The United States of Europe: A Gravity Model Evaluation of the Four Freedoms

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The idea of creating a "United States of Europe" has a long history of hopes outstripping achievements. The first well-known statement was by Victor Hugo (1849). Speaking at an International Peace Congress, the author-turned-politician prophesied: "A day will come when these two immense groups, the United States of America and the United States of Europe, shall be seen placed in presence of each other, extending the hand of fellowship across the ocean." He also forecast that inter-European wars would end: "A day will come when the only fields of battle will be markets opening up to trade and minds opening up to ideas." In the century after Hugo's speech, Germany and France went to war three times. At the end of the third of these wars, Winston Churchill (1946) repeated the call to "build a kind of United States of Europe."

The concept of a United States of Europe encompasses three different policy objectives. First, it expresses the wish to end the wars that plagued the continent for centuries. Second, it embodies the hope to unify a market as large and deeply integrated as its counterpart across the Atlantic. Finally, there is the goal of a political union: a subordination of the original nation states under a federal government. What progress has been made towards each of these objectives?

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The current European Union has its origins in the European Coal and Steel Community. The French foreign minister Robert Schuman (1950) explicitly prioritized the peace objective declaring, "The solidarity in production thus established will make it plain that any war between France and Germany becomes not merely unthinkable, but materially impossible." While the experience of the US Civil War cautions against complacency, the European unification project appears to have succeeded at ending war between its members. The Palmer et al. (2015) military dispute data show that there has never been use of force between contemporaneous members of the European Community.

Progress on the third policy objective, political union, has been assessed in two articles in this journal. Feldstein (1997) construes the move towards monetary union as "a way to further the political agenda of a federalist European political union, which will have a common foreign and military policy and a much more centralized . . . economic and social policies." Among other negative consequences, Feldstein predicted that declining competition within the European Union would lead to rising protectionist measures against non-European countries. Seven years later, Alesina and Perotti (2004) open their paper by flatly stating that Europe is not "building a federal state similar to the United States." They argue that deficient institutions and incompatible goals constrain the path of European unification. With these and other disadvantages stacked against the European integration project, there would appear to be little chance of fulfilling the greatest aspirations of Euro-optimists. Of course, Euro-optimism was not universal: the sovereignty concerns voiced by Brexit advocates show that Feldstein was far from alone in viewing greater political centralization as anathema.

The first objective, peace, seems settled; the third, political union, seems remote. What of the second objective, expressed in Hugo's vision of "markets opening to trade"? This goal of reciprocal market openness is an alternative way to envision a United States of Europe. The 1957 Treaty of Rome set out the commitment of the member states to the four freedoms of movement: goods, services, persons, and capital. In this essay, we ask if Europe is approaching the levels of economic integration in terms of these four freedoms found amongst the 50 states of the United States. We report here—with some degree of surprise—a body of quantitative evidence suggesting that, by several important metrics, European states have matched or surpassed the levels of openness prevailing amongst the 50 American states. Furthermore, we find that increased integration within Europe has come from lower intra-European barriers, rather than the rise of a "Fortress Europe" excluding external flows.

We begin with a primer on the phases of European economic integration. Remembering the timing will be useful in interpreting the evidence from a gravity model on flows of goods, people, and capital amongst European countries, as well as some evidence on convergence of prices and incomes.

A Primer on European Economic Integration Policies

The policies fostering EU economic integration can be usefully divided into three phases. The first phase is the original decade-long implementation of the

1957 Treaty of Rome that called for free movement of goods, services, persons, and capital. The policies of the second phase, the Single Market Program (SMP) spanning from 1986 to 1992, were intended to reduce the remaining border-related, non-tariff barriers to all four movements. The third phase began when the Maastricht Treaty entered into force at the end of 1993. The Maastricht Treaty created the European Union along with the European Central Bank and the beginning of movement toward the euro as a single currency. It also created a number of non-economic European institutions, including a common foreign and security policy and cooperation in justice and security.

For the free movement of goods, Article 3a of the Treaty of Rome created a timetable for elimination of tariffs and quantitative restrictions by 1970. Prior to the Treaty of Rome, the six signatories had sizeable tariffs: about 16 to 20 percent for France, Germany, and Italy, and 10 percent for Belgium, the Netherlands, and Luxembourg (1955 unweighted averages from Bown and Irwin 2016, Table 3). Tariffs were eliminated in 1968, which is also the year when the European Community became a customs union with a common external tariff.

By the early 1980s, it had become evident that the removal of formal trade impediments had not fully integrated the European market. Physical borders still impeded the flow of goods, and national product regulations still had the effect of shutting out imports. Prominent examples of the latter included Italy's requirement that all pasta contain 100 percent durum semolina and Germany's law mandating that beers include just the four ingredients authorized by the 1815 Bavarian Purity Law. While both policies would be struck down by the European Court of Justice, a White Paper by the European Commission (1985) titled "Completing the Internal Market" pointed to a broader need to remove technical barriers to trade. It listed 300 measures to implement deeper integration via elimination of frontiers, mutual recognition, and harmonization of regulations. These measures, legislated by the 1986 Single European Act would be implemented by the end of 1992.

Because the provision of services across national borders is often realized through foreign affiliates or embedded in professionals who travel in order to deliver the service, it is not surprising that the three freedoms other than goods—persons, services, and capital—were grouped by the writers of the original Treaty of Rome in Article 3c. Free movement of factors was not just instrumental for liberalizing service trade, it also became a goal in its own right. While the Single Market Program included some services measures, further liberalization would not come until the 2006 "Services Directive" to facilitate cross-border trade. Progress remained slow, leading Brussels to bring a lawsuit against all 28 members for failure to comply (as reported by Brunsden 2019).

Regarding migration, the Treaty of Rome's Article 48 committed members to ensure "free movement of workers . . . within the community" by the end of a 12-year transition period (which would have been in 1970). This provision gave workers the right to travel within Europe in search of employment and it prohibited discrimination on the basis of nationality. Further treaties tried to address some of the remaining impediments to migration within the Union. The 2007 Treaty of Lisbon extended free movement of workers to cover all persons, like retirees.

The Treaty of Rome also called for member states to abolish restrictions on capital flows amongst themselves. Baldwin and Wyplosz (2019) report that little progress was made in this area over the following 30 years, mainly because of loopholes within the Treaty. Article 73 allowed for "protective measures" on capital flows when needed to "avoid disturbances in the functioning of the capital market." When such measures were deemed necessary, member states could act without prior authorization from the European Commission. For example, France asserted the right to deny approval for foreign direct investments above certain thresholds (set at 50 million French francs). The Single Market Program and the Maastricht Treaty finally brought about the promised liberalization in the early 1990s. Starting in 1996, France had to allow all inward investment from EU members and could only apply the restrictions to investors outside the Union (for details, see https://www.senat.fr/rap/l95-191/l95-191_mono.html).

A Gravity Approach to Measuring Economic Integration

Using a gravity model to estimate the impact of trade agreements on bilateral flows goes back to Tinbergen (1962). The moniker comes from an analogy to Newton's gravity where the mass of two objects is replaced with the size of two economies, and trade volumes replacing force exerted. The attraction of the gravity model for our purposes goes beyond historical practice. Modern gravity models allow us to estimate the underlying costs of cross-border movement for all four freedoms in a unified framework.

