Join to prosper?

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Abstract: We ask whether EU membership has been associated with increased domestic economic growth. Using different causal identification strategies, different time periods, different country samples, and different datasets, we are unable to demonstrate the presence of a membership growth premium. This may reflect that GDP data are too noisy and/or causal identification too complicated, in which case we should remain agnostic about the EU's growth impact. Alternatively, it may reflect that EU membership simply has no effect on prosperity.

JEL classification codes: F43, F45, O4, P2

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I. Introduction

In his 2005 magnum opus, the distinguished historian Tony Judt (2005, p. 32) concluded that "taken all in all, the EU is a good thing."[1] In 2013, the equally distinguished historian Niall Ferguson called the European Union (EU) an "ignominious failure".[2] Others would object that reaching a verdict on the EU is a fool's errand: the historically unprecedented EU project is simply too complex and seeks to deliver on too long a list of outcomes. Nevertheless, a principled assessment of the European experiment in terms of well-defined outcomes is *a priori* reasonable. It also resonates with the wide-ranging agenda of evidence-based policy making, which is marked by a shift in focus from inputs or procedures (e.g., how the EU does things) to an evaluation of outputs or outcomes (e.g., what the EU delivers).[3] So how should we evaluate the accomplishments of the EU? Staab (2013, p. 4) notes that the EU "has, to date, been a highly successful attempt at integration." But integration is only a means to an end (it is an example of how the EU does things), so integration *per se* is of limited independent interest.[4] As Tony Giddens (2014, p. 5) notes, the EU is a functionalist enterprise, driven by results. We need instead to identify what the EU promises to deliver in terms of measurable outcomes.

The great European postwar statesmen, including the EU founding fathers, clearly saw the European project as a way of taming the passions by serving the interests; an age-old argument in favor of capitalism and market exchange (Hirschman 1977). That is, they envisaged the establishment of a common political and economic entity as a guarantor of both international peace and domestic economic progress. In his famous Zürich speech of 19 September 1946, Winston Churchill argued that "the sovereign remedy" to the plight of postwar Europe was "to recreate the European family, or as much of it as we can, and to provide it with a structure under which it can dwell in peace, in safety, and in freedom. We must build a kind of United States of Europe."[5] Four years later, on 9 May 1950, the epochal Schuman Declaration in turn stated that the pooling of coal and steel production had the double economic and political aim of "contributing to raising living standards and to promoting peaceful achievements." Creating such a "fusion of economic interests," Robert Schuman argued, "may be the leaven from which may grow a wider and deeper community between countries long opposed to one another by sanguinary divisions."[6] In 1957, Article 2 of the foundational Treaty of Rome explicitly talked about "raising the standard of living."

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[1] It is not a foregone conclusion that Tony Judt would have maintained his verdict in light of post-2005 developments in the EU.
[2] http://www.voxeurop.eu/en/content/article/3757341-european-project-total-failure
[3] Simply put, an evaluation gauges the changes in the well-being of subjects that can be attributed to a particular project, program, or policy. The fundamental challenge in carrying out good evaluations is therefore to identify the causal relationship between the project, program, or policy and the outcomes of interest (Gertler et al. 2010).
[4] In his chapter on the single market, Staab (2013) ponders whether the single market program has really delivered a 'single' market. However, while a single market may deliver increased welfare, the single market is (arguably) not inherently desirable. See however footnote 10 for a more subtle view.
[5] See http://www.churchill-society-london.org.uk/astonish.html
[6] http://europa.eu/about-eu/basic-information/symbols/europe-day/schuman-declaration/index_en.htm

Half a century later, in its award to the EU of the Nobel Peace Prize for contributing "to the advancement of peace and reconciliation, democracy and human rights in Europe," the Nobel Committee noted that the EU's *single* most important result over six decades is "the successful struggle for peace and reconciliation and for democracy and human rights. The stabilizing part played by the EU has helped to transform most of Europe from a continent of war to a continent of peace."[7] The official webpage of the European Commission itself also proclaims that the "EU has delivered half a century of peace, stability and prosperity".[8] But in practice EU today mainly emphasizes growth, as is evident from its most ambitious recent policy agendas. In 2000, a stated aim of the Lisbon Agenda was to make the European economy the "most competitive and knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion."[9] And all seven of the Flagship Initiatives adopted as part of the Europe 2020 Strategy were about growth—smart, sustainable, and inclusive.

Consequently, it should not be controversial to identify peace and prosperity as two crucial dimensions on which EU has set out to deliver.[10] In his wide-ranging account of Europe, Giddens (2014, p. 12) unambiguously states that "the EU is there to promote common economic prosperity." In reaching his conclusion, Niall Ferguson focuses on both peace and prosperity. He rejects the peace argument altogether. According to Ferguson, European integration has had absolutely nothing to do with peace in Europe since World War 2; that has been the achievement of NATO. If the EU was about war and peace, there would have been a European Defence Community, which was vetoed by the French National Assembly in 1954.[11] And Ferguson emphasizes that as European integration has proceeded, EU growth has declined. Moreover, since 1980 the EU has grown faster than the United States in only nine out of 32 years. Thus Ferguson's verdict: the EU is a failure. Tony Judt also weighs in on peace and prosperity. In terms of prosperity, he simply claims that the "economic benefits of the single market have been real" (Judt 2005, p. 732). With respect to peace, he concedes that the lesson that war is too high a price to pay for political or territorial advantage had been brought home to the victors after World War 1; it took World War 2 to also bring it home to the losers.[12] Nevertheless, the elites and institutions of the EU are now so intertwined and interdependent that armed conflict is all but inconceivable. Moreover, it would be difficult to deny that many of the Eastern European countries, which joined the EU in 2004 (cf. Table 1), saw the EU "as an

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[7] See http://www.nobelprize.org/nobel_prizes/peace/laureates/2012/eu-facts.html.
[8] http://europa.eu/about-eu/basic-information/about/index_en.htm
[9] http://www.europarl.europa.eu/summits/lis1_en.htm
[10] For a skeptical view on these two EU *finalitées* and others (such as mutual control, cultural diversity, and accountable government), see Offe (2015, Ch. 6), Giddens (2014). Other (more political) dimensions of the European project are surely important as well. For the French, the EU has traditionally been viewed as a foreign policy lever. The Germans, on the other hand, saw it as a way to become a 'normal' country. Elites of smaller countries, like the Benelux, have surely seen the EU as a way to obtain perks and posts. One could therefore make the case that integration is an end in itself.
[11] http://www.voxeurop.eu/en/content/article/3757341-european-project-total-failure
[12] A very similar view is found in Mazower (1999), who argues that the shock of being subjected to a regime of unprecedented violence in the few years between 1938 and 1945 instigated a sea change in Europeans' political and social attitudes; in fact, it made them rediscover the virtues of democracy. Mazower also argues that the postwar focus on full employment and state planning for the social good (as opposed to the inequities of pre-war laissez-faire) provided one of the preconditions for post-war political stability.

escape route out of their past and an insurance policy for the future" (p. 734).[13] Thus Judt's verdict: the EU is a good thing.

Whatever one's thoughts about the peace issue, it is not well-suited for an empirical evaluation. There is no credible way of separating the influence of the EU from that of NATO (or from widespread conflict weariness, for that matter). One could perhaps focus on the main proximate link in the peace argument, which holds that trade reduces conflict.[14] However, while multilateral trade reduces the risk of a global war, it does not necessarily reduce the risk of bilateral conflicts. Because openness to multilateral trade decreases bilateral dependence vis-à-vis any given country, it may thus (depending on the international governance system) decrease the cost of a bilateral conflict (Martin et al. 2008). So whether trade is always and everywhere good for peace is not a foregone conclusion. Add to this that the secular forces associated with modernity have steadily worked to diminish violence on a global scale (Pinker 2011). Consequently, the focus of the present paper will be on prosperity as the key outcome that the EU will be measured up against; this is also the dimension that Ferguson identifies as the most important and the one which Judt and the European Commission both assert that the EU has delivered.[15] Even if one considers the peace issue to be central, an assessment of EU's growth record should still be of independent interest.

There is a small empirical literature which considers the growth effects of European integration. Early studies rely on cross-sectional variation. They compare EU members with non-members, and they tend not to find any differences in terms of economic growth performance (e.g., Landau 1995). More recent studies rely on panel data to explore the growth effects of European integration, and they also tend to find no growth effects of EU membership. One example is Vanhoudt (1999), who asks whether EU membership carries a long-run growth premium when the sample is restricted to OECD countries over the period 1950-90. He finds that there are no differences in growth performance between EU and non-EU OECD countries. However, in a recent contribution using synthetic control methods, Campos et al. (2014) find large positive effects on per capita GDP of EU membership.[16]

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[13] Political stabilization also played a role when the EU was enlarged with Greece and, a few years later, with Portugal and Spain (Staab 2013). In the motivation for the Nobel Peace Prize, the Nobel Committee also emphasizes the EU's benign role for political stability. The Committee also believes that the question of EU membership bolsters the reconciliation process after the Balkan wars as well as the promotion of democracy in Turkey. See http://www.nobelprize.org/nobel_prizes/peace/laureates/2012/eu-facts.html.

