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Economic and Financial Integration in Europe[1]

ABSTRACT

We use industry valuation differentials across European countries to study the impact of membership in the European Union as well as the Eurozone on economic and financial integration. In integrated markets, discount rates and expected growth opportunities should be similar within one industry, irrespective of the country, implying narrowing valuation differentials as countries become more integrated. Our analysis of the 1990 to 2007 period shows that EU membership significantly lowers discount rate and expected earnings growth differentials across countries. By contrast, the adoption of the euro is not associated with increased integration. Our main finding that EU membership increases integration, while euro adoption does not, remains unchanged when the sample period is extended to 2016. However, we observe that the EU membership effect is smaller between 2008 and 2016 compared to the pre-crisis period.

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INTRODUCTION

For a long time, ever-larger flows of goods, capital and labor across national borders were seen as the welcome consequences of increased globalization. Indeed, financial economists have documented how policy changes like capital market liberalization reduced market segmentation, improved the allocation of capital, and ultimately spurred economic growth. However, the benefits of economic openness, as well as the institutions built around it, are increasingly questioned by politicians and voters alike. In June 2016, the unthinkable happened when UK citizens voted to exit the European Union ("Brexit"). It is therefore timely to assess the historical contribution of specific institutions whose policies and very existence are in doubt. In this article, we perform such an assessment for Europe; and more specifically, we examine the role that the European Union (EU) and the common currency (euro) have played in the financial and economic integration of Europe.

After World War II, the EU set out to free the movement of goods, services, capital and labor between its member countries. With a growing number of European countries joining the EU, barriers between member countries disappearing, and the introduction of a common currency, the EU and, later, the euro have been perceived as the driving forces behind the integration of European economies. However, European integration happened against the backdrop of an integration process across the world (Bekaert et al. 2011). Differentiating between a global trend and the effects of EU membership and euro adoption is, of course, critical when evaluating the consequences of the United Kingdom leaving the European Union, or Greece reintroducing its own currency in place of the euro.

Unlike existing studies on European equity market integration, which have focused on equity returns (see, e.g., Fratzscher 2002, Adjaouté and Danthine 2004, Baele 2005, and Hardouvelis, Malliaropulos and Priestley 2006), we use equity market valuations. Specifically, we evaluate financial *and* economic integration in Europe through the lens of stock market valuations of industry portfolios in different countries. Stock market valuations reflect financial integration through its impact on discount rates, as well as economic integration through its impact on capitalized growth opportunities. Integration should lead to "valuation convergence" of similar firms across different countries. Hence, we assess the degree of bilateral integration in Europe and the impact of the EU and the euro by determining whether, in a given country-pair, similar assets are valued similarly across both countries.

Most of our study focuses on the pre-crisis period from 1990 to 2007, which covers the expansion of the EU across many countries, the completion of the "single market", as well as the introduction of the euro. We initially examine the effect of EU membership on bilateral valuation differentials, as well as its components, discount rates and growth opportunities. We then consider the adoption of the euro in addition to EU membership on valuation differences between countries. Finally, accounting for EU membership and euro adoption, we also confront the recent crisis years by extending our sample period through August 2016.

MEASURING INTEGRATION

We assess financial and economic integration in Europe by measuring the extent of equity market segmentation in Europe. Our measure of market segmentation was first introduced by Bekaert et al. (2011) and has since been used by a number of researchers (see, for example, Goyenko and Sarkissian 2014; Beck et al. 2016). It is based on the simple intuition that two markets are integrated if similar assets are valued similarly.

As a starting point, consider the Gordon growth model, which assumes that the discount rate, r, is constant and expected earnings grow at a constant rate, g. If a firm pays out all earnings every year, its earnings yield simply is r-g. Hence, in this simple model, discount rates and growth opportunities are linearly related to earnings yields. Let us also assume that systematic risk is industry rather than firm specific and that the industry structure is sufficiently granular so that industries are