The crucial insight is that each type of flow can be thought of as the outcome of a discrete choice problem. For goods and services, the choice is between source countries for a given product (as in Eaton and Kortum 2002 and Head, Mayer, and Ries 2009, respectively). For migrants, the choice is the country in which to reside (for an early logit model, see Tabuchi and Thisse 2002; for an application, see Grogger and Hanson 2011). Finally, for capital, we imagine an asset owner seeking to sell to the highest bidder (as in Head and Ries 2008). All these choices can be formalized as an agent selecting the option with the maximum $(A_i/\tau_{ni})z_{hi}$, where A_i captures the attractiveness of option i to all agents, τ_{ni} captures the costs of separation between agents located in n and i, and z_{hi} captures the idiosyncratic factors influencing agent h's choice. With an assumption about the distribution of z (specifically, it comes from a Frechet distribution, with dispersion parameter ϵ), the probability for all agents in n choosing i has the following form:

$$\pi_{ni} = \frac{(A_i/\tau_{ni})^{\epsilon}}{\sum_j (A_j/\tau_{nj})^{\epsilon}}.$$

Getting to a modern gravity model that can be estimated with data takes four more steps. First, the total flow (of goods, migrants, and so on) can be obtained by multiplying the fraction π_{ni}, by the mass of country n's choosers, X_n; that is, $X_{ni} = \pi_{ni} X_n$. The second step is to utilize fixed effects to absorb the country-specific terms: A_i, X_n, and the n-specific denominator in the equation above. Third,

computation becomes more transparent once we realize this structure is (like Newton's gravity equation) linear in logs. That is, ln X_{ni} is linear in i and n fixed effects and ln τ_{ni}. This last term has an elasticity $-\epsilon$ that Arkolakis, Costinot, and Rodríguez-Clare (2012) established to govern the impact of trade costs on economic welfare. The final step, when we move to panel data, is to allow for the characteristics of each country (A_{it}) and the frictions (τ_{nit}) to vary over time.

For goods and services we follow the convention of referring to τ_{nit} as "trade costs"; when speaking of all four movements, we refer to "frictions." The interpretation of τ_{nit} depends on the movement under consideration. For goods, the obvious factors creating trade costs are tariffs and transport costs. For services, there are regulatory restrictions and travel costs for in-person services. For migration, the relevant τ_{nit} determinants are the transferability of human capital (such as acceptance of educational credentials) and the cost of maintaining connections to the origin country. For foreign asset-ownership, there are regulatory impediments as well as the costs of remote management emphasized in Head and Ries (2008). Considering each of these cases, some frictions are continuous functions of the distance, broadly defined, between i and n, but others rise discontinuously at the border. We will control for distance and measure integration of the overall market by its impact on border frictions.

We use a long panel approach to evaluate the success of Europe's policies that have sought to bring about lower impediments to each of the four movements. For trade and migration we can take the data back to 1960, just two years after the Treaty of Rome was implemented. Estimating changes in τ using this long panel has two attractive aspects. First, we can control for all unobserved linkages between country pairs that persist over time by using fixed effects. Second, we can compare the timing of the evolution of estimated τ_{nit} to the timing of single market policies recounted in the previous section.

Studies estimating the effect of trade agreements on τ_{nit} typically specify $-\epsilon \ln \tau_{nit} = \beta\, EU_{nit} + \upsilon_{nit}$, where $-\epsilon$ is again the key elasticity that governs the effect of changes in trade costs on welfare. In this specification, $EU_{nit} = 1$ if i and n are both members of the EU year t and υ_{nit} comprises other determinants of frictions. However, in this paper three distinct concerns motivate us to develop a richer specification of EU effects. First, back to the primer in the previous section, EU integration progressed in phases and did not simply turn on a constant level in a certain year. Therefore we allow for time-varying effects of EU membership; that is, we estimate the β_t coefficient on the EU variable for every year. The second concern is that EU membership obviously does not come about through randomized assignment. It is difficult to imagine what quasi-random variation could be exploited to estimate causal effects of EU membership. Following Baier and Bergstrand (2007), we control for a first-order source of endogeneity: unobservable bilateral frictions and linkages (linguistic and cultural similarity, distance and aspects of physical geography like the English Channel or the Alps). We specify that υ_{nit} includes dyad-ni fixed effects to control for such time-invariant factors, so as to identify EU effects from the long-run evolution of bilateral flows following each members' accession to the European Union.

The first two solutions, time-varying β_t and dyadic fixed effects, were employed in Mayer, Vicard, and Zignago (2019) to study EU effects on trade. Here we address a third concern—applicable to all four freedoms—that becomes apparent only after examining carefully the structure underlying the gravity model. The earlier equation showing the probability of agents in country n choosing i shows us that only relative trade costs matter. If we scale up all the τ, people will be poorer but the movement decisions will not change. There could be strong flows between two countries, say France and Germany, because they impose low barriers on each other, or because they impose high barriers on everyone else (the "fortress Europe" scenario). The appropriate measure of whether EU integration is working is not whether it causes the French to buy more German goods at the expense of fewer purchases of American goods, but whether the French buy more German goods in place of French goods. Estimating EU effects that are directly relevant for welfare therefore requires us to compare international flows to flows with self.[1]

To implement this solution, we distinguish three different types of flows as follows:

$$-\epsilon \ln \tau_{nit} = \beta_t^{EUB} \underbrace{B_{ni} EU_{nit}}_{\text{EU to EU}} + \beta_t^{CET} \underbrace{B_{ni}(1 - EU_{it}) EU_{nt}}_{\text{ROW to EU}} + \beta_t^{ROW} \underbrace{B_{ni}(1 - EU_{nt})}_{\text{ROW imports}} + \upsilon_{nit},$$

where B_{ni} denotes the presence of a national border ($B_{ni} = 1 \Leftrightarrow n \neq i$). In this specification, $B_{ni}EU_{nit}$ indicates within-EU flows that cross a national border. The product $B_{ni}(1 - EU_{it})EU_{nt}$ captures the EU members' flows from third countries, where CET is a mnemonic for the "common external tariff" pertaining to trade flows into the region. Finally, $B_{ni}(1 - EU_{nt})$ corresponds to the flows to the rest of the world, denoted ROW. The standard EU trade effect—the net gains to EU consumers achieved by buying from an EU source instead of an outside country—corresponds to $\beta_t = \beta_t^{EUB} - \beta_t^{CET}$.[2]

The country-pair fixed effects in the panel gravity equations imply that our estimates can inform us about changes in τ_{nit}, but not give its level. In particular, dividing the EU border effect by the relevant friction elasticity and exponentiating (to undo the logarithmic transformation), we measure relative frictions as $\tau_{nit}/\tau_0 = \exp(-\beta_t^{EUB}/\epsilon)$. The baseline τ_0 is the first year of τ_{nit} for ROW destinations. The panel approach

[1] Here we make this comparison using regressions. An alternative approach uses the multiplicative structure of the equation in the text to *infer* what must be the impediments underlying an observed pattern of choices. These friction indices, derived by Head and Ries (2001) for trade flows, use flows to self in a way that makes it possible to distinguish the impediments to within-agreement flows from the ones imposed on nonmembers. As in Novy (2013), the inferred frictions can be regressed on determinants of trade costs. When frictions are symmetric, the Head-Ries index regressions and the gravity regression method (including self trade) yield the same results. However, preferential agreements lead to asymmetric frictions, which only the regression approach can handle appropriately.

[2] Online Appendix A available with this article at the *JEP* website, contains the full structure of the gravity model for goods and reveals the tariff and non-tariff barriers that underlie each of the β_t coefficients. A simulated version of the model demonstrates that the gravity regressions recover the barriers contained in the regression specification in the text. Figure A.1 in this Appendix illustrates the connection between the EU border effect estimate and the implied change in welfare from regional integration.

allows us to assess the progress the European Union has made relative to this benchmark, but it does not reveal the level of integration that the European Union has achieved. For that purpose, we will use in the next section a comparison of two cross-sections, the flow amongst US states and the flow amongst EU members. For goods, migration, and mergers, we can construct the interstate flow matrix in a way that is closely comparable to the international matrix within the European Union. We then can estimate the effect of crossing a border on each of these flows in each "union." Normalizing $\tau_{nn} = 1$, the border effect estimates the average $-\epsilon \ln \tau_{ni}$ for $n = i$. We can then divide the estimated β by an estimate of ϵ from the literature and exponentiate to obtain the implied ad valorem equivalent: AVE = $\exp(-\beta/\epsilon) - 1$. These cross-sectional estimates of the ad valorem equivalent of the border allow us to quantify the level of remaining impediments to movement in the European Union and in the next section compare directly to the United States, which we can think of as a plausible lower bound for impediments.