[14] Judt's argument does not build on the foundation that war is less likely among countries that trade, an insight frequently associated with Emmanuel Kant's 1795 *Essays on Perpetual Peace*. However, a leading public intellectual such as Larry Summers (Harvard economics professor and former US Treasury Secretary) does not seem to question that trade leads to peace. See "Global trade should be remade from the bottom up," *Financial Times*, 11 April 2016.

[15] In fact, the whole notion of pan-European economic cooperation goes back at least to the interwar years (Mazower 1999). The 1925 Locarno treaties and the 1927 Genova conference were perceived by some as a move towards "an economic league of Nations [sic] whose long-term goal…is the creation of a United States of Europe" (p. 111). The chairman of the Genova conference envisaged this as the "sole economic formula which can fight effectively against the United States of America" (p. 113). Moreover, the idea of European economic integration with the creation of tariff-free zone was proposed by German Reich Minister of Economics (Reichswirtschaftsminister) Walther Funk in the summer of 1940, and idea which Goering seemed to approve (ibid).

[16] Campos et al. (2014) assert that they present "improved estimates". However, synthetic control methods—as the name suggests—are no panacea. There are non-trivial choices and assumptions involved. In any case, robust (causal) findings should be method neutral in the

Our approach in the present paper is to use different empirical strategies (difference-in-differences type setups and standard growth regressions); slice the length of the panel in various ways (e.g., dropping post crisis observations); look at different samples of countries (e.g., a global sample, the sample of original OECD countries, the sample of formerly planned economies, and the sample of EU member countries); pay attention to spatial dependencies; and, finally, require manipulability of the treatment variable. The conclusion that emerges upon looking systematically at the data is that EU membership has no impact on economic growth.

The paper is structured as follows. Section II essentially reconstructions Ferguson's economic argument and drives home the point that a more rigorous empirical analysis is required. Section III provides a systematic statistical analysis. For completeness, we address the issue of intra EU economic growth in Section IV. Section V concludes.

II. Some Simple Plots

We start by simply looking at the comparative performance of the EU and the United States, which is the comparison that Niall Ferguson makes. The IMF's World Economic Outlook Database provides real GDP growth rates going back to 1980 for the EU and the US. These are plotted in Figure 1. The EU only managed to outperform the US economy in terms of real GDP growth in ten out of the 35 years between 1980 and 2015. The (arithmetic) average annual growth rate in real GDP was 0.026 and 0.019 in the United States and the EU, respectively. With these growth rates, the US economy would double its size every 27 years, whereas the corresponding number for the EU is 36 years. This hardly amounts to stellar performance on part of the EU. It is more or less on this basis (and the identification of NATO as the main cause of peace in Europe) that Niall Ferguson reaches his negative verdict on the EU.

FIGURE 1

Two objections immediately present themselves. First, it is not obvious that we should size weight observations; [17] in the cross-country growth literature, weighting is practically never used. Second, it is not obvious the United States constitutes an appropriate comparison group. Consequently, we have (for the sample of 21 original OECD countries, cf. footnote 20 below) plotted unweighted real GDP *per capita* growth since 1961 for respectively the EU and the non-EU members in Figure 2. Inspection of the figure leads to the impression that

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sense that they hold across different identification strategies (Angrist and Pischke 2009). As shown in the present paper, the finding that EU has a large impact on prosperity is not method free in this sense.

[17] In the IMF's World Economic Outlook, group aggregate series are obtained using GDP valued at purchasing power parities as a share of country group GDP size as weights.

these two groups of countries have performed at a comparable level. Indeed, average annual growth was 0.0227 in the EU group versus 0.0235 in the non-EU group.

FIGURE 2

The brief discussion in this section illustrates the dangers of selectively choosing country samples, periods, and variables. The next section will therefore entertain a more systematic statistical analysis.

III. Empirical Analysis

A. Model Specification and Data

We will use real GDP per capita (or per worker) growth as our main dependent variable, as real GDP per capita growth is a better measure of changes in welfare than are changes in the size of the overall economy (Lequiller and Blades 2014). The US population, for example, is structurally much more dynamic (i.e., it rises faster) than that of Europe, say, which means that US real GDP grows faster, all else equal.[18]

We will use EU membership as the independent variable of interest; cf., Table 1. A more proximate measure such as trade integration may lead to problems of causal interpretation. The difficulty is that it does not provide a clear and well-defined counterfactual; in the language of the potential outcomes literature, there is *non-manipulability* of treatment (see Gerring 2012; Morgan and Winship 2015). Trade integration comes with EU membership; but so do many other policy-induced changes, which may impact growth. This means that a counterfactual scenario of EU membership without trade integration makes little empirical sense, and thus (according to a strict philosophical judgement) trade integration (not being manipulable) is not causal in nature.[19] EU membership, on the other hand, is amenable to manipulation, for which reason it has a causal interpretation. According to this line of reasoning, it is preferable to use the deep variable 'EU membership' as the treatment effect of interest.

TABLE 1

Consider then the following very simple regression equation:

[18] Focusing on real GDP growth, as done in Figure 1, therefore puts the European economy at a disadvantage.
[19] This 'no causation without manipulation' may appear at bit extreme for practical purposes. Indeed, Gerring (2012) argues that manipulability should only be considered a desirable trait, among others, in a causal analysis.

(1) $$\Delta \log(y_{it}) = \mu_i + \delta_t + \rho EU_{it} + \varepsilon_{it}.$$

In equation (1), $\Delta \log(y_{it})$ is the annual (continuously compounded) growth rate of real GDP per capita (per worker) of country i in year t; μ_i is a country fixed effect; δ_t is a time fixed effect; and EU_{it} is a binary indicator taking the value 1 if country i is an EU member in year t, and zero otherwise. In equation (1), ρ therefore tells us the average annual growth contribution of EU provided that $E(EU_{it}|\varepsilon_{it}) = 0$.

We start by estimating equation (1) on a global sample of more than 200 countries. This approach bears a resemblance to the well-known difference-in-differences estimator, where the group of countries that never entered the EU serves as an untreated control group for the countries that did enter. To be sure, it is not obvious that the group of all non-EU countries constitutes an appropriate control group for retrieving an estimate of EU's growth contribution. For instance, poorer countries may reap advantages of backwardness (Abramovitz 1986) and/or conditional convergence may be operative (Barro and Sala-i-Martin 2004). Put differently, at any given time countries that join the EU are richer than the 'average' world country, which likely invalidates $E(EU_{it}|\varepsilon_{it}) = 0$. We deal with this issue in two ways.

First, we estimate equation (1) on the sample of "original" OECD countries (henceforth OECD-21), which joined the OECD in the early 1960s.[20] Among the OECD-21, seven countries never joined the EU; these seven countries will therefore serve as control group in the difference-in-differences type setup that equation (1) amounts to.[21] The said countries are likely to constitute an appropriate control group. A complication that arises in the context of using the OECD-21 sample, however, is that the panel becomes long. This means that asymptotics should rely on fixed *N* and large *T*. We therefore use both pooled least squares with long panel-corrected standard errors as well as the Prais-Winsten FGLS estimator with AR(1) errors. That is, as the covariance matrix elements, σ_{ij}, are estimated using those observations that have common time periods, these estimators achieve their asymptotic behaviour as the T_i's approach infinity. While we include country fixed effects in the long panel context, we use a linear time trend instead of time fixed effects, as advised by Cameron and Trivedi (2010).

Second, we also estimate a standard growth regression (see Barro and Sala-i-Martin 2004) on the global sample. The growth regression looks as follows:

(2) $$\Delta \log(y_{it}) = \alpha + \delta_t + \gamma \log(y_{it-1}) + \rho EU_{it} + \epsilon_{it}.$$

[20] These are Austria 1961, Belgium 1961, Canada 1961, Denmark 1961, France 1961, Germany 1961, Greece 1961, Iceland 1961, Ireland 1961, Italy 1962, Japan 1964, Luxembourg 1961, Netherlands 1961, Norway 1961, Portugal 1961, Spain 1961, Sweden 1961, Switzerland 1961, Turkey 1961, United Kingdom 1961, and the United States 1961.

[21] These countries are Canada, Iceland, Japan, Norway, Switzerland, Turkey, and the United States. Among these countries, some surely gained from the EU e.g., Switzerland, Norway, and Turkey. This of course works against finding an EU growth premium.

The inclusion of the lagged income term, $\log(y_{it-1})$, is meant to control for convergence effects (distance from a country's steady state); indeed, this can be given a structural interpretation (Barro and Sala-i-Martin 2004). A more mundane interpretation is that it picks up more general advantages of backwardness (Abramovitz 1986). That is, where estimation of equation (1) on the OECD-21 sample seeks to eliminate confounders via simple stratification logic, the growth regression aims to do so via the inclusion of lagged income per capita. While stratification is likely more convincing as a strategy to rule out confounding, the growth regression has the advantage that it can be estimated on a much larger sample.