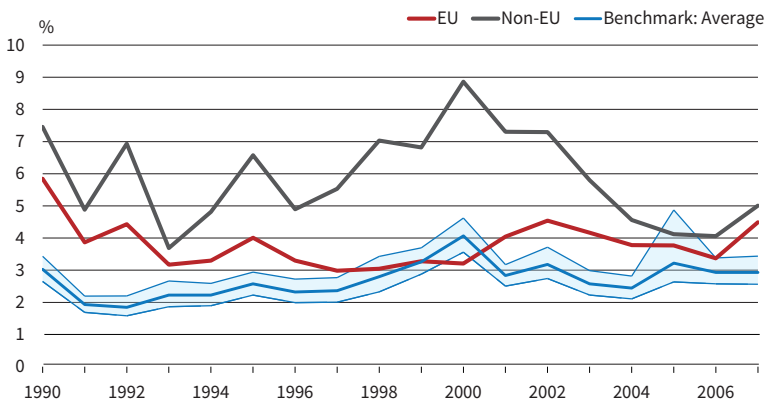
[1] This article is a shortened and updated version of "The European Union, the Euro, and Equity Market Integration," which was published in the Journal of Financial Economics in 2013. A working paper version of the original article is available for free at SSRN: https://ssrn.com/abstract=1573308.

comparable across countries.[2] Financial market integration then equalizes industry betas, as well as industry risk premia across countries. Furthermore, assume that in economically integrated countries, persistent growth opportunities are mostly industry rather than country specific or at least rapidly transmitted across countries. This is plausible as firms in the same industries face similar production processes and market conditions (again, under the null of free competition and lack of trade barriers). It then follows that the process of market integration should cause valuation differentials between industries in different countries to converge. We build on this intuition to create bilateral valuation differentials that serve as our segmentation measure.

Figure 1

Benchmarking segmentation

Full sample: 1990–2007, annual frequency



This figure presents average bilateral segmentation between 1990 and 2007 for all EU and Non-EU country pairs. For comparison, the figure shows the average US benchmark segmentations level (constructed for the set of all European countries) together with a 90% confidence interval.

Source: The authors.

Specifically, let $EY_{i,k,t}$ denote industry k's earnings yield in country i at time t and $EY_{j,k,t}$ the corresponding value for the same industry k in country j. Our main variable of analysis is the absolute value of the difference between the two industry valuations, $|EY_{i,k,t} - EY_{j,k,t}|$. The weighted sum of these bilateral industry valuation differentials is our measure of the degree of equity market segmentation between these two countries:

$$SEG_{\mathrm{i,j,t}} = \sum_{k=1}^{N_{i,j,t}} IW_{i,j,k,t} \, |EY_{i,k,t} - EY_{j,k,t}|,$$

where $IW_{i,j,k,t}$ is the relative market capitalization of industry k and $N_{i,j,t}$ is the number of industries for country-pair (i,j) at time t.[3]

Bekaert et al. (2011) discuss several biases in this segmentation measure, such as country-specific differences in financial leverage and in the volatility of earnings growth rates and discount rates. In addition, the number of firms in a particular industry should affect the accuracy of the measure. However, it is straightforward to control for these biases in a regression analysis, which is what we do.

Unlike the standard approach in the international finance literature that relies on historical return correlations or systematic risk exposures to *estimate* measures of segmentation (see Bekaert, Hodrick and Zhang 2009, and the references therein), our measure requires nothing more than industry-level valuation ratios, which are observed at every point in time.

EUROPEAN INTEGRATION OVER TIME

We construct our measure of annual bilateral valuation differentials, *SEG*, for a sample of 33 European countries listed in Appendix Table 1, using firm-level data from Datastream from 1990 to 2007. Using the Industry Classification Benchmark (ICB) framework, we form 38 value-weighted industry portfolios for all countries. For each country-pair, we compute *SEG* as described above. The number of country-pairs with non-missing data grows over time, from 120 country-pairs in 1990 to a maximum of 528 country-pairs.

During our main sample period from 1990 to 2007, the average segmentation level between European countries is 5.1%. However, for country-pairs for which both countries are EU members, the average segmentation is only 3.8%. While substantially lower than the level of non-EU country-pairs (6.0%), it is not clear whether this level is "close" to integration or not. That is because the segmentation measure uses absolute differences in earnings yields, it need not be zero even under full financial and economic integration. Therefore, we use US equity market data to measure the average level of segmentation for fictitious, randomly created, country-pairs that mimic our European pairs, but exclusively reflect US valuations.[4] To the extent that the US is financially and economically integrated, this exercise provides a meaningful benchmark to judge whether European country-pairs are segmented or not.