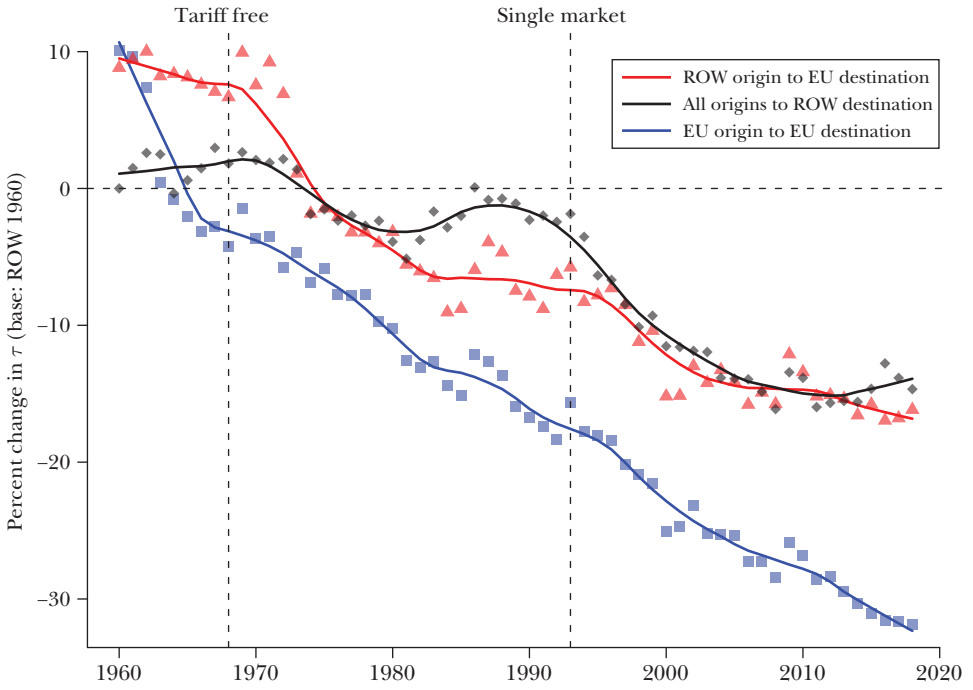
Details of the specific regressions and data we use are in the online Appendix available with this paper at the *JEP* website. All our regressions are estimated with the widely used Poisson pseudo-maximum likelihood estimation (PPML), including origin and destination fixed effects. When using panel data, the origin and destination effects vary over time, and we add dyadic fixed effects that absorb all time-invariant pair characteristics.[3] Here, we will use the share of total expenditure of the importing country as our dependent variable, which is consistent with using the level of trade (as proposed by Eaton, Kortum, and Sotelo 2013, and validated using Monte Carlo simulations by Head and Mayer 2014). Results using levels of trade are also provided in the online Appendix. For migration, the relevant denominator for the share variable is the population in the origin country. For asset transactions, we define shares as the ratios of n's acquisitions from country i relative to country n's total acquisitions. To implement our regression specification, we constructed a set of country-level flows with self for all four movements going back as far as 1960 for trade in goods and migration. While other datasets have created self-trade series—most recently the International Trade and Production Database for Estimation (ITPD-E) from the US International Trade Commission—those datasets have shorter time spans and do not include flows such as capital and migrants.

First Movement: Goods

Here, we evaluate the impact of six decades of efforts to facilitate trade in goods within the European Union. Figure 1 shows results obtained when estimating our augmented gravity equation on all the bilateral trade flows recorded from 1960 to 2018 (online Appendix B.2 describes how we constructed this data). The blue squares show the percentage change in implied trade costs (τ_{nit}) for trade between two members of the European Union relative to imports to the rest of world in 1960. In backing out the changes in τ from the left-hand side of the regression equation, we use the median of the literature's estimates for the critical elasticity

[3]Weidner and Zylkin (2019) prove consistency of the three-way fixed effect estimator under Poisson.

Figure 1
Estimates of the Evolution of Trade Costs in Europe: Goods



Source: See online Appendix B.2 for data sources.
Note: Each point is obtained by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -5$, exponentiating, subtracting one, and multiplying by 100.

as collected by Head and Mayer (2014), $\epsilon = 5$. The red triangles show the trade costs EU members impose on their imports from the rest of the world. The black diamonds are the changes in trade costs of non-EU members (regardless of origin) relative to the base year. We can see that intra-EU trade started out 10 percent more costly than export to the rest of the world, then falls sharply during the period of tariff reductions, and then continues to decline until the present. The total decline is 38 percent. Trade costs by EU countries on outsiders have also fallen considerably, by 23 percent.

The striking finding here is that bringing self-trade into the estimation reveals a much larger trade-liberalizing trend than the traditional approach exemplified in Mayer, Vicard, and Zignago (2019). The worry was that the bias would go in the opposite direction: rising EU external protection could have been interpreted as rising internal integration. What the red triangles show is that the European Union actually lowered its external barriers.

Baier, Bergstrand, and Feng (2014) were the first to show that deep trade agreements take over a decade to realize their full integration gains, estimated to be about a doubling of trade. Limão (2016) summarizes the broader evidence on free trade agreements with a focus on deep integration agreements such as the European

Union. As we do here, he estimates the three-way fixed effect model. However, Limão estimates a single coefficient capturing the total effect of deep integration agreements. To compare our time-varying effects to his specification (which does not include internal trade), we take the difference in differences between the initial and the final coefficients for EU-EU and ROW-EU. In 1960 the two were nearly the same, but a large gap emerges by 2018, implying a standard EU effect estimate of 1.1, which amounts to a tripling of trade (that is, $\ln(3) = 1.1$). This is remarkably similar to the 1.2 coefficient estimated by Limão.[4]

The dashed vertical line in 1968 in Figure 1 shows the point at which tariffs ceased to be collected on intra-EU trade. In the years leading up to this, the steep fall in the blue squares shows the rapid progress towards integration inside the European Union. Even after tariffs had been eliminated, the persistent downward trend in the blue squares implies that internal liberalization continued at a steady pace until the present day. Starting in the early 1970s, the imports of EU member countries originating from non-EU countries also grew quickly. This attenuates the bias of EU members to trade within the bloc, which dampens the growth of the standard EU effect (the difference between the blue and the red estimates). The reason both types of trade can increase at once, even after controlling for origin-year fixed effects, is that EU members were trading less and less intra-nationally, which is the relevant criterion for welfare-improving regional liberalization.[5] The figure reveals declining intra-EU trade costs both before and after 1992 (shown with the second dashed line)—the year the single market program was completed. All in all, Figure 1 conveys an optimistic message of continuous progress for EU integration in goods.

Second Movement, Persons

While economists have been using gravity equations to estimate the trade effects of regional agreements since the 1960s, attention did not turn to the estimation of EU effects on migration until recently. However, development economists have long used gravity to study migration with a particular focus on migrant networks (for a survey, see Beine, Bertoli, and Moraga 2016). Important advances integrating trade and spatial economics (Redding 2016; Redding and Rossi-Hansberg 2017) show that the incentive to migrate depends in part on the openness to trade of the destination country. In a model featuring changes in both trade and migration costs, Caliendo et al. (2020) quantify the sources of welfare gains to the countries joining the European Union as part of the 2004 eastern enlargement. They report 30 percent of the gains come from trade policy, 68 percent from migration policy and 2 percent from the interaction of these two. For the European Union as a

[4] Using levels of trade instead of shares delivers a much lower difference in differences, as can be seen in online Appendix Figure C.2. The reason our Poisson in shares is more similar to Limão (2016) than our own Poisson in levels coefficient is that he uses a linear-in-logs specification. Eaton et al. (2013) show that Poisson in shares results are closer to the linear-in-logs specification. Head and Mayer (2014) explain this proximity in results using the underlying features of those estimators.

[5] Building on Costinot and Rodríguez-Clare (2014), section A.3.1 of the online Appendix explains why welfare effects of trade agreements move inversely with the share of intra-national trade.

whole, a calculation from Table 7 of Caliendo et al. (2020) reveals that the relative contributions of trade and migration are almost inverted, with 63 percent from trade and 35 percent from migration.

Here we estimate the EU effect on migration, following the same specification used for trade in goods. The literature on gravity equations in migration mainly uses migration flows as the dependent variable. The problem with migrant flows is that intra-national flow data are not widely available. Our regressions use United Nations and World Bank migration datasets on the number of residents by country of birth. "Migration to self" is the count of people who live in the country they were born in (calculated by subtracting the stock of immigrants from the total population).