Equations (1) and (2) are not nested. Of course, we could ensure nesting by estimating the following equation:

$$(3) \qquad \Delta \log(y_{it}) = \alpha + \mu_i + \delta_t + \gamma \log(y_{it-1}) + \rho EU_{it} + \nu_{it}.$$

Unfortunately, the conditions for consistent estimation of equation (3) are much more demanding than those required for estimation of equations (1) and (2) (see e.g. Wooldridge 2010, Cameron and Trivedi 2005, or Roodman 2009). The dynamic panel-data model in equation (3) can be estimated using the somewhat complicated machinery of difference and system GMM estimators. These estimators do not require external instruments, but instead rely on lags of the instrumented variables (so-called internal instruments). Consequently, they allow the unobserved country fixed effects to be correlated with the lagged dependent variable[22]; it is this correlation that makes standard estimators inconsistent, provided of course that (3) is the correct specification. We will estimate equation (3) on a global sample using these dynamic panel methods.[23]

The appropriate length of the panel is not clear-cut. The Eurozone both exacerbated the pre-2007 boom and the post-2010 crisis. It exacerbated the boom because, as Walters (1990) warned long ago, with the nominal interest being beyond any single country's own control, the real interest rate falls with rising inflation, and vice versa. This rendered the system potentially unstable. It exacerbated the bust due to the incompleteness of the Eurozone edifice (Sinn 2014; De Grauwe 2014). Thus it may make some sense to discard the years 2010-2015 from the observation window. On the other hand, it probably makes less sense to discard the global financial crisis years 2008-09, as basically all rich countries were hit hard and because it represented a warranted correction. Consequently, we will consider three periods. The full sample period 1961-2015 (1951-2011) is the result of using all available data in the World Development Indicators (WDI) 2015 (Penn World Tables (PWT)

[22] To see that $\log(y_{it-1})$ is a lagged dependent variable use that $\Delta \log(y_{it}) = \gamma \log(y_{it-1})$ is mathematically equivalent to $\log(y_{it}) = (\gamma + 1) \log(y_{it-1})$.

[23] Both estimators assume no second-order autocorrelation in the differenced errors, so this will be tested. Moreover, there is the problem of 'instrument proliferation', so the number of instruments will reduced by setting the number of usable lags to two. The two estimators basically differ in that the difference estimator instruments differences with levels, whereas the system estimator instruments levels with differences.

8.1); that is, this is the maximum length of the panel.[24] The sample period 1961-2009 (1951-2009) removes the Eurozone crisis period, whereas the sample period 1961-2007 (1951-2007) removes the global financial crisis.

A few words on the pros and cons of WDI versus PWT. The PWT panel is longer than (more years), but not as wide as (fewer countries), WDI. Moreover, a recent assessment of measures of economic activity, based on nighttime lights data, concludes that the WDI are as good, and often better, measures of unobserved true income as are any recent vintages of the PWT (Pinkovskiy and Sala-i-Martin 2016). WDI is therefore our preferred data source. However, the advantage offered by PWT for present purposes is that the EU_{it} variable varies for all EU countries. As the WDI sample starts in 1961, the 'original six' do not contribute to the *within variation* in EU_{it}.[25]

Figure 3 displays the correlation (correlation coefficient is 0.63) between annual growth in real GDP per worker from PWT and annual growth in real GDP per capita from WDI.[26]

FIGURE 3

B. Results

Table 2 reports estimates of growth of real GDP per capita (columns 1-3) and GDP per worker (columns 4-6) on the binary EU membership variable and country and time fixed effects; i.e., it estimates equation (1). Here we basically measure pre- and post-entry growth for the EU countries up against the growth trajectories of all other countries. Inspection of the table reveals that EU membership is associated with lower economic growth in all columns. In column 1, where we use the maximum length WDI sample (i.e., 1961-2015), EU entry is associated with a statistically significant growth reduction of roughly 1.8 percentage points per year. When we remove the period associated with the sovereign debt crisis in the Eurozone (i.e., 2010-15), the reduction remains significant but is lower (1.27 percentage points per year). Finally, when we remove the global financial crisis of 2008-09, the reduction (which is now statistically insignificant) is 0.5 percentage points per year. Using GDP per worker growth from PWT gives roughly similar results, cf. columns 4-6. Consequently, in a difference-in-differences type setting EU entry seems to have reduced economic growth.

TABLE 2

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[24] We use GDP per capita in constant local currency from World Development Indicators 2015. The WDI indicator code is NY.GDP.PCAP.KN. From PWT 8.1, we extract real GDP per worker. We construct it as real GDP at chained PPP divided by employment (i.e., rgdpe/emp in PWT notation). PWT Data, which can be downloaded at http://www.rug.nl/research/ggdc/data/pwt/pwt-8.1, are from Feenstra et al. (2015).

[25] Note, however, that EU-28 becomes EU-27 in PWT, as Croatia first entered the EU in 2013.

[26] Mathematically, GDP per capita can be written as GDP/P, where P is the population. GDP per worker (or labour productivity), on the other hand, is equal to GDP/L, where L is the labor force. This means that GDP per capita equals GDP per worker times the fraction of the population in the labor force; i.e., $GDP/P = (GDP/L)(L/P)$. As the L/P ratio varies across countries, GDP per capita and GDP per worker are related but different concepts.

As alluded to in Section III.A, this negative finding is likely a result of convergence dynamics.[27] Consequently, in Table 3 we focus on the OECD-21 sample where all countries are to some degree (structurally) similar; indeed, a *t*-test (unequal variances) fails to reject the null that the difference in means in (log) real GDP per capita in 1961 between EU and non-EU OECD-21 countries is zero (*p*-value 0.22). In this OECD-21 sample we find neither an economically nor a statistically significant difference between economic growth in EU and non-EU OECD member countries, cf. Table 3. Moreover, point estimates shift between being positive and negative when we use WDI data, cf. panel A of Table 3. All in all, this strongly suggests that the EU has performed at a level comparable to its closest peers.[28]

TABLE 3

Focusing attention on OECD-21 (as done in Table 3) seeks to balance the data using stratification. This amounts to *indirect* covariance control, which is (in many cases) a fairly credible causal strategy. In Table 4, we turn to the less credibly strategy of *direct* covariance control via estimation of the growth regression associated with equation (2) on the global sample. Inspection of the table reveals that WDI data tends to find a negative effect of EU membership, cf. columns 1-3. However, this impression is turned on its head once we use PWT data, where the EU variable is always positive and significant. The difference between WDI and PWT are neither driven by the sample reduction of 39 countries going from WDI to PWT nor by the change in panel length. In fact, when we estimate equation (2) on the sample generated by the intersection of the WDI sample and the PWT sample (results not reported), the EU variable is positive and significant in the PWT sample ($\rho_{PWT} = 0.006$, *p*-value = 0.062) but negative and significant in the WDI sample ($\rho_{WDI} = -0.005$, *p*-value = 0.046). This probably reflects nontrivial uncertainties surrounding national accounts data (we will return to this issue below).

TABLE 4

We cannot rigorously decide between equations (1) and (2), as the two equations are non-nested. Consequently, in Table 5 we turn to dynamic panel estimation of equation (3), which nests equations (1) and (2). Inspection of Table 5 reveals a negative impact of EU membership when the difference GMM estimator is employed. This is regardless of whether we use real GDP per capita from WDI (cf. panel A, columns 1-3) or real GDP per worker from PWT (cf. panel B, columns 1-3). However, the effect is always statistically insignificant.

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[27] Formally, if $COV(EU_{it}, \log(y_{it-1})) > 0$ and $\gamma < 0$ (where γ is the population coefficient associated with the omitted term $\log(y_{it-1})$) then plim $\hat{\rho} < \rho$ when estimating equation (1).

[28] Of course, we cannot rule out that a rising EU has "lifted all boats" in the OECD-21 sample.

When system GMM is employed, we find evidence of a growth premium in the WDI context when the sample ends in 2009 (cf. panel A, column 5). However, as we reject the null of no second order autocorrelation, the conditions for consistent estimation are not met in this case. Moreover, when we use PWT's real GDP per worker in panel B, there is no effect. Overall, the basic message from the dynamic panel estimations reported in Table 5 is that the EU entry has no measurable impact on economic growth.

TABLE 5

Let's sum up the results so far. First, when we estimate equation (1) on the global sample (using either WDI or PWT) we tend to find a growth drag associated with EU entry, cf. Table 2. The growth drag is not driven by the Eurozone crisis; it also obtains when the years 2010-15 are removed from the dataset. However, the growth drag is only found in the global sample, where confounders are more likely to taint results; it is never found in the preferred OECD-21 sample, where economic and statistical insignificance obtains in all columns, cf. Table 3. Second, when we turn to equation (2), WDI and PWT yield opposing results, cf. Table 4. As noted above, these opposing findings are not driven by sample differences. Finally, when we estimate equation (3) using dynamic panel methods, we also conclude that there is no effect, cf. Table 5. Overall, this suggests the conclusion that the EU has performed at a level comparable to its peers; or, put differently, EU membership does not increase prosperity.