Figure 1 shows the average segmentation level for all EU and non-EU European country-pairs between 1990 and 2007. EU country-pairs are country-pairs where both countries are EU members, all other coun-

[2] We also assume that the world real interest rate is constant. It is well known that that real interest rate variation does not account for much variation in valuation ratios.

[3] The relative market capitalization of a given industry is calculated as the combined market capitalization of the industry in both countries divided by the combined market capitalization of all industries in both countries. With this weighting scheme, the industry structure of the country with the larger equity market has more influence on the segmentation measure.

[4] In particular, we use all US stocks that are covered by the Center for Research in Security Prices (CRSP) and Compustat to form country-industry portfolios by randomly drawing firms from the US data set, mimicking the number of firms found in a given country-industry portfolio in a given year in our European data. We then use these US data-based country-industry portfolios to calculate bilateral segmentation measures as described above. We repeat this process 500 times and thus obtain a distribution of the average level of bilateral segmentation.

try-pairs are non-EU country-pairs. At all times, EU country-pairs are less segmented than non-EU country-pairs. Figure 1 also shows the average, randomly created US benchmark segmentation level corresponding to the set of all European country-pairs, together with a 90% confidence interval. It is worth noting that, even though the US is an integrated market, the level of measured segmentation was mostly in the 2% to 4% range. With the exception of 2005, the valuation differentials of non-EU country-pairs were above the 90% confidence interval of valuation differences in the US. By contrast, the segmentation levels measured across EU countries were similar to those in the US by 2000. After 2000, segmentation was again larger across EU members than in the US, but still lower than for non-EU pairs. Importantly, this does not necessarily mean that EU membership was the cause of integration. For example, a plausible alternative hypothesis is that the general movement towards global market integration led to narrower valuation differentials across equity markets in the EU. We use a regression framework to address this question.

THE EU AND INTEGRATION

One potential problem with our full sample underlying Figure 1 is that the sample is unbalanced. Moreover, with the emergence of Eastern European countries in the 1990s, the sample composition changes substantially over time. We therefore focus our analysis on a balanced sample of the 120 country-pairs for which we have data since 1990. This sample excludes all Eastern European countries (see Appendix Table 1 for a list of all countries included). For this balanced sample of 2,160 observations, the average overall level of bilateral segmentation is 3.8%, 3.4% for EU country-pairs and 4.6% for non-EU country-pairs.

We investigate the effect of EU membership on bilateral equity valuation differentials, using a linear regression model and controlling for several potentially confounding factors:

$$SEG_{i,j,t} = a + b_{EU}EU_{i,j,t} + b_X X_{i,j,t} + c_{i,j} + d_t + \varepsilon_{i,j,t},$$

$EU_{i,j,t}$ is an indicator that is one in year t if both countries are EU members and zero otherwise, $X_{i,j,t}$ represents a set of controls related to the construction of the segmentation measure,[5] $c_{i,j}$ and d_t represent country-pair and year fixed effects. Their inclusion yields a difference-in-differences (DID) estimation, whereby the EU effect is identified by country-pairs' changes in EU membership status, while year fixed effects capture potential global integration trends. All standard errors are robust to arbitrary correlation over time within country-pairs and across country-pairs within years. Adjusting standard errors for contemporaneous correlation across country-pairs is particularly important given that country-pairs that share one country are not independent of one another.

[5] Specifically, we include the sum of the number of firms from both countries (in natural logs), as well as the average absolute difference in industry leverage, industry earnings growth volatility, and industry return volatility for a given country-pair in a given year. For details, see Bekaert et al. (2013).

Table 1, Column 1 reports the first main result. For brevity's sake, we report only the coefficient estimate and the associated standard error for the effect of EU membership.[6] EU membership reduces bilateral segmentation by 1.43 percentage points (*pp*) or by about 31% relative to the segmentation level of non-EU country-pairs.

From the Gordon growth model, we know that such a convergence in earnings yields represents a convergence in the cost of equity capital (i.e., expected returns) and/or expected earnings growth. While we measure absolute differences, EU membership typically reduced earnings yields towards the levels observed for existing EU members. Hence, our results indicate that EU membership is accompanied by a reduction in the cost of capital and/or an improvement in growth opportunities. Measuring these effects separately is of considerable interest, because the EU's impact on financial market integration likely operates through changes in the cost of capital, whereas changes in expected earnings may have been associated with a variety of EU-induced measures to promote trade, labor mobility and competition.

