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Estimating economic benefits of the Single Market for European countries and regions*

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Abstract

This study provides insights into the economic benefits of the European Single Market (SM) for countries and regions across Europe. Specifically, we evaluate the impact of the trade boosting effects of the SM on productivity, markups, product variety, welfare and the distribution of population across European countries and regions. We employ a model characterized by costly trade, love of variety, heterogeneous firms, labour mobility as well as endogenous markups and productivity. The model is quantified using trade as well as GDP and population data for European countries and regions as well as other countries. We compute counterfactual economic changes stemming from changes in trade costs related to the SM. The findings suggest that on average, EU citizens' per capita welfare gains from the SM amount to 840 euros per year. We uncover a strong heterogeneity of gains: Countries and regions in the geographic core of the EU see gains of up to 3,600 euros per capita (a 4.7% increase) while gains in some peripheral regions can be as small as 150 euros (about 2%). We also shed light on regional variation of welfare gains from the SM within individual EU countries.

Keywords: Europe; Regions; EEA; Single Market; Firm heterogeneity; Endogenous markups; Gravity equation; Labour mobility.
JEL Classification: F12; R12; F15; F17

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1 Introduction

The agreement on the European Single Market entered into force in 1993 and today forms the world's biggest single market area. It goes well beyond traditional free trade agreements as it extends the full rights and obligations of the common market to its member states. It allows more than 500 million people to freely move and travel, and the businesses in the EU to easily trade and invest. This way, the internal market has not only strongly contributed to increasing living standards in the EU, but it has also become a key pillar of tangible EU integration – which can be perceived by virtually all citizens in their everyday lives. Yet, there is an ongoing debate about growing regional disparities in Europe. Indeed, a number of regions appear to enjoy strong growth in their gross domestic product (GDP), productivity and wages along with a high level of public goods provision, while other regions are lagging behind. In this context, some have argued that the Single Market may have a differential impact on welfare across EU regions, thereby potentially exacerbating widening gaps between regions.

In this paper we provide quantitative insights into the economic benefits of the European Single Market (SM) for countries and regions across Europe. More specifically, we evaluate the impact of the trade boosting effects of the SM on productivity, markups, product variety and welfare across European countries and regions. We focus on the economic impact of the SM on its current members: the 28 EU member states as well as the non-EU member states Iceland, Norway and Switzerland, added to the SM via the European Economic Area (EEA) and bilateral trade agreements. In order to achieve this, we employ a model characterized by costly trade, love of variety, heterogeneous firms, labour mobility as well as endogenous markups and productivity. We quantify the model using international goods and services trade data as well as GDP and population for countries/regions that are members of the SM, and we also include BRIC countries and other OECD countries in our analysis. We finally compute, starting from the observed initial situation in the year 2016, counterfactual economic changes stemming from changes in trade costs related to the SM. The analysis allows us to break down any welfare effects of the SM not only to the country level, but also to the regional level across Europe.

The model used in our analysis builds upon the tradition of the so-called "gravity models of trade", i.e., models where a key feature of trade is that its volume is increasing in the size of the exporting and importing countries/regions and inversely

related to the distance and trade costs between the two countries/regions. In this respect, abundant research and empirical evidence has demonstrated the robustness and accuracy of these models that represent nowadays a standard in international trade. These models are also very versatile and modern versions like ours incorporate several channels via which trade affects the economy. More specifically, we build upon Behrens et al. (2014) and Behrens et al. (2017) to develop a gravity model characterized by costly trade, love of variety, heterogeneous firms, labour mobility as well as endogenous markups and productivity. We quantify the model using goods and services trade data as well as GDP and population for a large number of countries and regions.[1] In the first part of our analysis we run counterfactual analyses at the country-level. In the second part, we decompose SM member countries into the corresponding NUTS2 regions to uncover effects on European regions. We assess the importance of the SM by performing a counterfactual experiment assuming the effects following a de-facto removal of the SM agreement. From the counterfactual we then derive the impact of the trade boosting effects of the SM on productivity, markups, product variety and welfare across European countries and regions.

Specifically, we obtain the trade costs equivalent to the SM from the estimation of a trade gravity equation from which we recover a parameter measuring the amount of additional trade that members of the SM do with each other controlling for other determinants of bilateral trade flows (such as distance, language, adjacency, past colonial ties). Such a parameter is an indicator of the trade boosting effects of the SM and is the key to our counterfactual analysis. In our counterfactual scenario, we set this parameter to zero between SM countries and regions and subsequently compute a counterfactual equilibrium that we then compare with the one we observe in 2016. Differences in productivity, markups, welfare, etc., between the counterfactual and observed equilibria represent our estimates of the economic impact of the SM on countries and regions.