In Section C below, we subject this conclusion to a list of additional robustness checks.

C. Additional Robustness Issues[29]

1. Spatial Error Correlation

So far, we have assumed that growth rates are statistically independent across countries. This is potentially problematic, as pointed out long ago by among others De Long and Summers (1991). The concern is that unobservables may be correlated across countries, for which reason each country does not necessarily provide as informative and independent an observation as any other.[30] Such spatial dependencies distort conventional standard errors, which leads to unreliable statistical inference. It is not possible to obtain precise knowledge about spatial dependencies across countries. However, the fact that we use country fixed effects should reduce the problem somewhat, as the country fixed effects pick up correlation among slow-moving and time-invariant

[29] For brevity, this section restricts attention to WDI data. Note in addition that, as shown by Pinkovskiy and Sala-i-Martin (2016), WDI are likely superior to PWT data in terms of estimating true income.

[30] De long and Summers exemplify the problem using Belgium and Holland, whose respective growth rates are unlikely ever to deviate significantly. Of course, the growth rates within the EU are also highly dependent.

unobservables. Nevertheless, it may be of some interest to address the issue more directly in order to gauge whether statistical inference is based on a (fairly) safe footing.

A widely used approach to address the problem is to assume that the physical distance between countries reflect their proximity in terms of unobservables. Under this assumption, Conley (1999) shows how to calculate consistent standard errors through what is essentially an application of Hansen's (1982) GMM estimator to spatial error autocorrelation.[31] In what follows, we apply the Conley estimator to the difference-in-differences type regressions used in Table 2, column s 1-3, in an attempt to gauge the consequences of spatial dependencies.[32] Table 6 reports the results.[33] Since we are not using instruments, parameters are always estimated using just-identified GMM. This means that allowing for spatial dependencies will only affect standard errors; it never affects point estimates. Interestingly, Conley standard errors are slightly less conservative (i.e., they are smaller and thus rejects the null hypothesis more frequently) than the standard clustered standard errors. In any case, as the ratio of Conley to clustered standard error is between 0.75 and 0.92 (cf. Table 2, columns 1-3, and Table 6), spatial dependencies do not appear to be important for results reported in this paper.

TABLE 6

2. Panel Averages

In the cross-country growth literature it is not uncommon to generate panel averages to prune the data for business cycles. As we always include a time trend or a full set of time dummies, this should not make any difference to the results reported in the paper. For completeness, however, Table 7 reports results from the global sample and the OECD-21 sample when the panel is averaged into 8-year epochs. Columns 1-2 contain results for the global sample and columns 3-4 for the OECD-21 sample. A quick comparison between respectively Tables 2 (columns 1 and 3) and 7 (columns 1-2) and Tables 3 (panel A, columns 1 and 3) and 7 (columns 3-4) reveals that results do not change with 8-year epochs.

TABLE 7

3. Pre- and Post-Accession Dynamics

Before accession to the EU lays an extended period of negotiations. Between March 1994 and January 1996, ten Central and Eastern European countries submitted their applications to the EU. Cyprus and Malta had

[31] The time-series analogue of this approach is roughly that of Newey and West (1987).
[32] We use Stata code developed by Hsiang (2010) and subsequently amended by Thiemo René Fetzer see http://www.trfetzer.com/conley-spatial-hac-errors-with-fixed-effects/).
[33] As WDI and PWT yield similar results in Table 2, we restrict attention to WDI data in Table 6.

already submitted their applications in 1990. Ten of these countries became EU members in 2004. Moreover, in the run-up to accession countries undertook a number of reforms and received help from the EU to modernize agriculture, infrastructure, etc. Reforms disturb the economy in the short run in ways that may be either positive or negative. Consequently, it may be misleading to use the date of actual accession in an empirical analysis, as we may underestimate or overestimate the effects of EU membership. To explore the consequences of this potential oversight, we both lag and lead the EU membership variable five years (that is, we substitute EU_{it-5} and EU_{it+5} for EU_{it} in equations (1), (2), and (3)). Moreover, to conserve on space we only estimate on the period 1961-2009, which (as argued in Section III.A) is arguably the truest and fairest period to use in order to gauge EU's growth performance

Table 8 reports results. In columns 1-5, we report regression where we substitute EU_{it-5} for EU_{it}; in columns 6-10, we substitute EU_{it+5} for EU_{it}. Making the said changes have no implications for the results reported in Tables 2 and 4 whatsoever. Moreover, it makes no differences to the results reported in Table 3 when we use EU_{it+5}. It matters quite a lot, however, for the results reported in Table 3 when we use EU_{it-5}; the size of negative impact of EU membership triples and turns statistically significant in column 2 of Table 8. Finally, it also matters quite a lot for the dynamic panel regressions reported in Table 5 when we use EU_{it+5}. The size of the negative impact increases by an order of magnitude and turns statistically significant.

Overall, it is safe to conclude that trying to take pre- and post-accession dynamics into account does nothing to further the impression that the EU is good for growth. However, the changes are not consistent and there are still many statistically insignificant entries in Table 8, for which reason the conservative conclusion that the EU has no impact on prosperity should probably stand.

TABLE 8

4. Formerly Planned Economies

Yet another way to assess the economic growth contribution of EU membership is to look at the sample of the Eastern European countries, which were granted membership in 2004 or later. These countries are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Rumania, Slovakia, and Slovenia, cf. Table 1. All these countries were previously planned economies, although they were also, on the whole, geographically closer to Western Europe than other non-EU acceding countries further to the East (Kopstein and Reilly 2003). It therefore makes sense to compare these new EU member states' growth record with that of 18

non-EU countries that were also connected with the Soviet orbit.[34] That is, in this section we ask whether growth picked up in the new Eastern European EU countries after accession vis-à-vis growth in 18 formerly planned non-EU countries.

Before turning to regression based statistical inference, it may be instructive to take a brief look at economic growth before and after the EU accession in the accession countries. Of the 11 accession countries, not a single one had higher *average* annual real GDP per capita growth in the period after the EU accession as compared to the period before, cf. Figure 4. This means that a simple difference estimator would find a negative effect; one that is statistically insignificant, as it turns out (not reported).

FIGURE 4

The financial crisis of 2008-09 and the Eurozone crisis certainly confound any attempt at inference, as crises tend to elevate growth prior to their onset and the reverse after. However, once we turn to difference-in-differences type regressions as in equation (1), where the comparison group consists of the formerly planned non-EU accession countries, we control for the potentially confounding impact of crises, as the non-accession countries were also influenced by them. This is of course the advantage of the difference-in-differences setup. If we calculate growth in the group of 18 formerly planned non-EU accession countries before and after 2004 (the year in which eight of the 11 accession economies joined the EU), we get respectively –0.8% and 4.7%. Doing the same calculation for the accession countries, we get respectively 3.32% and 2.99%. Thus, not only was the growth rate in the non-accession countries faster after 2004 than before, these countries also grew faster than accession countries after 2004. In fact, save for the year 2014, growth has been higher every year since 2004 in non-accession countries compared to accession countries, cf. Figure 5.[35] Such simple considerations should instil moderation with respect to what we can expect in terms of an EU-induced growth premium in the formerly planned EU accession economies.

FIGURE 5

[34] The full sample consists of the following 29 countries: Albania, Armenia, Azerbaijan, Bulgaria, Bosnia & Herzegovina, Belarus, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

[35] The better pre-2004 growth performance of the (subsequent) EU accession countries (evident especially between 1990 and 1996) may be due to more radical post-communist transition reforms in this fast-reformer subset of former communist states. Alternatively, or additionally, it could be due to economic diffusion and network effects due to these EU-accession countries' closer proximity to the EU-15, as compared to countries in the Western Balkans and the former Soviet Republics (Kopstein and Reilly 2003; Krugman 1995). By contrast, the worse post-2004 growth performance of EU accession countries may represent greater exposure to the Eurozone crisis in the latter group of countries. Alternatively, it may reflect entirely different models of economic development adopted by the less democratically advanced polities in the Western Balkans and the former USSR (Acemoglu and Robinson 2012).

Let us now turn to regression results, which are reported in Table 9. As is immediately obvious upon inspection of the table, all EU coefficients are negative. Moreover, they are statistically significant when equations (1) and (2) are used (cf. columns 1-2, 4-5), but statistically insignificant in equation (3) (cf. columns 3 and 6). This once again suggests that the EU has not added anything in terms of higher economic growth.[36]

TABLE 9

IV. Intra-EU Economic Growth

There are a number of empirical contributions that focus more narrowly on the question of income convergence within the EU.[37] Cuaresma et al. (2008), for example, analyse an EU-15 panel using the period 1961-1998, and they conclude that there is a convergence effect (i.e., a *temporary* growth effect). Badinger (2005) deviates from using EU membership as the main independent variable; he instead constructs an index of economic integration of EU-15, and he analyses the growth effects of integration in a panel setting using the period 1950-2000. Badinger also finds a temporary but no permanent growth effect.