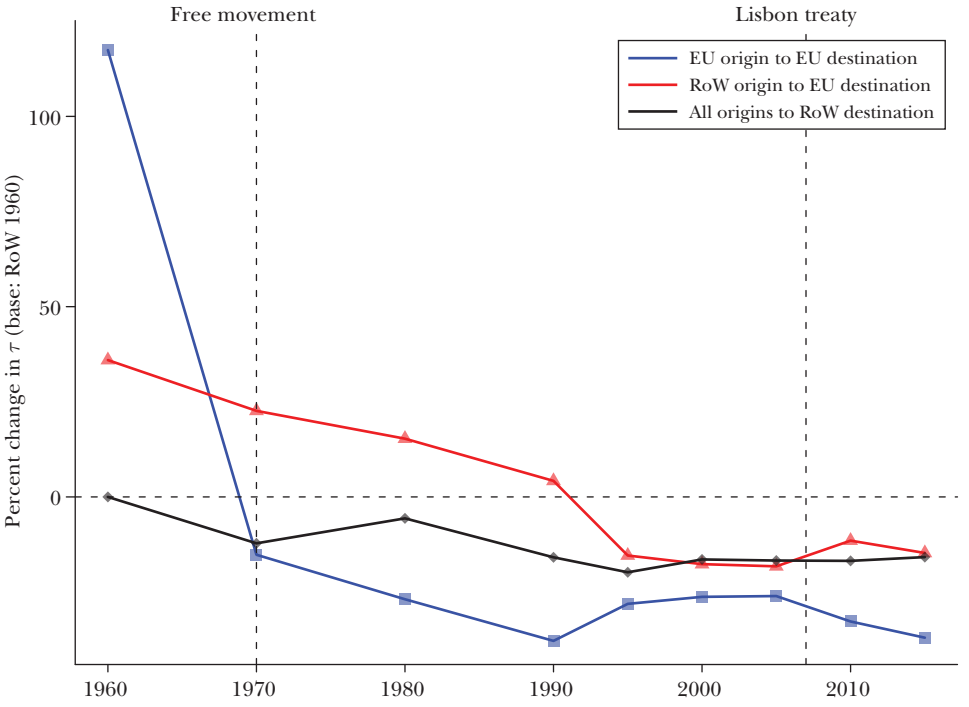
Figure 2 depicts the changes in migration frictions implied by the gravity β_t coefficients. As with trade flows, we need an estimate for the key elasticity ϵ to do this. As there is currently no consensus value for the appropriate migration elasticity, we summarize the estimates from ten recent influential papers in online Appendix Table B.1. The starting point for this miniature meta-analysis of the migration elasticity is the review in this journal by Kleven et al. (2020) of estimates of the response of high earners to the highest income tax rates. We complement this line of research with a recent stream of work in economic geography. While the public finance literature seeks this elasticity to inform optimal taxation, the work in geography values the elasticity because of the critical role it plays in counterfactual policy experiments. The median estimate for a migration cost elasticity is $\epsilon = 1.63$.

As we saw with trade in goods, the implied migration impediments within the European Union started out more onerous than those imposed by the rest of the world. Over the 1960 to 2015 period, the implied frictions for intra-EU migration (depicted with blue squares) fall by 71 percent. Most of the reduction in intra-EU migration impediments occurs during the 1960s. This is in line with the rapid schedule of liberalized migration promised in the Treaty of Rome for its original members. Thereafter the pace of integration slackens. Intra-EU migration frictions in 2015 are no smaller than they were in 1990. Relative to 1960, the implied tax on immigration from non-members (the red triangle coefficients) falls by 37 percent. There is much less migration liberalization in the rest of the world. Non-EU migrant frictions (black diamonds) falls by just 16 percent. The results depicted here for migration reinforce the conclusion obtained with trade data: Fears of "Fortress Europe" were unfounded.

Third Movement, Services

Baldwin and Wyplosz (2019) note: "Even to this day, the tension between allowing EU members to take care of their own regulation of services has prevented truly free trade in services." Integration of the service sector has not only been harder to achieve in practice, but also harder to measure. The literature on services integration is correspondingly smaller, but two recent papers have estimated the EU effect. Using Eurostat data on tradeable services, Mayer, Vicard, and Zignago (2019) obtain a coefficient of 0.18. On a comparable sample of goods flows they estimate an

Figure 2
Estimates of the Evolution of Migration Frictions in Europe



Source: See online Appendix B.3 for data sources.
Note: Each point is obtained by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -1.63$, exponentiating, subtracting one, and multiplying by 100.

EU effect of 0.32. Heiland, Felbermayr, and Groeschl (2020) use the World Input-Output Database (with coverage from 2000 to 2014) and estimate larger EU effects for services (0.60) than for goods (0.43).

One of the distinctive advantages of the World Input-Output Database is that it contains intra-national trade flows, including for services. We therefore apply the same time-varying border effect analysis that we used for goods and migration to the case of services. This enables us to estimate the evolution of implied trade costs in services when a member of the EU imports from another member, when it imports from a third country, and when imports are from a rest-of-world country.[6]

[6]In contrast to Heiland, Felbermayr, and Groeschl (2020, table A2), we separate all the welfare-relevant border effects and let them evolve over time. Another distinction is that we keep only tradable services in the regression, dropping a number of International Standard Industry Classifications (construction, water distribution, electricity, sewerage, health, education and government services) that Heiland et al. attribute to services in the aim of running counterfactuals. With this change in industry coverage, the equivalent coefficients to the ones in table A2 of Heiland, Felbermayr, and Groeschl (2020) for goods and services are closer (0.43 and 0.48).

Figure 3 shows that frictions for services within the European Union are declining, as we have already seen for goods and migration. Again, to back out the changes in frictions, we need an estimate of the trade cost elasticity. Estimating this parameter for services is difficult because of the absence of tariffs and measurable transport costs. We therefore keep the same elasticity as we use for goods, which essentially assumes that the degree of heterogeneity in tastes or productivity revealed by this parameter is similar for goods and services. Using this $\epsilon = 5$, we can express the tariff equivalent of trade costs in services inside the European Union as being 11 percent smaller than when a non-EU country imports services in 2000. Over time, our estimates imply that those trade costs fell by 8 percent within the European Union. The European Commission, disappointed by the pace of reductions in barriers to service trade, issued a "Services Directive" in 2006. The data does not seem very impressed, and friction estimates continued on roughly the same trend line, perhaps explaining why the European Union recently brought a lawsuit for non-compliance against the 28 members. On a more positive note, we see from the red triangles that trade costs imposed on outsiders fell by 12 percent over the 2000–2014 period. Hence, we see no more evidence of "Fortress Europe" for services than for goods or migration.

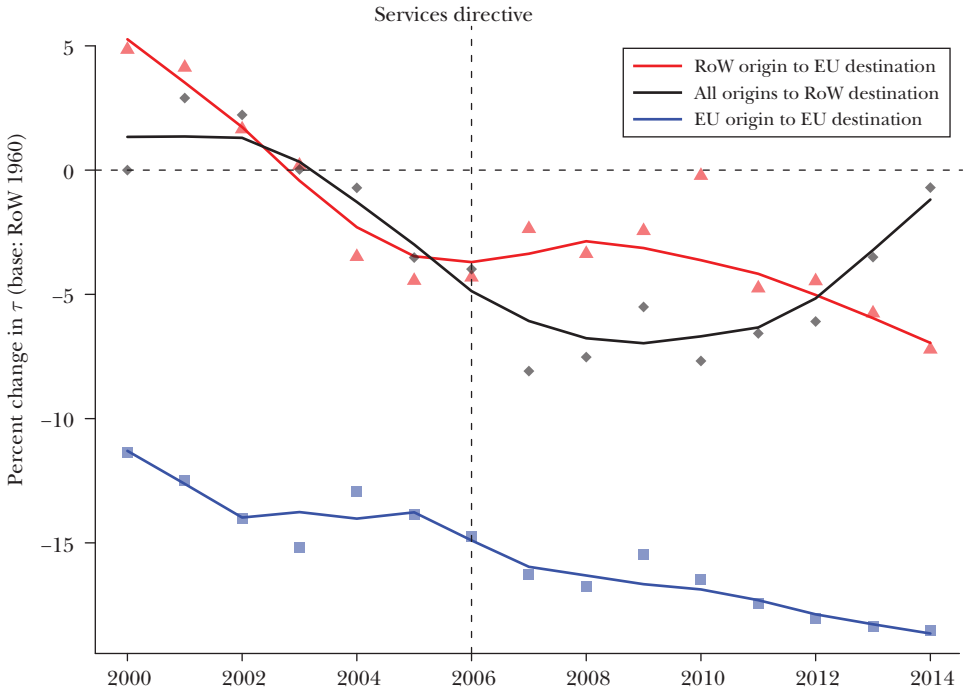
Fourth Movement, Capital

Unlike the first three freedoms, where there is an obvious flow to use in gravity model estimation, there are multiple measures of capital flows we could consider, including foreign direct investment, portfolio investment, and mergers and acquisitions. Foreign direct investment is probably the most studied form of capital flow but there is no straightforward way to measure foreign direct investment to self (nor to measure foreign direct investment between states in the United States). Noting that Head and Ries (2008) find a 0.94 correlation between inward foreign direct investment and merger and acquisition flows for OECD countries, we see promise in examining mergers and acquisitions as a capital flow measure. The data easily allow for consistent calculation of merger and acquisition flows to self as well as the flows amongst American states that we will need later in the paper to compare levels of frictions.