Using an empirical three-equation model of annual returns, earnings growth rates and earnings yields at the country-industry portfolio level, we estimate country-industry discount rates ($DR_{i,k,t}$) and growth opportunities ($GO_{i,k,t}$). We then form two measures of segmentation between countries *i* and *j*, reflecting differences in cost of capital and in growth opportunities between these countries:

$$SEG^{DR}_{i,j,t} = \sum_{k=1}^{N_{i,j,t}} IW_{i,j,k,t} |DR_{i,k,t} - DR_{j,k,t}|$$

$$SEG^{GO}_{i,j,t} = \sum_{k=1}^{N_{i,j,t}} IW_{i,j,k,t} |GO_{i,k,t} - GO_{j,k,t}|$$

The first measure, SEG^{DR}, captures the degree to which industry-level discount rates differ between two countries, i.e., the degree to which markets are not financially integrated. However, the second measure, SEG^{GO}, highlights the degree to which industry-level expected growth rates differ for a country-pair, which could reflect economic integration. As above, we focus on segmentation measured in December of each year, starting, if available, in 1990, and ending in 2007.

Table 1, Columns 2 and 3 report the results for the same DID estimation as for the aggregate segmentation measure (*SEG*). These results suggest that joint EU membership was associated with significantly lower cross-country differences in discount rates (-4.34 *pp*). The financial integration effect was sizeable and consistent with the evidence in Hardouvelis, Malliaropulos and Priestley (2007), who show that the cross-country dispersion of industry-level cost of equity dropped in Europe in the 1990s. However, the integration effects associated with EU membership went beyond the discount rate channel and also implied lower cross-coun-

[6] For the full set of results, see Bekaert et al. (2013).

try differences in earnings growth rates (-3.98 *pp*).

THE EU OR THE EURO?

The introduction of the euro in 1999 constituted another momentous change in Europe. Most, but not all, EU countries adopted the euro, with some joining later and others like the UK, Sweden and Denmark, declining to join the currency union. Given that euro adoption was often viewed as the culmination of the process towards economic and monetary integration within the EU, it is conceivable that our finding that the EU significantly contributed to equity market integration is, in fact, due to the adoption of the euro, rather than to EU membership per se.

While it is possible that our results are related to the introduction of the euro, it is also conceivable that EU membership and the move towards global market integration already integrated EU equity markets before the advent of the euro. By 1999, regional and global market integration may have moved far enough along for the euro to have only small effects. In addition, ex ante we would expect the process of financial market integration to be more important for equity valuations than the adoption of a single currency, as currency movements account for only a small part of the total variation in equity returns.

Table 1

The impact of the EU on financial and economic segmentation in Europe

Balanced sample: 1990–2007 (annual frequency)

	SEG 1	*SEG*^{DR} 2	*SEG*^{GO} 3
EU - indicator	**-0.0143** (0.0045)	**-0.0434** (0.0105)	**-0.0398** (0.0114)
Number of observations	2,160	1,962	1,962
Adj. R^2	0.47	0.49	0.27

This table reports coefficient estimates and standard errors for linear regression models of pairwise segmentation. All standard errors are robust to heteroskedasticity and to arbitrary correlation across country-pairs in a given year as well as across years for a given country-pair. All specifications contain additional control variables as well as year and country-pair fixed effects. Coefficient estimates with absolute t-statistics larger than 1.96 appear in bold.

Source: The authors.

Table 2

The EU and the euro

Balanced sample: 1990–2007 (N = 2,160; annual frequency)

	Dependent variable: *SEG* 1	 2
EU - indicator	**-0.0145** (0.0045)	**-0.0142** (0.0045)
Euro - indicator	0.0028 (0.0030)	
Exchange rate stability indicator		-0.0008 (0.0045)
Adj. R^2	0.47	0.47

This table reports coefficient estimates and standard errors for linear regression models of pairwise segmentation. All standard errors are robust to heteroskedasticity and to arbitrary correlation across country-pairs in a given year as well as across years for a given country-pair. All specifications contain additional control variables as well as year and country-pair fixed effects. Coefficient estimates with absolute t-statistics larger than 1.96 appear in bold. N denotes the number of observations.