Moving to the results of the study, we first show that the Single Market provides higher welfare, higher productivity and lower markups to all members of the SM program while at the same time countries outside the common market are actually (slightly) worse off because of the existence of the SM. Per capita percentage welfare gains for SM countries vary from 2.07% in Iceland all the way up to 4.35% in

[1] Beyond members of the Single Market, we also include the following OECD and BRIC nations: Australia, Brazil, Canada, Chile, China, India, Israel, Japan, Korea, Mexico, New Zealand, Russia, Turkey and the US.

Belgium. In terms of monetary values (2016 euros), they instead range from 193 euros per capita for Bulgaria to a maximum of 2,914 euros per capita for Switzerland. Total aggregate welfare gains, computed as per capita gains times population, for all countries belonging to the Single Market sum up to 461 billion euros – for EU members states alone, the aggregate benefit of SM membership amounts to about 427 billion euros. In this respect, it is important to note that these are yearly gains. For example, in the above mentioned case of Belgium, welfare would every year be 4.35% higher than what it would have been without the SM. Therefore, the one-off equivalent gain related to the SM would be considerably higher than the 461 billion euros provided here. The same applies to costs and gains for other countries. As far as changes in markups and productivity are concerned, their ranking across countries follows the same ranking of welfare changes albeit with somewhat smaller numbers. Overall, our results at the country level are broadly consistent with other works analyzing welfare effects related to the SM (e.g., Felbermayr et al., 2018).

When moving from countries to regions we unveil rich and very heterogeneous patterns. In terms of the interpretation of such patters we find that, for example, welfare changes are stronger for regions closer to the center of Europe (higher market access effect), regions that are small and/or belong to a small country (for smaller regions and/or countries trade in the SM area is more important quantitatively) and regions with better technology (more productive and innovative regions gain more from trade). These observed trends are largely consistent with the widely discussed "core-periphery" pattern across EU regions.

Specifically, we find that citizens of the Zurich region (3,592 euros), London (2,702 euros) and the Brussels region (2,473 euros) show the greatest per-capita monetary gains. Other regions with a robust services or manufacturing sector and a relatively high share of exports also benefit strongly. For instance, regions where the automotive industry is strong in Germany and France see particularly strong welfare gains. Regions in southern Europe and in some of the eastern European countries, however, show significantly lower welfare gains ranging from 117 to a maximum of 500 euros. This pattern of differential welfare gains from the SM is, by and large, consistent with the view of a "core-periphery" pattern where economic activity is primarily concentrated on the geographic core of the EU. We also take a closer look at within-country variation: Our findings within countries suggest that gains from the SM may be yet another factor reinforcing pre-existing north-south divides (in Italy and the UK) as well as east-west divides (in France and Germany).

The building blocks of our analysis are the models developed in Behrens et al. (2014) and Behrens et al. (2017). As stated in Behrens et al. (2014), many general equilibrium models of international trade yield equivalent results about the aggregate impact of trade liberalization for welfare and trade flows as captured by the gravity equation (Arkolakis et al., 2012). However, models differ in their specific predictions along which margins an economy adjusts to freer trade. Recent workhorse frameworks have focused on combinations of wages, productivity, and consumption diversity as adjustment mechanisms, triggered by firm selection and market share reallocations. Yet, those models do not come to grips with the fact that trade integration also changes firms' price-cost margins.

In this respect there has been vastly growing empirical interest in markups recently, and important contributions by De Loecker (2011), De Loecker et al. (2016), Feenstra and Weinstein (2017), Simonovska (2015) and others, have established some basic facts: (i) markups differ substantially across firms even within industries, and firms with lower marginal costs tend to charge higher markups; (ii) firms apply different markups across different markets; and (iii) trade integration affects price-cost margins. The main contribution of Behrens et al. (2014) is to develop a general equilibrium quantifiable model of trade under monopolistic competition with variable demand elasticity, heterogeneous firms, and multiple asymmetric countries. Wages, productivity, and consumption diversity are all endogenously determined, and in line with the facts (i)–(iii), markups differ across firms and across markets, and respond to trade integration. We use this model in our analysis and further allow for mobility of workers across space along the lines of Behrens et al. (2017). Finally, note that we use the concept of equivalent variation in order to measure changes in welfare drawing upon the results laid down in Arkolakis et al. (2018).