Coeurdacier, De Santis, Aviat (2009) show that bilateral merger and acquisition flows are higher when both countries are members of the European Union. They use Securities Data Company (SDC) Platinum data to measure the flows of bilateral mergers and acquisitions but restrict attention to international transactions over the years 1985 to 2004. We also use SDC Platinum as the source for flows of mergers and acquisitions, but we extend it until 2018, and most importantly, we augment it with internal flows of mergers and acquisitions.

To convert the β_t coefficients into tax equivalents, we need the elasticity of capital flows with respect to taxes on cross-border movement. Ahern, Daminelli, and Fracassi (2015) estimate the elasticity of transaction values with respect to one plus the tax rate to be 5.03 (in column 1 of their Table 3). Coeurdacier, De Santis, and Aviat (2009) estimate a tax semi-elasticity of 4.46. Head and Mayer (2004) estimate a host-country tax semi-elasticity of 2.1 in a study of location choice of Japanese

Figure 3
Estimates of the Evolution of Trade Costs in Europe: Services

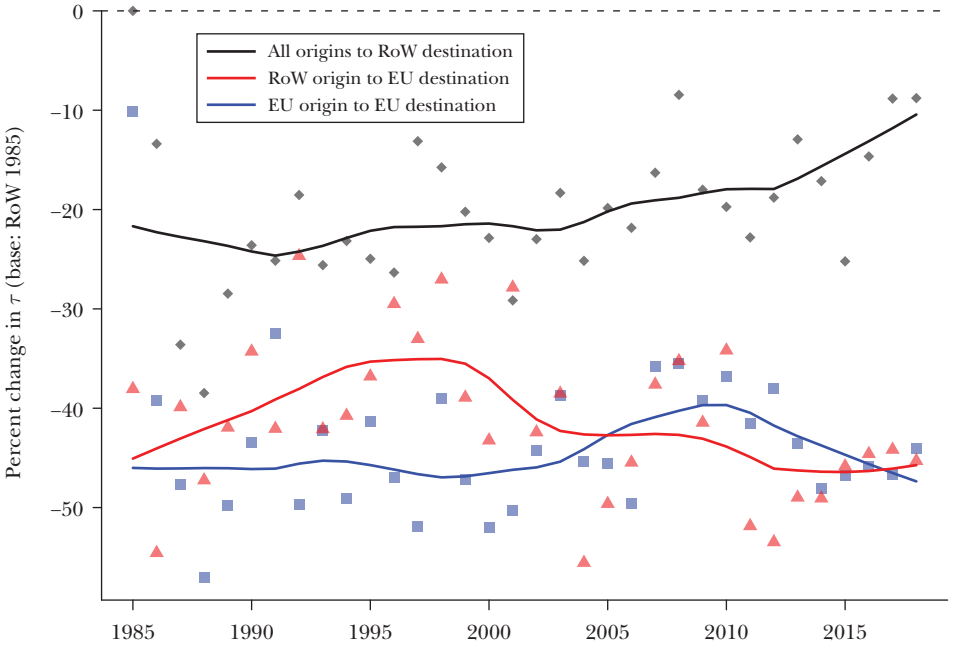


Source: See online Appendix B.4 for data sources.
Note: Each point is obtained by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -5$, exponentiating, subtracting one, and multiplying by 100.

investments in Europe. We average these three estimates to obtain $\epsilon = 3.86$ as an estimate of the key elasticity.

Figure 4 depicts the time-varying border cost measured in ad valorem equivalents (AVEs) corresponding to EU acquirers of EU targets (blue squares), their non-EU acquirers of EU targets (red triangles), and transactions in the rest of the world (black diamonds). The normalization follows our practice in the other figures of using rest-of-the-world in the first year of the data. However, rest-of-the-world mergers and acquisitions in 1985 were very low compared to other years. The pattern we see in the figure is highly volatile from year to year so we smooth the data (using locally weighted smoothing). Over the 30 years of our data, EU members show little evidence of systematic bias in transactions against outsiders. However, our estimates imply EU targets are much less costly to acquire than targets in the rest of the world (the black diamonds). The absence of a clear upward trend in the blue squares from 1985 to 2018 tells us that membership in the European Union has not lowered the tendency of mergers and acquisitions activity to stay within borders of EU members, except possibly in the last decade.

Figure 4
Estimates of the Evolution of M&A Frictions in Europe



Source: See online Appendix B.4 for data sources.
Note: Each point is obtained by differencing with respect to the 1960 ROW-border coefficient, dividing by $-\epsilon = -3.86$, exponentiating, subtracting one, and multiplying by 100.

Comparing Levels of Border Barriers with the United States

We now compare flows inside the European Union and inside the United States to determine whether frictions within the 62-year old European Union have fallen to a level comparable to a federal state where many formal barriers have been banned for over two centuries. The regressions we discuss in this part of the paper are a simplified version of the ones from the previous section. Here, the estimation includes only intra-EU flows. Since $EU_{nit} = 1$ for all flows, and we estimate using cross-sectional data, our earlier regression equation collapses to $-\epsilon \ln \tau_{ni} = \beta B_{ni} + \upsilon_{ni}$. This leaves us with only one border coefficient to be estimated (β), which measures the tendency of EU countries to trade less with EU partners than with themselves. We then estimate an analogous equation where the flows are between and within the 50 American states. For both EU and US regressions, we control for distance (between and within the trading partners), but for the European Union we add a common language dummy. Head and Mayer (2010) show that border effects can be systematically overestimated if we use excessive distances to self. The Constant Elasticity of Substitution distance indexes used here should mitigate this problem. Even if some bias remains, we can still compare EU and US

border effects in the plausible case that approximately the same bias pertains in both areas.

For this investigation, we are limited to the three freedoms for which we can obtain comparable data for interstate flows in the United States (the EU part of the analysis retains the same datasets as in the previous section). Trade in goods within the 50 American states is measured using the Commodity Flow Survey (CFS). We use two issues of the CFS separated by 20 years, 1997 and 2017, and estimate a cross-section for each of those years. Migration data for the United States is constructed using the 2000 decennial census and the 2015 edition of the American Community Survey. Both provide a bilateral matrix of place of birth by state of current residence. As in the previous section, we use mergers and acquisitions transactions as our measure of capital movement, recognizing that it may not be representative of all types of capital. A very attractive feature of this flow is that SDC Platinum lists the state of both the acquirer and the target for almost all the transactions taking place in the United States. To the best of our knowledge, there is no US interstate data on trade in services.

Table 1 reports the tax equivalents of the border costs for each flow, region, and period. Recall that the ad valorem equivalent is calculated as $\text{AVE} = \exp(-\beta/\epsilon) - 1$, where β denotes the border coefficient. The gravity elasticities ϵ are the same ones from the previous section: 5.0 for trade, 1.6 for migration, 3.9 for mergers and acquisitions. For details of the regressions, including the raw coefficients on border, distance, and language, see online appendix Tables C.3, D.2, and F.1.