In light of the finding above that EU countries have not grown faster than non-EU countries, evidence of a growth premium within the EU is evidence of intra EU redistribution, which is probably not a first-order issue. Nevertheless, intra EU growth will briefly be considered for completeness reasons in this section.

Table 10 reports estimation of equation (1) on the sample of countries that are present-day EU members (i.e., the group of countries that at some point experience $EU_{it} = 1$).[38] Note that EU_{it} always equal 1 for the 'original six' in panel A of Table 1, which means that the growth effect is measured relative to this group; in panel B, where we use PWT data, EU_{it} varies for these countries. Inspection of panel A of the table, columns 3 and 6, reveals that prior to the financial crisis there is clear evidence of an EU membership growth premium. Adding post-2007 data points, however, makes this effect disappear (cf. columns 1-2 and 4-5). Moreover, when we use PWT data (cf. panel B) there is no effect at all.

TABLE 10

The results in Table 10, however, are quite fragile. If we instead estimate a standard convergence specification as equation (2) using the Prais-Winsten estimator on WDI data, we never find a growth premium of

[36] If we alternatively use PWT data, we obtain similar results.
[37] Convergence (or cohesion policy) is of course an explicit aim of the EU's regional policy, which aims to reduce economic and social inequalities between regions (Staab 2013).
[38] As in connection with Table 3, we will rely on fixed N and large T asymptotics.

membership; if we use pooled OLS with long panel-corrected standard errors, we a find statistically significant growth drag. In keeping with the approach so far, we take erratic findings as evidence of no effects.

The stylized fact that (unweighted) real GDP per capita growth in the EU is negatively correlated (corr. coef. $= -0.36$) with EU membership count (cf. Figure 6) constitutes a sobering and transparent piece of evidence to suggest that EU membership is no growth panacea.[39]

FIGURE 6

V. Concluding Remarks

It is noteworthy that EU membership does not appear to have increased countries' economic growth rates. Of course, one could take a defensive position. According to Martin Wolf, the influential chief economics commentator of the Financial Times,[40] nobody can credibly argue that "EU membership has been a significant obstacle to UK prosperity."[41] Results reported in the present paper are not inconsistent with this assessment. Depending on one's disposition, the cup is either half full or half empty. The finding that the EU has no discernible effect on the economic growth of its member nations should perhaps not come as a major surprise to those familiar with the literature on growth diagnostics (see Rodrik 2010) and globalization more generally (see Rodrik 2011). The EU can create a level playing field, but there is no one-size-fits-all to growth policies. Policies to address (country specific) binding constraints must be tailored to local circumstances, and thus becomes the remit of national policymakers (Rodrik 2010). Put differently, EU membership (which now means adopting and implementing the EU *acquis*) does not make for a growth strategy *per se*.

Of course, our 'non-findings' could simply be a reflection of noisy data. Although all OECD countries refer to the same international system of national accounts, in practice they use different statistical methods and the quality of their statistical systems varies (Lequiller and Blades 2014). The OECD concludes that measurement differences imply that a growth difference between the United States and another OECD country of less than 0.3 percentage points should not be considered (statistically) significant.[42] When we turn to developing countries, we are on a substantially less solid base. Indeed, for some countries one may reasonably doubt that GDP data make much sense at all (Jerven 2013).[43]

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[39] If we use PWT data to calculate growth, the correlation between growth and membership count is also negative (corr. coef. $= -0.2578$).
[40] Mervin King (2016), former Governor of the Bank of England, has called Wolf's writings in the Financial Times "one of the most important commentaries on our world." Dani Rodrik (2011) has called Wolf "one of the most articulate advocates of globalization".
[41] "What Brexit means for the UK economy," Financial Times, 2 March 2016.
[42] See Lequiller and Blades (2006).
[43] In Zambia, for example, just one man was responsible for preparing national income accounts in 2010; at the same time, incentives were actually biased against producing estimates. Moreover, data collection is often politicized with measurement often "taking the backseat" (Jerven 2013). For many African countries, base years for GDP series even date back some 20 years.

We end with a word of caution. Needless to mention, the EU provides many other *direct* benefits (or costs, depending on one's perspective) to the citizens of Europe. For example, the right to study, work, travel, and live in any EU country of one's choosing is certainly a benefit that the authors of this paper value highly. And the EU has also contributed to, among other things, consumer protection, workplace safety, regional convergence, and constitutional rights protection. By focusing exclusively on economic growth, we only consider the *indirect* 'growth value' of any of these many likely direct EU benefits. This is an obvious limitation of the present research. But overall, we trust that an agnostic stance with respect to the growth contribution of EU membership is both justified empirically and non-trivial in terms of political economy.

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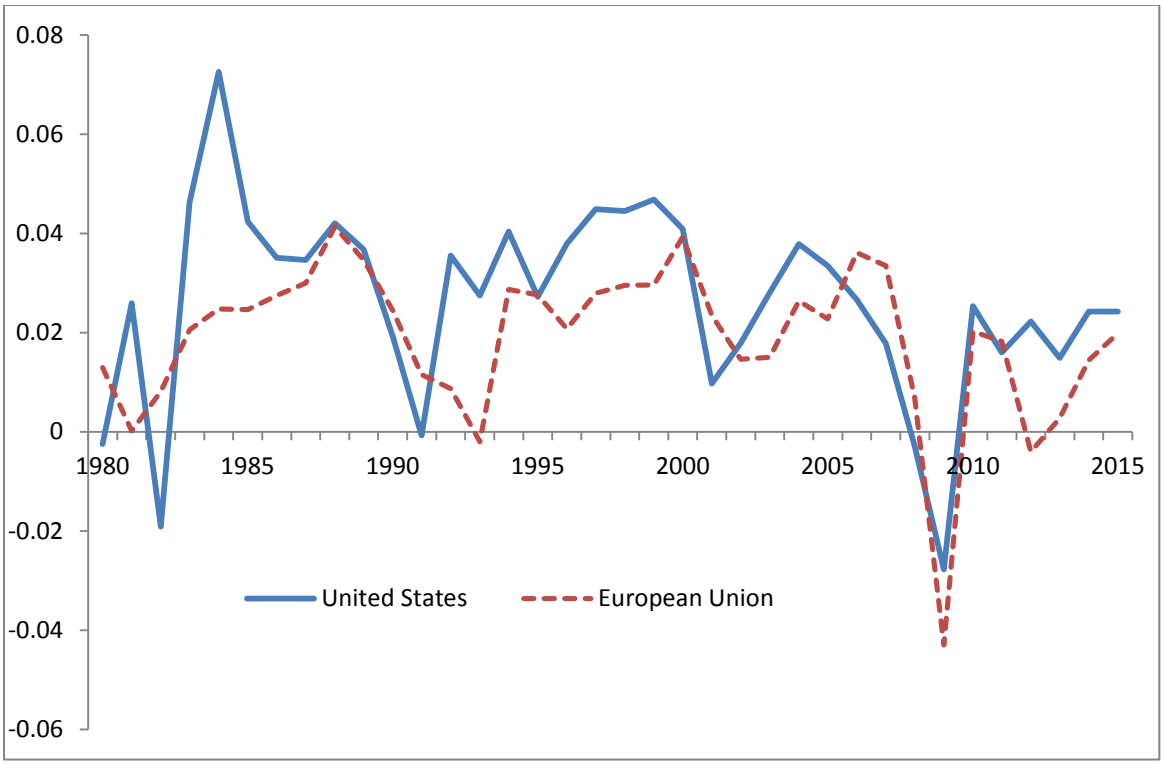

Figure 1: Real GDP growth in the European Union (broken line) and the United States (solid line). *Notes*: The source is the IMF's World Economic Outlook Database, April 2016.