The remainder of this paper is structured as follows. In the next section, we first give a non-technical account of the methods used in this study.[2] We then discuss welfare gains at the country and, afterwards, at the regional level. Our analysis will also focus on individual countries to uncover even more regional heterogeneity. Last, section 4 discusses the highlights of our findings and draws implications for policymakers.

[2]The full model derivation is available for download at https://bit.ly/2JkdFQM.

2 Method and approach

In this section, we provide a non-technical outline of the model used for the analyses throughout this study. The full derivation of the model as well as a detailed description of the quantification procedure and the construction of the counterfactual scenarios are available for download.[3] To estimate the economic impact of the Single Market (SM) on European countries' and regions' productivity, markups and welfare we use a modern quantitative trade model of the global economy based on Behrens et al. (2014) and Behrens et al. (2017). Quantitative trade models incorporate the channels through which trade affects consumers, firms and workers and provide a mapping from trade data to welfare. The model provides numbers for how much countries and regions are affected by different trade policies, using readily available data on trade volumes, GDP and potential trade barriers. The trade data we use are from the COMTRADE (ITS) database provided by the United Nations (Eurostat) for the period 2010-2016. We also consider data from a set of relevant factors to be used in our gravity regression, provided by the Centre d'Etude Prospectives et d'Informations Internationales (CEPII). Using data on trade costs and based on a gravity regression, we derive a measure of "freeness of trade" that mirrors the trade boosting effect of the Single Market. For the analysis here, we derive a counterfactual freeness of trade-parameter that reflects, all else equal, the weakened projected trade between countries in case of a hypothetical abolishment of the SM – i.e., a situation in which no EU country benefits from any trade facilitation policies that currently apply to members of the SM/EEA agreement. To construct the counterfactual freeness, we update the dummy variable on SM membership – derived by a gravity regression – by setting it equal to zero, essentially reflecting higher trade costs. We then use the counterfactual freeness to shock the initial equilibrium and let the system settle into a new equilibrium, taking into account all general equilibrium effects. The resulting shift in welfare (and other quantities) would thus be an indication of what would be lost if there were no SM anymore – it is this yearly loss that we consider the value of the SM (from today's point of view) and thus the welfare gain compared to a scenario of non-existence of the SM.

The model used in our analysis builds upon the tradition of so-called "gravity models of trade", i.e., models where a key feature of trade is that its volume is in-

[3] Please follow this link to download the technical appendix: https://bit.ly/2JkdFQM.

creasing in the size of the exporting and importing countries/regions and inversely related to the distance and trade costs between the two countries/regions. In this respect, abundant research and empirical evidence have demonstrated the robustness and accuracy of these models that represent nowadays a standard in international trade. These models are also very versatile and modern versions like ours incorporate several channels via which trade affects the economy.

For example, our model features countries/regions that are more or less competitive depending on the productivity of their firms and/or the cost of their labour force as well as consumers buying differentiated varieties of products and services produced anywhere in the world. It also allows for firms in each country/region to be heterogeneous in their productivity and size and to be differentially affected by trade exposure while at the same time incorporating the impacts of trade on the degree of competition among firms and so ultimately on markups and prices. Finally, it allows for entry and exit of firms to affect and be affected by trade and for country size to be a determinant of trade patterns. Countries and regions in our model trade with each other and trade is subject to trade costs. Any change in trade barriers affects all countries/regions in a general equilibrium fashion via the above channels and our model pins down these interdependencies and quantifies the impact of changes in trade barriers on key economic outcomes: productivity, markups, welfare and population. Our analysis of welfare changes is based on the concept of equivalent variation as in Arkolakis et al. (2018). More specifically, we compute the change in income that, given initial prices, would allow the representative consumer to reach the same utility level corresponding to the counterfactual equilibrium. Loosely speaking, this corresponds to the income reduction/increase equivalent to the counterfactual scenario in which the SM would have been removed.

