	Kuwait	KWT	Palau	PLW	Tajikistan	TJK
Belize	BLZ	Equatorial Guinea	GNQ	Kyrgyzstan	KGZ	Panama	PAN	Tanzania	TZA
Benin	BEN	Eritrea	ERI	Laos	LAO	Papua New Guinea	PNG	Thailand	THA
Bermuda	BMU	Estonia	EST	Latvia	LVA	Paraguay	PRY	Timor-Leste	TLS
Bhutan	BTN	Ethiopia	ETH	Lebanon	LBN	Peru	PER	Togo	TGO
Bolivia	BOL	Fiji	FJI	Lesotho	LSO	Philippines	PHL	Tonga	TON
Bosnia and Herzegovina	BIH	Finland	FIN	Liberia	LBR	Poland	POL	Trinidad &Tobago	TTO
Botswana	BWA	France	FRA	Libya	LBY	Portugal	PRT	Tunisia	TUN
Brazil	BRA	Gabon	GAB	Lithuania	LTU	Puerto Rico	PRI	Turkey	TUR
Brunei	BRN	Gambia, The	GMB	Luxembourg	LUX	Qatar	QAT	Turkmenistan	TKM
Bulgaria	BGR	Georgia	GEO	Macao	MAC	Romania	ROM	Uganda	UGA
Burkina Faso	BFA	Germany	GER	Macedonia	MKD	Russia	RUS	Ukraine	UKR
Burundi	BDI	Ghana	GHA	Madagascar	MDG	Rwanda	RWA	United Arab Emirates	ARE
Cambodia	KHM	Greece	GRC	Malawi	MWI	Samoa	WSM	United Kingdom	GBR
Cameroon	CMR	Grenada	GRD	Malaysia	MYS	Sao Tome and Principe	STP	United States	USA
Canada	CAN	Guatemala	GTM	Maldives	MDV	Saudi Arabia	SAU	Uruguay	URY
Cape Verde	CPV	Guinea	GIN	Mali	MLI	Senegal	SEN	Uzbekistan	UZB
Central African Republic	CAF	Guinea-Bissau	GNB	Malta	MLT	Serbia	SRB	Vanuatu	VUT
Chad	TCD	Guyana	GUY	Marshall Islands	MHL	Seychelles	SYC	Venezuela	VEN
Chile	CHL	Haiti	HTI	Mauritania	MRT	Sierra Leone	SLE	Vietnam	VNM
China Version 1	CHN	Honduras	HND	Mauritius	MUS	Singapore	SGP	Yemen	YEM
China Version 2	CH2	Hong Kong	HKG	Mexico	MEX	Slovak Republic	SVK	Zambia	ZMB
Colombia	COL	Hungary	HUN	Micronesia, Fed. Sts.	FSM	Slovenia	SVN	Zimbabwe	ZWE