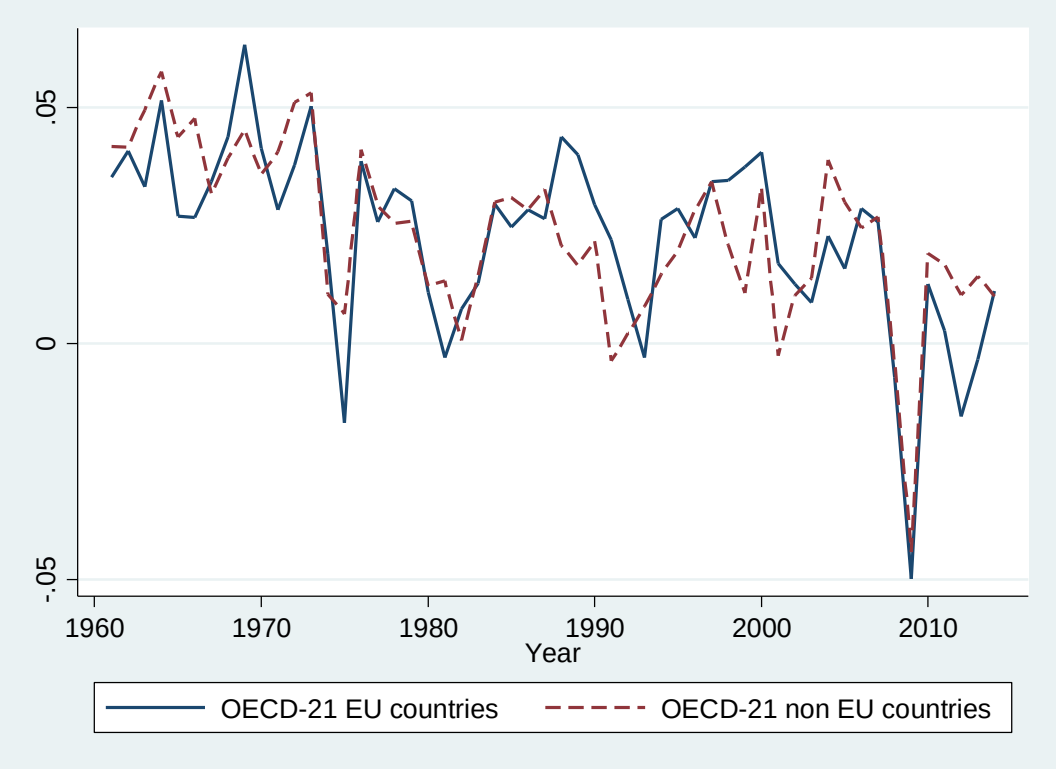

Figure 2: Real GDP *per capita* growth in the OECD-21 country sample for EU and non-EU countries, respectively. *Notes*: Series are unweighted averages. The source is World Development Indicators 2015.

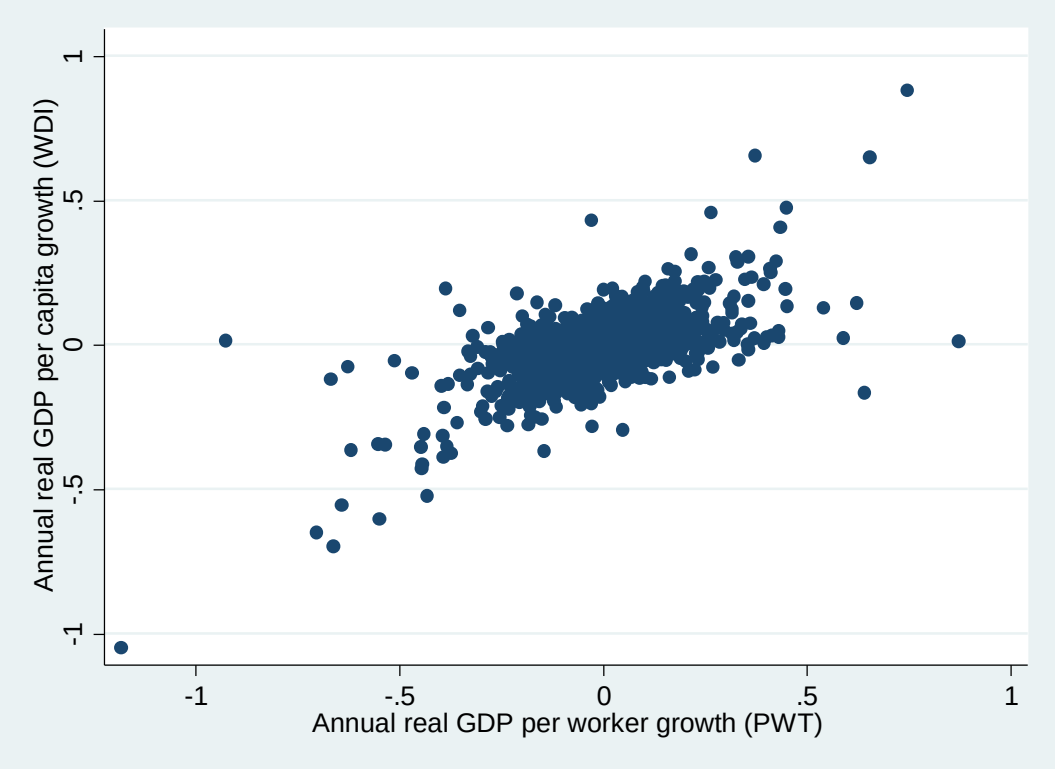

Figure 3: Scatter plot of PWT-based real GDP per worker growth (x-axis) and WDI-based real GDP per capita (y-axis). The period is 1960-2011, the correlation is 0.63, and the number of observations is 6,056. *Notes*: The sources are World Development Indicators 2015 and Penn World Tables 8.1 (see Feenstra et al. 2015).

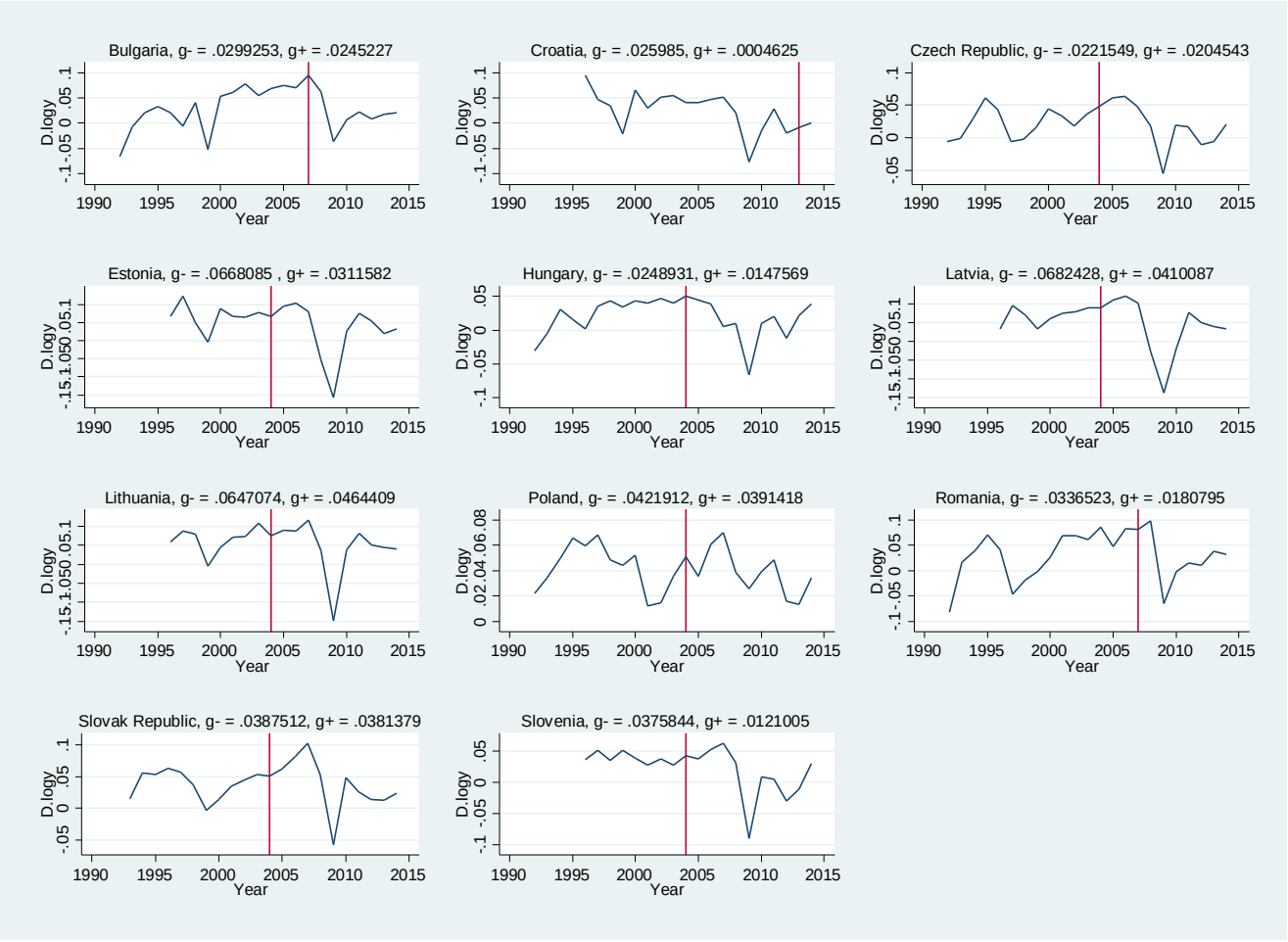

Figure 4: Real GDP per capita growth in formerly planned economies before and after the EU accession. *Notes*: Average annual growth before and after is given by respectively $g-$ and $g+$. The vertical line is the date of accession. The data source is World Development Indicators 2015.