However, despite being rich and versatile our model, like any modern quantitative trade model, is based upon assumptions that limit its capacity to be able to speak about other important aspects. For example, our model has nothing to say about how countries'/regions' trade balances would be affected as we assume that trade is balanced. At the same time, our model does not feature growth and so the impact of trade on the speed of innovation is not accounted for. In the same vein, the positive effects that European integration has on other important dimensions (i.e., innovation, education, culture and national security, to name a few) are not part of our analysis either. Finally, our model also abstracts from the distribution of welfare gains and losses due to changes in trade costs. Indeed, our model provides insights

into overall gains and losses at the country/region level but has nothing to say about *who* will be positively and/or negatively affected within a country/region. Finally, the model does not consider "second-round" effects. For instance, an abolishment of the SM could lead to a recession and a further contraction of trade, thereby further reinforcing losses from weakened intra-EU trade. In this case, the estimated welfare gains would understate the true size of the gains. By the same token, the effects may be overstated, e.g., if countries were to respond to the sudden lack of the SM by negotiating free trade agreements. In any case, it is important to note that second-round effects can go into either direction.

3 Results

We present two sets of results. First, we work at the country level and document the welfare gains stemming from the SM. In our analyses of welfare effects through the SM, we focus on the 28 EU member states as well as the non-EU member states Iceland, Norway and Switzerland added to the SM via the European Economic Area (EEA) and bilateral trade agreements.[4] Second, we focus on the regional level and shed light on within-country heterogeneity of welfare gains through the Single Market. We also discuss productivity and markup gains, suggesting that these are the channels driving the welfare effect. Note that the counterfactual simulations for countries and regions are separate simulations – that is, the country simulations treat SM member countries as country units, while the region-wide quantification treats the same set of countries as a collection of their respective regions.[5]

3.1 Countries

Table 1 summarizes our key results at the country level. Overall, we find that the SM provides higher welfare, higher productivity and lower markups to all its members while at the same time countries outside the SM are actually (slightly) worse off because of the existence of the common market. Total aggregate welfare gains (computed as monetary per capita gains times population) for countries in the Sin-

[4]The only country in the SM we do not cover in our analysis is Liechtenstein.

[5]Thus, the estimated economic impact for the same country can slightly differ across the simulations. Whenever we refer to gains at the country level, we refer to the country-wide simulations. When we refer to regional gains, we base our analysis on the region-wide simulations.

gle Market sum up to 461 billion euros. In this respect, it is important to note that these are yearly gains. Therefore, the one-off equivalent gain would be considerably higher than the 461 billion euros estimated here. In terms of yearly per capita welfare gains (in euros), the countries benefiting the most are Switzerland (2,914 euros), Luxembourg (2,834 euros) and Ireland (1,894 euros). These gains can clearly be attributed to the relatively high level of productivity in these countries, combined with small population sizes and a high degree of openness of these economies. Gains in monetary values are, however, also high for big economies with large population sizes. For instance, France and Germany would be among the top 10 countries with welfare gains of 1,074 and 1,046 euros per capita, respectively.

In terms of relative per capita welfare gains (in %) the results vary from 2.07% of Iceland all the way up to 4.35% in Belgium. Again, Luxembourg (4.33%) and Switzerland (4.02%) are among the top three countries. Notably, some Eastern European countries see strong *relative* welfare gains, while monetary gains in *absolute* terms are low – for example, the Czech Republic comes fourth with a relative welfare gain of 3.99% due to gains from the SM. However, other countries in the periphery like Greece and Bulgaria see both low welfare gains in absolute *and* relative terms, suggesting that, at least partly, gains from the SM follow a core-periphery logic: Countries in the southern and eastern European periphery do not appear to gain in the same way that countries in the core do. These patterns will be discussed in more detail when examining gains at the regional level in the following sections. The welfare effects are mainly driven by changes in markups and productivity induced by the SM. Thus, the productivity and markups ranking broadly follows the ranking of relative welfare changes, albeit with somewhat smaller numbers.