Source: The authors.

In Table 2, Column 1, we report results from our baseline model when adding a euro indicator variable to the specification from Column 1 of Table 1. The euro indicator equals one if both countries in a country-pair are part of the euro area in a given year and zero otherwise. Perhaps surprisingly, we find a positive, although statistically insignificant effect of the euro on market segmentation. These results suggest that it is hard to make a case for a strong euro effect on market integration within Europe during our sample period. Importantly, the EU effect is not significantly impacted by the introduction of the euro indicator.

It is quite conceivable that some of the effects ascribed to the introduction of the euro in the literature on this topic are simply induced by EU membership. For example, Hardouvelis, Malliaropulos and Priestley (2006) find that several euro-adopting countries experienced increased equity market integration during the 1990s, while the UK did not; but they do not formally compare the effects of EU membership and euro adoption. Moreover, Engel and Rogers (2004) find no tendency of goods prices to converge after January 1999, but find a significant reduction in price dispersion throughout the decade of the 1990s. Goldberg and Verboven (2005) similarly document substantial price convergence in the EU's car market throughout the nineties, although absolute price differentials persisted until the end of their sample in 2000. Hence, the EU, not the euro, led to the integration of consumer markets.

However, there may have been strong *indirect* effects of the euro related to the original mission of the EU. After all, the Maastricht Treaty, drafted in 1991 and officially adopted in November 1993, set out a path to harmonize national regulation, which would culminate in economic and monetary union and the eventual adoption of the euro. It is possible that some of the EU effects we detect are related to changes only occurring in the 1990s with the adoption of the Maastricht Treaty. However, in our opinion, the euro effect should measure the actual effect of the single currency, not the capital, trade, and labor market integration that may have preceded it.

Nevertheless, we test an additional specification that changes the timing of the euro effect. We recognize that preparations for the euro may have been long underway and countries may have undertaken measures to limit exchange rate volatility some time before the euro was actually adopted.

We test the anticipation effect directly by replacing the euro indicator by an exchange rate stability indicator, which is inversely related to exchange rate volatility. Using daily exchange rates for all of our countries relative to the Deutsche Mark before 1999 and relative to

the euro thereafter, we assign the value of one to a country with zero exchange rate volatility (i.e., to all euro countries once they adopt the euro) and a value of zero to a country with 12% annual volatility (roughly that of a major floating currency).[7] For a country-pair, we employ the average value of the two countries in a pair. In Column 2 of Table 2, we show that the effect associated with this alternative measure based on exchange rate volatility is similar to the effect of the euro indicator. While the stability variable indeed moves up prior to the introduction of the euro as exchange rate volatility decreases, the estimated euro effect is essentially zero. Furthermore, the introduction of this alternative indicator has little impact on the coefficient on the EU indicator.

Table 3

Robustness

1990–2007 (annual frequency)

	At least 5 firms 1	Equal weights 2	Full sample 3
EU - indicator	**-0.0250**	**-0.0125**	**-0.0134**
	(0.0083)	(0.0041)	(0.0054)
Euro - indicator	0.0037	0.0013	**0.0096**
	(0.0035)	(0.0029)	(0.0044)
Number of observations	2,145	2,145	3,918
Adj. R^2	0.36	0.37	0.36

This table reports coefficient estimates and standard errors for linear regression models of pairwise segmentation. Column 1 includes only industry-country portfolios with at least five firms in a given year. The segmentation measure in Column 2 uses equally weighted averages of industry valuation differentials. Column 3 uses data from the full, unbalanced sample. All standard errors are robust to heteroskedasticity and to arbitrary correlation across country-pairs in a given year as well as across years for a given country-pair. All specifications contain additional control variables as well as year and country-pair fixed effects. Coefficient estimates with absolute *t*-statistics larger than 1.96 appear in bold.

Source: The authors.

ROBUSTNESS

So far, we have documented a significantly lower earnings yield differential associated with EU membership, but not with euro adoption. In Table 3, we report three robustness checks.

Firstly, in Column 1 of Table 3, we consider a segmentation measure that only includes those industries that contain at least five firms in a country and year. This should improve the precision of our segmentation measure. Implementing this rule, we lose 15 observations as no common industries are left to construct the segmentation measure. The EU effect increases by 1.00 *pp*, suggesting that measurement error may have reduced our estimate. The coefficient on euro adoption is again not significantly different from zero.