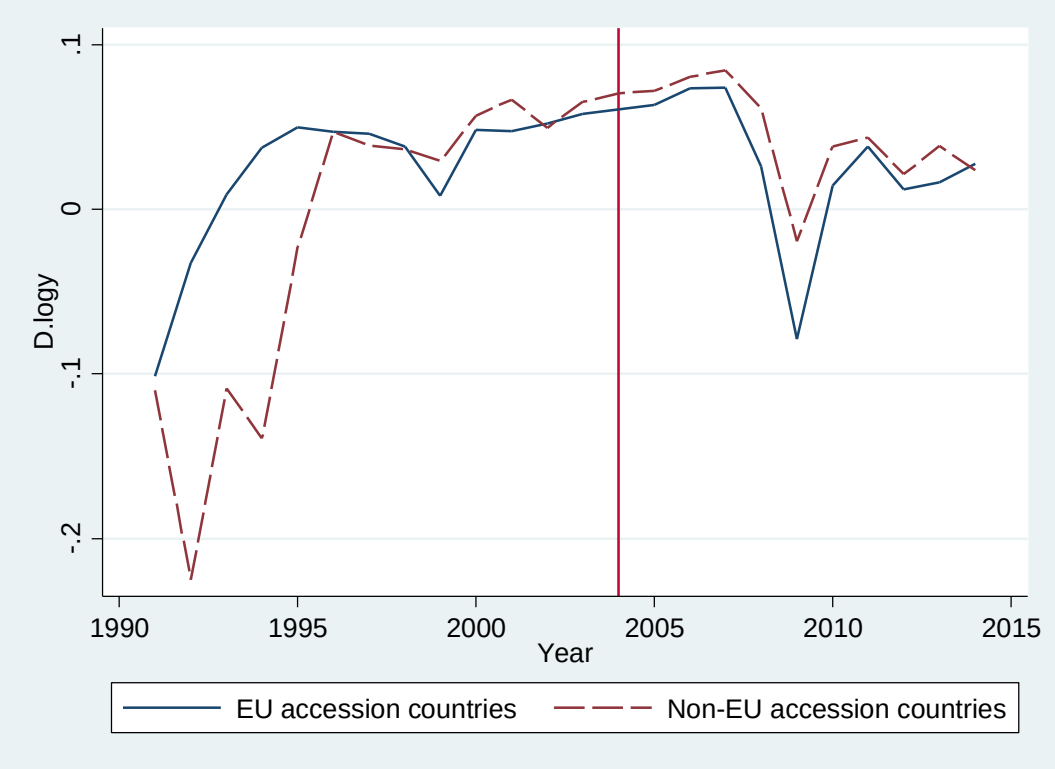

Figure 5: Real GDP per capita growth in formerly planned accession (solid line) and non-accession (broken line) countries before and after 2004. *Notes*: The vertical line is placed at year = 2004. The data source is World Development Indicators 2015.

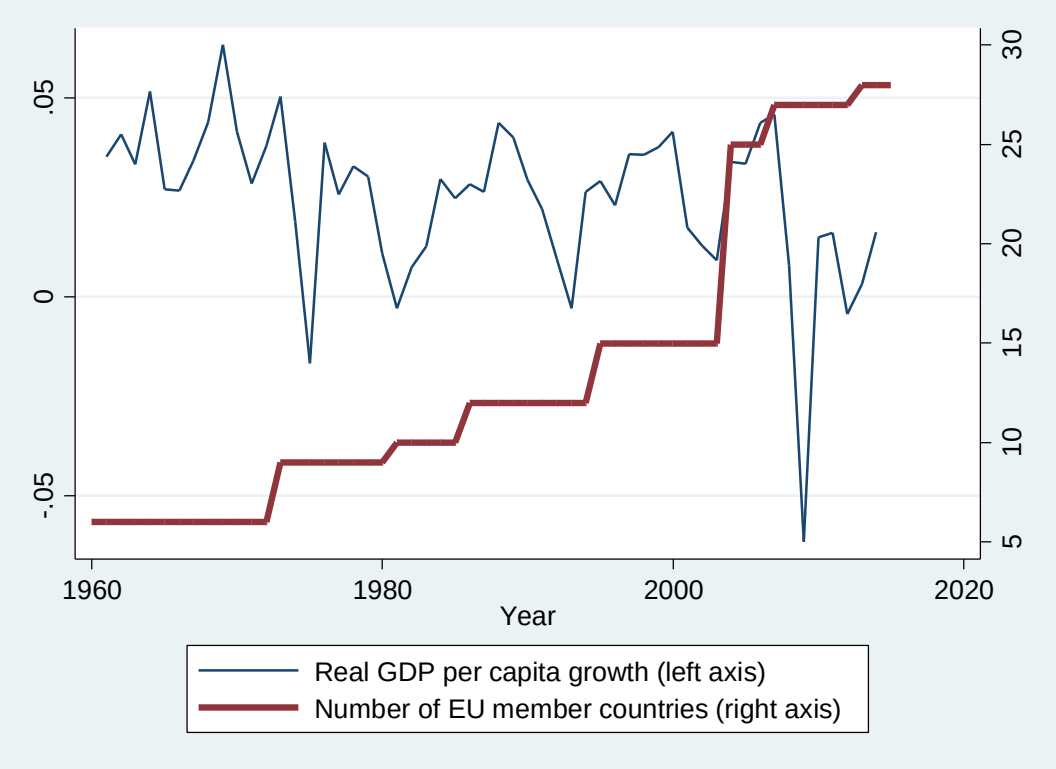

Figure 6: Unweighted EU real GDP per capita growth (left axis) and EU membership count (right axis). *Notes*: The period is 1960-2015. The correlation between growth and membership count is -0.36. The sources are World Development Indicators 2015 and Staab (2013).

Table 1: Chronology of EU enlargement

Year	Membership count	Countries
1958	Original six	(West) Germany, France, Italy, Belgium, Luxembourg, the Netherlands
1973	9	Britain, Denmark, Ireland
1981	10	Greece
1986	12	Portugal, Spain
1995	15	Sweden, Finland, Austria
2004	25	Malta, Cyprus, Estonia, Latvia, Lithuania, Poland, Hungary, Czech Republic, Slovakia, Slovenia
2007	27	Bulgaria, Romania
2013	28	Croatia

Table 2: Fixed effects estimation

VARIABLES	(1) D.logy	(2) D.logy	(3) D.logy	(4) D.logy	(5) D.logy	(6) D.logy
EU	-0.0179***	-0.0127***	-0.0054	-0.0119***	-0.0103**	-0.0106**
	(0.0040)	(0.0037)	(0.0037)	(0.0044)	(0.0043)	(0.0047)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,403	7,463	7,076	7,026	6.701	6.374
R-squared	0.056	0.061	0.053	0.051	0.051	0.047
Number of countries	205	205	204	166	166	166
Sample	Global sample 1961-2015	Global sample 1961-2009	Global sample 1961-2007	Global sample 1951-2011	Global sample 1951-2009	Global sample 1951-2007
Data source	WDI	WDI	WDI	PWT	PWT	PWT

Notes: Standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Fixed effects estimation on OECD-21 sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimator		Pooled OLS			Prais-Winsten	
VARIABLES	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy
			Panel A			
EU	-0.0002	0.0017	-0.0005	-0.0005	0.0020	-0.0008
	(0.0032)	(0.0029)	(0.0028)	(0.0043)	(0.0045)	(0.0043)
Linear time trend	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,094	989	947	1,094	989	947
R-squared	0.169	0.149	0.104	0.113	0.105	0.068
Number of countries	21	21	21	21	21	21
Autocorrelation coefficient				0.270	0.316	0.284
Sample	OECD-21	OECD-21	OECD-21	OECD-21	OECD-21	OECD-21
	1961-2015	1961-2009	1961-2007	1961-2015	1961-2009	1961-2007
Data source	WDI	WDI	WDI	WDI	WDI	WDI
			Panel B			
EU	0.0030	0.0039	0.0023	0.0029	0.0041	0.0021
	(0.0039)	(0.0040)	(0.0039)	(0.0048)	(0.0051)	(0.0051)
Linear time trend	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,274	1,232	1,190	1,274	1,232	1,190
R-squared	0.112	0.117	0.094	0.085	0.085	0.067
Number of countries	21	21	21	21	21	21
Autocorrelation coefficient				0.176	0.219	0.215
Sample	OECD-21	OECD-21	OECD-21	OECD-21	OECD-21	OECD-21
	1951-2011	1951-2009	1951-2007	1951-2011	1951-2009	1951-2007
Data source	PWT	PWT	PWT	PWT	PWT	PWT

Notes: Standard errors in columns 1-3 are long panel-corrected errors, which allow heteroskedasticity and correlation over *i*. *** p<0.01, ** p<0.05, * p<0.1. Standard errors in columns 4-6 in addition assume AR(1) for each *i*. The option *pairwise selection* in Stata's **xtpcse** routine is invoked in order to use all observations that can be matched by period between panels *i* and *j*.