We begin with trade in goods. The data collection for the interstate trade is somewhat different from normal trade data, and there are issues with wholesale trade (discussed in Hillberry and Hummels 2003, and our online Appendix). While we need to be cautious in interpreting the border effects in the United States, it is not clear which way the bias goes relative to the European Union; indeed, it is not clear that the changes would be biased at all. Comparing EU15 countries in 1997 and 2017, as shown in Table 1, we see the revealed trade costs drop from 19 to 13 percent. Over the same period, the implied cost of trading across borders of American states falls from 11 to 10 percent. The confidence intervals on the ad valorem equivalents estimated for 2017 are sufficiently wide so that EU15 trade barriers are not significantly higher than US barriers. Moreover, if we consider the large EU28 (which includes the 2004 expansion into Eastern Europe), the point estimate of trade barriers actually falls below that for states in the United States.

When examining levels of border effects, differences in methods can make a big difference. For example, Head and Mayer (2000) estimate border coefficients ranging from 3.0 (1978–80) to 2.5 (1993–95). Using $\epsilon = 5$, this works out to ad valorem tariff equivalents of 82 and 65 percent. Using more comparable methods and data, we obtain in the online Appendix a border coefficient of 1.94 with a corresponding ad valorem equivalent of 47 percent in 1997 (with those methods, 28 percent for the states of the US economy). Another example of how border effects depend on the estimation method comes from Santamaría, Ventura, and Yesilbayraktar (2020). Taking advantage of newly available subnational flow data in the European Union

Table 1
EU Border Effects Compared to Their US Counterparts

Type of flow	*United States*		*European Union*		
	1997	*2017*	*EU15 1997*	*EU15 2017*	*EU28 2017*
Goods	11	10	19	13	8
Migrants	233	256	2,302	2,304	1,929
Mergers and Acquisitions	23	48	42	8	36

Note: Amount in each cell is the ad valorem equivalent (AVE) of τ for state or national borders. For migrants, the early year is 1995 (European Union) and 2000 (United States) and the late year is 2015. For mergers and acquisitions, the early period pools 1995–1998 and the later period pools 2015–2018.

(resembling the US Commodity Flow Survey), their approach does not require estimates of distance to self. In their study, the average ratio of within-border to cross-border log normalized market shares for comparable region pairs is 1.74, which implies a tariff equivalent of 42 percent for the period 2011–2017. While higher than our estimates, there are so many differences in data and method that we should use caution in comparing these amounts.

The second row of Table 1 compares border costs implied by within-EU migration to those implied by US state-to-state migration data. A first striking takeaway is how large those revealed tax rates are: leaving your European country of birth amounts to a tax-equivalent of 2300 percent (which barely changes over time, consistent with the flat migration costs since 1990 in Figure 2). The implied migration costs for the United States are also very high compared to trade costs, but an order of magnitude lower than the EU migration frictions. Mobility across American states is evidently easier than across EU countries, but still surprisingly costly.

How can we reconcile the de jure freedom of movement in the European Union since 1970 with these extremely high tax equivalents of migration frictions? One set of potential answers lies in the variety of institutions that erode the earnings or consumption potential for migrants. For example, for the purposes of pension benefits, years of work in one country are not always portable to the other countries. There are limitations on the transferability of employment insurance benefits. Finally, Baldwin and Wyplosz (2019) point out that recognition of professional qualifications remains imperfect: they give the example of French licensing rules that effectively exclude hairdressers from the rest of Europe. The United States also features some limitations of this kind, such as the requirement to pass legal exams in each state where a lawyer would like to practice.

The above examples notwithstanding, the estimated tax equivalents may be overestimated because the migration literature has underestimated the migration cost elasticity. Using instead the $\epsilon = 5$ that we do for trade flows, the ad valorem equivalent falls to 165 percent in the EU28 in 2017 and 51 percent for the United States. The trade literature has the advantage of using bilateral variation in trade costs, coming from tariffs or freight rates to estimate the cost elasticity. In contrast, the migration elasticity estimates rely on destination-level variables, such as real wages

or income taxes. When Eaton and Kortum (2002) use wage variation to estimate the elasticity for trade, they obtain a lower estimate than is typically found using tariff variation. We conjecture that if the migration gravity literature could find bilateral cost shifters, the elasticity estimates would be larger, lowering the implied tax of the border. Resolving this issue is also important because of the welfare implications of freer migration that are implied by this elasticity.

The final row of Table 1 shows the ad valorem equivalent of the implied border costs for merger and acquisition transactions in the United States and different definitions of the European Union. The US estimate of 48 percent for the 2015–2018 pooled years is surprisingly high. The European Union appears to exhibits lower cross-border frictions in the firm acquisition market, particularly when we confine the sample to the longer-standing EU15. From the late 1990s to the late 2010s, it appears that the EU15 market for corporate control has become considerably more free. One caveat is that even with the help of pooling four years in each period, the merger and acquisition data are noisy and the standard errors on the border effects are large. The confidence intervals for the various estimates of the ad valorem equivalent overlap considerably. The key point, however, is that for this measure of freedom of capital movement, the European Union is not significantly behind the United States and might even have passed it.

Kalemli-Özcan et al. (2010) and Ekinci, Kalemli-Özcan, and Sørensen (2009) examine capital market integration in the United States and the European Union from a very different angle and render a different verdict. While we focus on merger and acquisition flows because of the geographic detail, they use a broad measure of capital flows: the ratio of output (GDP) to income (GNI). This ratio diverges from one when the economy becomes a net recipient of income earned abroad. Kalemli-Özcan et al. (2010) find that their model-based test does not reject full capital market integration for states in the United States. Ekinci, Kalemli-Özcan, and Sørensen (2009) find less integration in the European Union and attribute some of the frictions to absence of trust between countries. These studies not only differ from our approach in terms of methodology, they also use earlier data; the US and EU data finish in 2000 and 2003, respectively.

The cross-sectional evidence on the levels of border effects in the United States and European Union should be viewed cautiously given the various measurement issues. However, the results provide additional evidence that the European integration project has succeeded in the market for goods, but less progress has been made on integration with respect to migration.

Price-Based Measurement of the EU Effect

The natural complement to measuring EU economic integration based on quantities in the context of a gravity model is to look at differences in prices. This approach is motivated by the Law of One Price: essentially, if the same good is being sold in the same market, it should sell for a single price. An implication is that as trade costs fall, competitive pressures should lead to convergence in the prices paid

by consumers. Anderson and van Wincoop (2004) use simulations from a modified version of Eaton and Kortum (2002) to show that the bilateral price gaps are informative about the extent of trade costs between two countries.

Price-based methods have mainly been applied to assess market integration for goods, but one can also view real wage gaps as measures of the degree of labor market integration. The incentive to migrate depends importantly on variation in real per capita income. Across a region where migration is relatively easy, we expect movement of people to put pressures on incomes to fall where they start out high and vice versa. This argument suggests that dispersion of real incomes across countries is complementary to the gravity evidence on migration: as border impediments decline, we should see both a decrease in the border effect in migration and shrinking dispersion of real incomes.

Price-Level Index Convergence

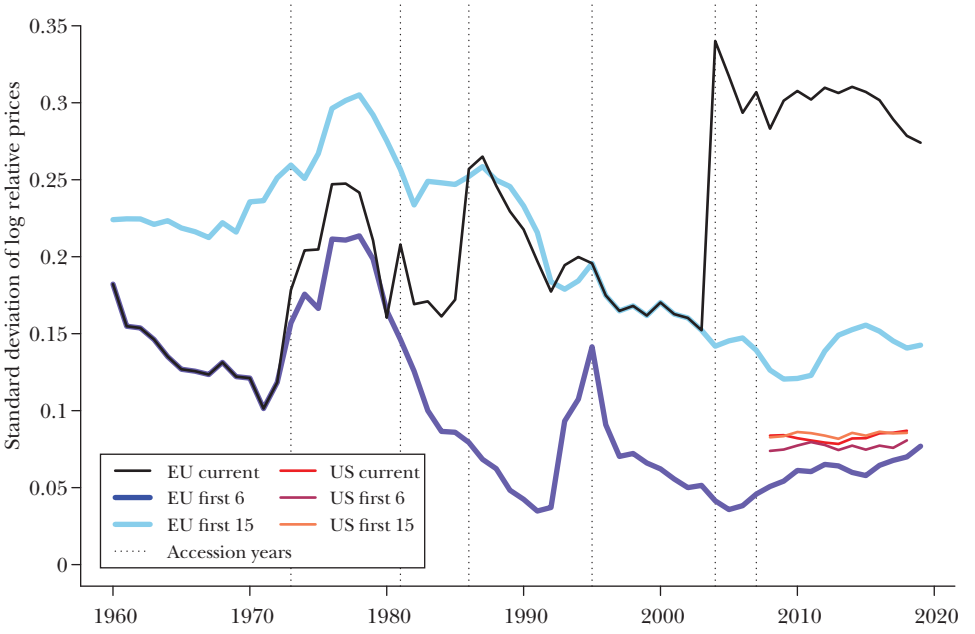
We start with aggregate evidence on price convergence, taking advantage of an OECD dataset on purchasing power parities (PPP) for each country going back to 1960. The price level index of GDP is calculated as the PPP exchange rate per US dollar divided by the market exchange rate in each year. We take logs and calculate the standard deviation year by year over different subsets of countries and years.