Above, we have defined our segmentation measure as the *value*-weighted average industry valuation differential. An industry's value is the sum of the industry's equity market capitalization across both countries in a country-pair. In Column 2 of Table 3, we report results when measuring bilateral segmentation as the *equally* weighted average across industries.[8] The estimated EU effect is again quite similar to the one for the value-weighted segmentation measure, at -1.25 *pp*. The euro effect is once again insignificant.

Finally, in Column 3 of Table 3, we investigate whether our results hold in the full, but unbalanced sample that uses all of our data, including many Eastern European countries whose data become available throughout the 1990s. We again include only those industries that contain at least five firms in a country and year. We find a significantly negative EU effect (-1.34 *pp*). The euro effect is positive, and, perhaps surprisingly, statistically significant (0.96 *pp*), providing further evidence that euro adoption did not increase integration in our framework.

In the results reported here, we identify the effect of the EU through changes in EU membership status. In untabulated results again using the full, unbalanced sample, we explore an alternative identification by modelling EU membership as a function of a country's distance to Brussels, which does not vary over time and addresses concerns that a country joins the EU as a function of time-varying economic conditions. We do indeed find that the maximum distance to Brussels for a given country-pair is significantly negatively related to the pair's EU membership status. Using the distance to Brussels as an instrument, we find that EU membership retains its significantly negative effect on bilateral valuation differentials. Indeed, the effect is more prominent, suggesting that country-pairs with higher valuation differentials were more likely to become EU members, biasing the previous results against finding an EU effect. For details, see Bekaert et al. (2013).

EUROPE IN TIMES OF CRISIS

Since the end of 2007, Europe has experienced a global financial crisis, several sovereign debt and banking crises, and most recently the decision of the United Kingdom to leave the EU. Our results show that EU integration efforts led to significantly lower segmentation between EU member states than non-member states up to 2007. This finding holds when explicitly controlling for the introduction of the euro, which by 2007 had not contributed to the increased equity market integration in Europe. Our results imply that policymakers should be particularly concerned with preserving "EU institutions" so that the current euro crisis does not endanger the past accomplishments of economic and financial integration

But have the recent crises already "undone" some of the integration benefits that EU countries experi-

[7] The measure is derived as a non-linear transformation of the volatility, σ, of a country's exchange rate relative to the Deutsche Mark and later the euro. Specifically, we transform the volatility into a stability measure on a [0,1] scale by computing $1/\exp(100\sigma)$.

[8] We again only include those industries that contain at least five firms in a country and year. Without this requirement, the corresponding EU effect drops to -0.21 *pp*.

Table 4

Market integration in times of crisis

Monthly frequency: January 1990–August 2016

	1990–2007	1990–2016	
	1	2	3
EU - indicator	**-0.0209** (0.0050)	**-0.0214** (0.0047)	
Euro - indicator	**0.0074** (0.0024)	**0.0092** (0.0024)	
EU - indicator until 2007			**-0.0221** (0.0047)
EU - indicator after 2007			**-0.0181** (0.0056)
Euro - indicator until 2007			**0.0072** (0.0024)
Euro - indicator after 2007			**0.0096** (0.0031)
Number of observations	25,402	37,882	37,882
Adj. R^2	0.42	0.38	0.38

This table reports coefficient estimates and standard errors for linear regression models of pairwise segmentation *(SEG)*. The segmentation measure is constructed for all country-pairs in the balanced sample, using Datastream industry index data at the monthly frequency. All standard errors are robust to heteroskedasticity and to arbitrary correlation across country-pairs in a given year as well as across years for a given country-pair. All specifications contain additional controls as well as time and country-pair fixed effects. Coefficient estimates with absolute t-statistics larger than 1.96 appear in bold.