Table 4: Growth regressions

VARIABLES	(1) D.logy	(2) D.logy	(3) D.logy	(4) D.logy	(5) D.logy	(6) D.logy
EU	-0.0050*	-0.0021	0.0030	0.0055*	0.0072**	0.0062*
	(0.0027)	(0.0025)	(0.0027)	(0.0032)	(0.0032)	(0.0035)
L.logy	-0.0006	-0.0009	-0.0009	-0.0039***	-0.0047***	-0.0046***
	(0.0006)	(0.0008)	(0.0009)	(0.0014)	(0.0015)	(0.0015)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	No	No
Observations	8,403	7,463	7,076	7,026	6,701	6,374
R-squared	0.049	0.054	0.046	0.053	0.052	0.047
Number of countries	205	205	204	166	166	166
Sample	Global sample 1961-2015	Global sample 1961-2009	Global sample 1961-2007	Global sample 1951-2011	Global sample 1951-2009	Global sample 1951-2007
Data source	WDI	WDI	WDI	PWT	PWT	PWT

Notes : Standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Dynamic panel estimation of growth regressions

	(1)	(2)	(3)	(4)	(5)	(6)
		Difference GMM			System GMM	
VARIABLES	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy
				Panel A		
EU	-0.0021	-0.0012	-0.0015	0.0261	0.0518**	-0.0543
	(0.0056)	(0.0053)	(0.0048)	(0.944)	(0.0226)	(0.2827)
L.logy	-0.2646***	-0.2666***	-0.2477***	0.0167	0.0160	0.0156
	(0.0802)	(0.0681)	(0.0746)	(0.0393)	(0.0122)	(0.0130)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of instruments	160	145	139	213	193	185
Test for second order autocorrelation (p-value)	0.3172	0.1038	0.0713	0.1666	0.0246	0.0184
Test for overidentifying restrictions (p-value)	0.4119	0.4228	0.4000	0.2043	0.1335	0.1253
Observations	8,195	7,256	6,870	8,403	7,463	7,076
Number of countries	204	203	203	205	205	204
Sample	Global sample 1961-2015	Global sample 1961-2009	Global sample 1961-2007	Global sample 1961-2015	Global sample 1961-2009	Global sample 1961-2007
Data source	WDI	WDI	WDI	WDI	WDI	WDI
				Panel B		
EU	-0.0244	-0.0229	-0.0077	-0.0116	-0.0103	-0.0104
	(5.0689)	(4.1628)	(2.0061)	(11.2275)	(7.3333)	(6.8406)
L.logy	-0.2562	-0.2374	-0.2775	0.0324	0.0347	0.0319
	(7.9848)	(8.1390)	(6.1276)	(0.3546)	(0.5829)	(0.3193)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of instruments	181	175	169	241	233	225
Test for second order autocorrelation (p-value)	0.9367	0.9276	0.9088	0.1001	0.1268	0.0602
Test for overidentifying restrictions (p-value)	0.2577	0.1549	0.0861	0.9991	0.9925	0.9799
Observations	6,860	6,535	6,208	7,026	6,701	6,374
Number of countries	166	166	166	166	166	166
Sample	Global sample 1951-2011	Global sample 1951-2009	Global sample 1951-2007	Global sample 1951-2011	Global sample 1951-2009	Global sample 1951-2007
Data source	PWT	PWT	PWT	PWT	PWT	PWT

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Arellano-Bond test of the null of zero autocorrelation in first-differenced errors. The null in Sargan test of overidentifying restrictions is that overidentifying restrictions are valid; the Sargan test is calculated without cluster robust standard errors. Columns 1-3 are estimated using **xtabond** in Stata, whereas columns 4-6 are estimated using **xtdpdsys** in Stata. All columns are estimated with the twostep option, which means that we report robust standard errors that are obtained using the Windmeijer WC-robust estimator.

Table 6: Fixed effects estimation with Conley standard errors

VARIABLES	(1) D.logy	(2) D.logy	(3) D.logy
EU	-0.0179***	-0.0127***	-0.0054*
	(0.0028)	(0.0035)	(0.0030)
Year fixed effects	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Observations	8,403	7,463	7,076
R-squared	0.056	0.061	0.053
Number of countries	205	205	204
Sample	Global sample 1961-2015	Global sample 1961-2009	Global sample 1961-2007

Notes: Conley standard errors in parentheses. Spatial correlation cutoff is set at 500 km. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Fixed effects estimation, 8-year epochs

VARIABLES	(1) D.logy	(2) D.logy	(3) D.logy	(4) D.logy
EU	-0.020***	-0.007	-0.005	-0.002
	(0.0068)	(0.0062)	(0.0069)	(0.007)
Time fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	1.151	955	143	122
R-squared	0.039	0.055	0.572	0.328
Number of countries	205	204	21	21
Sample	Global sample 1961-2015	Global sample 1961-2007	OECD-21 1961-2015	OECD-21 1961-2007

Notes: Standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Pre-and Post-Accession Dynamics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy
EU t-5	-0.0122**	-0.0065**	-0.0061	-0.0024	-0.0050					
	(0.0049)	(0.0032)	(0.0047)	(0.0028)	(0.1489))					
EU t+5						-0.0175***	-0.0022	-0.0018	-0.0062*	-0.0150*
						(0.0054)	(0.0031)	(0.0045)	(0.0034)	(0.009)
L.logy				-0.0009	0.2670				-0.0009	-0.2667***
				(0.0008)	(0.1932)				(0.0008)	(0.0678)
Linear time trend	No	Yes	Yes	No	No	No	Yes	Yes	No	No
Year fixed effects	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes
Country fixed effects	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Observations	7,463	989	989	7,463	7,463	7,463	989	989	7,463	7,463
Number of countries	205	21	21	205	205	205	21	21	205	205
Sample	Global sample 1961-2009	OECD-21 1961-2009	OECD-21 1961-2009	Global sample 1961-2009	Global sample 1961-2009	Global sample 1961-2009	OECD-21 1961-2009	OECD-21 1961-2009	Global sample 1961-2009	Global sample 1961-2009

Notes: Columns 1 and 6, 2 and 7, 3 and 8, 4 and 9, and 5 and 10 correspond to respectively column 2 in Table 2, column 2 in Table 3, column 5 in Table 3, column 2 in Table 4, and column 2 in Table 5. The notes below the said tables apply.

Table 9: Formerly planned economies

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy
EU	-0.0390***	-0.0173***	-0.0181	-0.0434***	-0.0218**	-0.0123
	(0.0115)	(0.0066)	(0.0167)	(0.0126)	(0.0087)	(0.0146)
L.logy		-0.0012	-0.1850		0.0021	-0.1896
		(0.0016)	(0.1093)		(0.0020)	(0.1210)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	No	Yes	Yes	No	Yes
Observations	642	642	613	497	497	468
R-squared	0.4259	0.4358		0.4371	0.4445	
Number of countries	29	29	29	29	29	29
Sample	1991-2015	1991-2015	1991-2015	1991-2009	1991-2009	1991-2009

Notes: Columns 1 and 4 estimate equation (1); columns 2 and 5 estimate equation (2) ; and columns 3 and 6 estimate equation (3) using dynamic panel methods (difference GMM). *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Fixed effects estimation on EU-28 sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimator		Pooled OLS			Prais-Winsten	
VARIABLES	D.logy	D.logy	D.logy	D.logy	D.logy	D.logy
			Panel A			
EU	0.0002	0.0024	0.0099***	0.0009	0.0006	0.0097*
	(0.0055)	(0.0065)	(0.0027)	(0.0075)	(0.0095)	(0.0051)
Linear time trend	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1.118	979	923	1,118	979	923
R-squared	0.158	0.128	0.176	0.100	0.082	0.116
Number of countries	28	28	28	28	28	28
Autocorrelation coefficient				0.270	0.316	0.284
Sample	EU-28	EU-28	EU-28	EU-28	EU-28	EU-28
	1961-2015	1961-2009	1961-2007	1961-2015	1961-2009	1961-2007
			Panel B			
EU	0.0060	0.0054	0.0058	0.0066	0.0060	0.0072
	(0.0055)	(0.0057)	(0.0056)	(0.0066)	(0.0070)	(0.0071)
Linear time trend	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,337	1,281	1,225	1,337	1,281	1,225
R-squared	0.065	0.067	0.053	0.046	0.047	0.035
Number of countries	28	28	28	28	28	28
Autocorrelation coefficient				0.201	0.231	0.232
Sample	EU-28	EU-28	EU-28	EU-28	EU-28	EU-28
	1951-2011	1951-2009	1951-2007	1951-2011	1951-2009	1951-2007
Data source	PWT	PWT	PWT	PWT	PWT	PWT

Notes: Standard errors in columns 1-3 are long panel-corrected errors, which allow heteroskedasticity and correlation over i. *** p<0.01, ** p<0.05, * p<0.1. Standard errors in columns 4-6 in addition assume AR(1) for each i. The option *pairwise selection* in Stata's **xtpcse** routine is invoked in order to use all observations that can be matched by period between panels i and j.