The number of EU members has expanded over time, bringing dissimilar countries into the Union. When measuring price-level convergence, it is thus useful to look at different groups. In Figure 5, the heavy purple line shows price-level index convergence for the original six members of the Treaty of Rome in 1957. The light blue line shows price convergence across the 15 countries that joined the European Union by 1995. The light black line shows price convergence across the 28-country membership of the European Union, including the countries that joined after 2004, but before the exit of the United Kingdom.

While the solid lines in Figure 5 show different groups of countries; the vertical dashed lines show dates when additional countries joined the European Union. Figure 5 reveals three periods of price convergence. The first is from 1960 to 1971, which coincides with the removal of tariffs and quantitative restrictions amongst the original six members (shown in purple in the figure). The broader group of 15 countries who join the European Union by 1995 does not exhibit this convergence at this time, suggesting that the price-level convergence among the EU6 was not some general European effect like reduced transportation costs. For the EU15 group of countries (the light blue line), a clear phase of convergence follows the accession of low-price countries Portugal and Spain in 1986. Finally there is some modest convergence of the full set of EU members following the 10-country accession in 2004. The two cases of divergence in the EU6 price levels in the late 1970s and early 1990s come from real depreciation of the Italian lira relative to the other original members. From 1995 forward, Italy's prices cease to deviate markedly from the other core EU countries (for an illustration of price level convergence in Italy, see online Appendix figure B.1).

How does this price convergence across Europe compare to the experience of the United States? Starting in 2008, the US government began to estimate what it

Figure 5
Price-Level Variation across EU Members and US States



Source: Source: See online Appendix B.6 for data sources.
Note: The first 6/15 US states are determined by order of admission to the European Union. For the EU, the first 6 are signatories of the Treaty of Rome (1957) and the first 15 are members as of 1995.

calls regional price parities. To preserve an analogy with the way we carry out the EU calculations, we consider the whole set of 50 states as well as the first six and the first 15 American states. The latter subsets comprise more proximate economies. The striking finding is that original EU founders have slightly less price-level dispersion than American states, regardless of which set of states we use. However, the broader EU28 group of countries exhibits more than three times as much price dispersion as American states, pointing to incomplete integration of the more recent joiners.

Measuring overall price-level convergence has the advantage of comprehensiveness: both goods and services enter the index, weighted according to their relative importance in the economy. The disadvantage is that most services are not actively traded across borders. Furthermore, there is little reason to believe that the mix of product varieties and qualities offered in say, Portugal, are the same as those available in Denmark. These considerations motivate us to investigate whether prices of specific, consistently defined, tradeable goods have been converging over time.

Product-Level Price Convergence: A Case Study of Three Cars

Several studies have examined the relationship between EU integration and price convergence at the level of detailed products, typically using a sample of products tracked over time. Like us, Crucini, Telmer, and Zachariadis (2005) measure

price dispersion as the standard deviation of log prices. Their sample has 594 products in 1975, and this figure rises to 1,101 in 1990. Furthermore, their survey adds the low-wage countries Greece, Portugal, and Spain in 1980. These changes may explain why price dispersion jumps by 6 percentage points from 1975 to 1980. However, price gaps in their study then fell slightly from 0.28 in 1980 to 0.26 in 1990. Changes in the relative importance of goods might matter, as the authors show that there is a lot of heterogeneity across goods. This points to the importance of keeping the sample of products and countries constant.

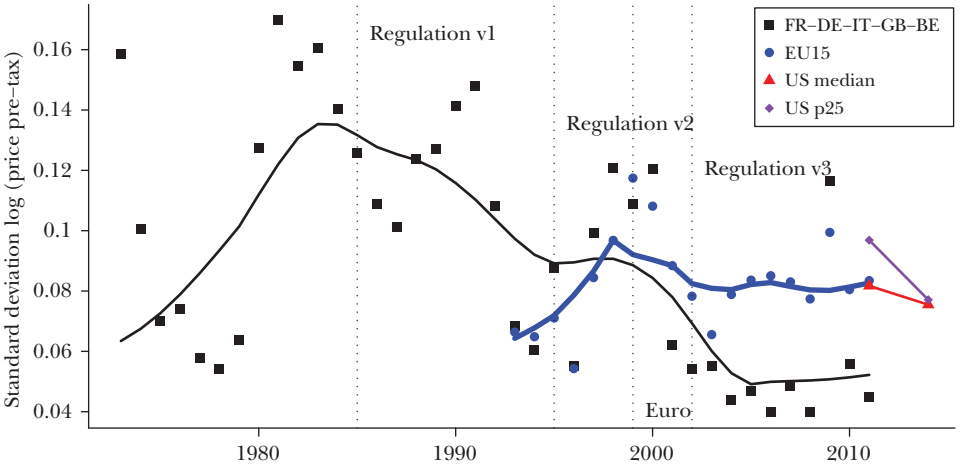
Méjean and Schwellnus (2009) also analyze cross-country prices for detailed (eight-digit) products. They consider exports from France to the EU15 countries (those that had joined the European Union by 1995) and to the rest of the world. They show lower absolute price variation within the European Union, but it is fairly flat at about 30 percent from 1995 to 2004. They interpret their results as market integration increasing arbitrage pressures. Verboven et al. (2020) examine price dynamics for desktops, laptops, smartphones, and tablets for ten EU members from 2012 to 2015. They find "international price differences appear to be large and persistent . . . . There is no obvious indication that price differences are lower online." Given the short time period, their study is silent on whether cross-sectional variation has been declining over time.

Large gaps in car prices across EU members have long been the subject of scrutiny. In response, the European Commission (2011) reported price data for a large set of car models between 1993 and 2011. They collected prices on versions of each model with common engine size and trim across all countries. We augmented the 1993–2011 European Community dataset with Goldberg and Verboven (2005) data from 1970 to 1999 for Germany, France, Italy, the United Kingdom, and Belgium, giving us four decades of data on a stable set of products. To preserve a standard comparison over the longest possible period, we focus on three major models that have been available in all major EU markets since the 1970s: the Honda Civic (introduced in 1973), the VW Golf (1974), and the Ford Fiesta (1976).

Figure 6 plots the evolution of the standard deviation (across countries) of the log of these three car prices across countries, on a before-tax basis. The black squares show price dispersion in the five large markets from 1973 to 2011 using both datasets. The blue circles depict standard deviations over the 15 members of the European Union since 1995 (relying solely on the European Commission data). Although we use just three models, they do not appear to be outliers. Dvir and Strasser (2018) use all models from the European commission sample and also calculate standard deviations of the log pre-tax price fluctuating in the 0.05–0.1 range over the 1993–2011 period.

The main takeaway of Figure 6 is that after a period of noisy dispersion of car prices in the 1970s, we mainly see convergence in prices in the 1980s and 1990s for the five major markets shown with black squares. Degryse and Verboven (2000) review the large hedonic price literature on car prices and report similar time patterns. The declining trend in price dispersion starting in the late 1980s is also consistent with Goldberg and Verboven (2005), who find strong support for the hypothesis that European integration resulted in price convergence. In the late

Figure 6
Car Price Differentials



Source: See online Appendix B.6 for data sources.
Note: Regulations v1, v2, and v3 refer to the three versions of EU texts regulating the block exemption of the motor vehicles industry regarding distribution (see https://ec.europa.eu/competition/sectors/motor_vehicles/legislation/legislation_archive.html).