Source: The authors.

enced prior to 2007? To address this question, we extend our sample to include data through August 2016, covering the same country-pairs as the balanced sample above. Unlike in our pre-crisis analysis, we employ monthly rather than annual data. This allows us to extend the sample through the Brexit referendum in the UK, rather than ending the sample in 2015.[9]

In Column 1 of Table 4, we show the monthly results for the 1990–2007 sample period to compare with the annual results in Table 2. The key results remain intact, constituting another robustness check of our main results. The EU effect is a bit stronger than the result in Table 2 and not too far from the finding in Table 3, where we restricted the sample to industries with at least five firms to minimize measurement error. We do find a small, but now significantly positive euro effect, which is not surprising given the positive euro effects shown previously in Tables 2 and 3.

Columns 2 and 3 of Table 4 report results for the extended sample period through August 2016. Column 2 reveals that extending the sample and increasing the number of observations by about 50% does not substantially affect the overall estimates of the EU and euro effects. The EU effect remains essentially unchanged, while the euro effect increases slightly, probably reflecting the differential economic impact of the euro crisis within the Eurozone. In Column 3, we separately estimate the EU and the euro effect for 1990 to 2007 and 2008 to 2016. We find that the EU effect changed from -2.21 *pp* during the earlier period to -1.81 *pp* during the more recent period. On the other hand, the euro effect changed from 0.71 *pp* to 0.96 *pp*. The combined effect of EU membership and euro adoption changed from -1.49 *pp* during 1990 to 2007 to -0.85 *pp* during 2008 to 2016.

[9] A second difference is that we use Datastream's pre-calculated industry indices instead of industry indices we constructed from the bottom up. In a few cases, index coverage by Datastream begins after firm-level coverage, so that we are missing 518 observations (1.3% of the expected sample size without missing observations) between 1990 and February 1992. Starting in March 1992, the data set is fully balanced.

CONCLUSIONS

Using industry-level equity market valuations, we measure financial and economic integration among European countries and study the effects of joint EU membership and euro adoption on bilateral segmentation. Our measure is based on average differences in industry earnings yields and the assumption that, in financially as well as economically integrated markets, industry earnings yields converge.

Our main result reveals that between 1990 and 2007, bilateral earnings yield differences were about 1.50 *pp* lower if both countries were EU members. EU membership significantly lowered both discount rate differentials (financial integration) as well as expected earnings growth rate differentials (economic integration) across countries. Importantly, we do not find that euro adoption increased financial and economic integration between European countries.

Extending our sample period through August 2016 does not alter our main finding: EU membership increases integration, while there is no evidence in our analysis that the introduction of a common currency has had a positive impact on integration. However, the extended sample analysis reveals that integration benefits due to EU membership decreased somewhat during recent years, while segmentation between Eurozone countries increased slightly.

Both our novel measure of integration and our results may be relevant for the important decisions facing policymakers, as well as for the future research that will analyze their actions.

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Appendix Table 1

Countries, sample composition, EU membership, and euro adoption
1990–2007

Country	First year	Balanced sample	First year of membership / adoption	
			EU	Euro
Austria	1990	X	1995	1999
Belgium	1990	X	1957	1999
Bulgaria	2003		2007	-
Croatia	1999		2013*	-
Cyprus	1995		2004	2008*
Czech Republic	1995		2004	-
Denmark	1990	X	1973	-
Estonia	2000		2004	2011*
Finland	1990	X	1995	1999
France	1990	X	1957	1999
Germany	1990	X	1957	1999
Greece	1990	X	1981	2001
Hungary	1993		2004	-
Iceland	2005		-	-
Ireland	1990	X	1973	1999
Italy	1990	X	1957	1999
Latvia	2000		2004	2014*
Lithuania	2001		2004	2015*
Luxembourg	1991		1957	1999
Malta	2002		2004	2008*
Netherlands	1990	X	1957	1999
Norway	1990	X	-	-
Poland	1994		2004	-
Portugal	1990	X	1986	1999
Romania	2000		2007	-
Russian Federation	1997		-	-
Slovak Republic	2001		2004	2009*
Slovenia	2001		2004	2007
Spain	1990	X	1986	1999
Sweden	1990	X	1995	-
Switzerland	1990	X	-	-
Turkey	1992		-	-
United Kingdom	1990	X	1973	-
Total countries	33	**16**	27	13
Total distinct country pairs	**528**	**120**	**351**	**78**

This table reports for each country the first year that the country is included in our data set, whether we include the country in the Balanced Sample as well as the first year of EU membership and Euro adoption. * denotes EU accession or Euro adoption after 2007.

Source: The authors.