1990s, the core five countries shown by the black squares and the broader EU15 have similar levels of dispersion. A period of price convergence follows that is more pronounced for the core group of five countries than for the EU15 countries.[7]

While much of the price dispersion seems related to exchange rate fluctuations, actions by the European Commission also appear to have curbed the tendency of firms to segment the market and price discriminate across consumers. Vertical dotted lines in Figure 6 shows the timing of revisions of the rules about how carmakers can choose their distribution system. Our figures (including the ones in Appendix H) show that the 2002 revision might have been the most efficient in promoting car price convergence. In 2011, when the European Commission discontinued reporting of model-level prices for cars (at https://ec.europa.eu/competition/sectors/motor_vehicles/prices/report.html), it explained, "the situation has improved greatly, in part due to enforcement action by the Commission, and also thanks to the increased availability of price information on the internet."

As a way of benchmarking the level of price convergence for these three models of cars, we compare the level of price dispersion across US states. For that purpose, we use Consumer Expenditure Survey micro data from 2010 to 2015. When

[7]Online Appendix H.3 shows the same figure including taxes. This does not change the pattern much for the five nations shown by the black squares in Figure 6, but it leads to much wider dispersion in prices in the EU15 countries, driven chiefly by the high taxes charged in Denmark and Finland. Also, Appendix H shows the shorter sample constructed by the European Commission that covers a wider range of countries. This data shows greater convergence in the EU15 countries, a pattern also reported by Gil-Pareja and Sosvilla-Rivero (2008) and Sosvilla-Rivero and Gil-Pareja (2012).

disaggregated to the state level, the number of observations for small-population states is sometimes too small to be reliable. Therefore, we pool the state-level data into two periods, 2010 to 2012 and 2013 to 2015 and compare those two periods (for further details, see online Appendix B.6). Since the Consumer Expenditure Survey does not provide model-level prices, we compute measures of dispersion based on the median and 25th percentile prices. The latter may be more appropriate since the Fiesta, Civic, and Golf are relatively inexpensive cars, but it turns out not to matter much. The bottom line is that car price dispersion across the EU15 seems to have reached a level strikingly close to the one observed in the United States. Aside from 2009 (when UK pound depreciation increased dispersion), the five large EU countries appear to have less car price dispersion (0.04–0.06) than the US states (0.08–0.11). The efforts of the European Commission to reduce car price dispersion appear to have been successful in the five large EU markets.

As a final comparison, we use state-level incomes in the United States and national-level incomes in Europe, adjusted by purchasing power parity exchange rates, to calculate the standard deviations of real log incomes in each period. For the United States, we use state-level personal incomes from the US Bureau of Economic Analysis adjusted by the corresponding regional price parities. For EU real incomes, we combined data from the Penn World Tables and World Development Indicators (online Appendix B.6 provides detail on the calculations).

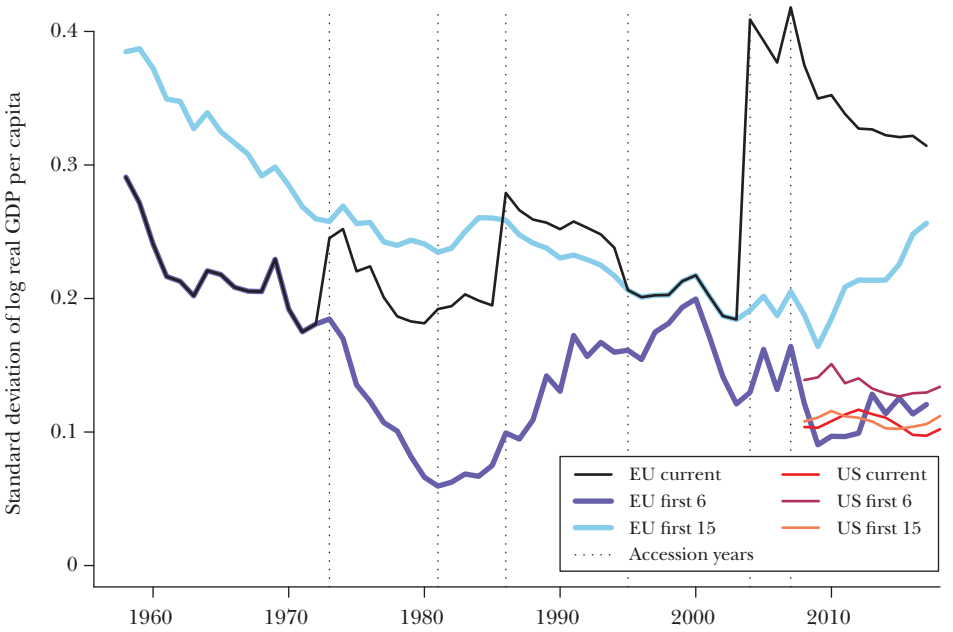
It is again useful to divide the results for Europe into the original six countries that signed the Treaty of Rome in 1957, the EU15 group that were members by 1995, and the EU28 group that represents the countries that are currently members of the European Union (although this data includes the United Kingdom, which has of course recently left the Union). Figure 7 shows that adding new members creates big jumps in real wage variation, followed by periods of steady convergence. This occurs after the admission of Ireland in 1973, Portugal and Spain in 1986, and even more impressively after the eastern EU enlargements in 2004 and 2007.[8] Looking at fixed sets of countries eliminates the upward jumps that occur when low-wage countries join. The founding EU members have a downward trend in real income variation that lasted until the early 1980s. The real incomes of the 15 countries who had joined by 1995 mainly converged until the most recent decade. The most remarkable finding in Figure 7 is that even after a recent resurgence of inequality, dispersion among the founding six EU nations is about the same as among the US states: about 0.10 to 0.13 over the last decade.

Conclusion

In terms of formal institutions, the European Union is not on the verge of becoming a "United States of Europe." But on multiple fronts, EU economic

[8]Various studies have considered the evidence on real wage or income convergence in the European Union, but most have focused on "beta convergence" and unit root tests. Quah (1993) compellingly argues that this approach suffers from Galton's fallacy.

Figure 7
Real Income Variation across EU Members and US States



Source: See online Appendix B.6 for data sources.
Note: The first 6/15 US states are determined by order of admission to the Union. For the EU, the first 6 are signatories of the Treaty of Rome (1957) and the first 15 are members as of 1995.

integration now matches or even beats the equivalent measure for the 50 American states. This is remarkable. The United States has more than 230 years as a federal state with a constitutional prohibition on barriers to interstate commerce. Of course, all comparisons with the United States require caution since the last two additions for the United States occurred in 1959, whereas 22 countries have joined the European Union since that year, with the most recent entrant (Croatia) joining in 2013. Perhaps the most useful comparison across the US states is with the EU15, which includes the entry of some lower-income states but has had constant membership since 1995. The border tax equivalents implied by flows of goods and merger and acquisition transactions within the EU15 have reached the levels estimated for US states. When measuring integration as convergence in price levels, the EU15 is quite similar to the American states. Focusing on a product for which we have detailed and comparable measures across all countries—compact, mass-market cars—we confirm the finding for the aggregate price index: the American states and the EU15 are again very similar.

Regarding what may be the most politically sensitive of the four movements, migration, our estimates suggest that barriers remain considerably higher in Europe. Despite the absence of formal restrictions on movement, Europeans act as if their

human capital is very heavily taxed by moving countries. This lack of mobility across European borders likely reflects a variety of labor market frictions and cultural differences. On the other hand, the incentives to move have fallen substantially within the EU6, with dispersion in real incomes now essentially the same as that in core eastern states of the United States. Real income variation is three times as high in the European Union as a whole, but enlargement has been followed by a trend towards equalization, so there is little reason to think the EU28 has reached a steady state in terms of income disparities across its members.

A potential objection to the rosy view of EU integration depicted above is that a rising inward orientation for the European Union could arise from construction of higher barriers imposed on flows from the rest of the world—unification via "Fortress Europe." However, adapting the gravity equation to allow for such a possibility, we find the opposite tendency prevails. With respect to goods, services, and migration, the European Union is increasingly open to the rest of the world. Rising intra-EU flow shares have come from falling intra-national shares, precisely the pattern needed for welfare to rise in standard trade models.

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