Table 1

Economic benefits of the single market, country level

Country	Change Productivity (%)	Change Markups (%)	Change Welfare (%)	Change Welfare in EUR (per capita)	Aggregate Welfare Change (Million EUR)
AUS	-0.959	0.950	-0.305	-143	-3,484
AUT	3.199	-3.305	3.918	1,583	13,839
BEL	3.604	-3.739	4.351	1,627	18,401
BGR	2.062	-2.106	2.851	193	1,371
BRA	-1.118	1.106	-0.520	-41	-8,431
CAN	-0.879	0.871	-0.230	-88	-3,196
CHE	3.444	-3.567	4.016	2,914	24,264
CHL	-1.054	1.043	-0.447	-55	-1,009
CHN	-0.873	0.866	-0.265	-19	-26,847
CYP	1.454	-1.476	2.166	462	392
CZE	3.157	-3.260	3.985	666	7,031
DEU	2.052	-2.095	2.741	1,046	86,139
DNK	2.789	-2.869	3.463	1,682	9,601
ESP	1.730	-1.760	2.446	589	27,351
EST	2.020	-2.062	2.775	446	585
FIN	1.841	-1.875	2.523	992	5,443
FRA	2.401	-2.460	3.113	1,074	69,360
GBR	1.443	-1.465	2.119	776	50,943
GRC	1.746	-1.777	2.485	401	4,328
HRV	2.744	-2.821	3.568	397	1,655
HUN	2.627	-2.698	3.438	408	4,011
ISL	1.429	-1.449	2.073	1,131	380
IND	-1.040	1.030	-0.449	-7	-9,225
IRL	2.602	-2.672	3.235	1,894	8,900
ISR	-1.430	1.410	-0.791	-266	-2,270
ITA	2.035	-2.077	2.755	763	46,303
JPN	-0.844	0.837	-0.200	-70	-8,947
KOR	-0.821	0.814	-0.188	-47	-2,395
LTU	2.230	-2.281	3.007	405	1,162
LUX	3.725	-3.869	4.334	2,834	1,632
LVA	2.136	-2.183	2.910	368	725
MEX	-0.793	0.787	-0.180	-14	-1,747
MLT	1.986	-2.026	2.720	615	277
NLD	2.970	-3.061	3.675	1,516	25,814
NOR	2.126	-2.173	2.746	1,753	9,205
NZL	-0.936	0.927	-0.296	-104	-495
POL	2.593	-2.662	3.404	382	14,492
PRT	2.020	-2.061	2.769	497	5,136
ROM	2.041	-2.084	2.822	242	4,788
RUS	-0.770	0.765	-0.156	-13	-1,805
SVK	2.782	-2.862	3.592	537	2,914
SVN	3.086	-3.185	3.896	763	1,574
SWE	2.130	-2.177	2.800	1,302	13,011
TUR	-0.881	0.873	-0.269	-26	-2,096
USA	-0.979	0.970	-0.315	-164	-53,015

Notes: Columns 2 to 6 provide counterfactual changes in productivity and product diversity (column 2; % changes), markups (column 3; % changes), welfare (columns 4, 5 and 6; % changes, per capita changes in euros and aggregate changes in Million euros, respectively). Productivity corresponds to value added per worker. Welfare corresponds to the change in income that, given initial prices, would allow consumers to reach the same utility level corresponding to the counterfactual equilibrium. Markups (as defined in the model) are equivalent to price over marginal cost.

3.2 Regions

While Table 1 summarizes our key results at the country level, it also masks a substantial amount of within-country heterogeneity. Regions within countries are asymmetrically exposed to trade integration, depending on their geographic position, competitiveness, size, and the country they belong to. We hence now present results for our counterfactual scenario by breaking down countries of the SM area into their NUTS2 regions. Together with the rest-of-the-world countries we hence run the model for 297 regions in total (283 NUTS2 regions, and 14 other OECD and BRIC trading partners).

Figures 1 and 2 depict per capita welfare gains (in euros) and relative gains (percentage changes in welfare), respectively, stemming from the SM for NUTS2 regions. Such figures highlight the richness of the level of detail and heterogeneity that our analysis can capture. A detailed table containing the information on regional gains is provided in the Appendix. Based on both figures, we first observe strong heterogeneity in gains from the SM across Europe. Overall, it appears that regions closer to the center benefit more strongly than those in the periphery. Indeed, Swiss regions like Zurich (3,592 euros) and Ticino (3,238 euros) as well as the Brussels region (2,473 euros) and Austrian regions like Voralberg (2,062 euros) and Salzburg (2,038 euros) show the highest per capita gains. At the same time, regions in countries like Bulgaria, Greece and Romania indicate the lowest per capita welfare gains, ranging from 117 euros to just about 500 euros. These observations give rise to a core-periphery pattern across EU regions, where regions closer to the geographical core (i.e., countries like Germany, France, Belgium, Netherlands and Denmark) benefit more strongly than regions in the southern and eastern periphery of Europe.

Looking at relative welfare gains, however, slightly mitigates this pattern with respect to Eastern Europe: relative to their GDP per capita level, regions in countries like Hungary and Poland show strong welfare gains – which is consistent with the catch up in Eastern Europe following the end of the Cold War and the accession to the EU 15 years ago. However, both absolute and relative gains remain low for regions in Bulgaria and Romania. Similarly, regions in Southern Italy, Greece and Southern Spain are lagging behind in terms of both relative and absolute welfare gains. We have further investigated the overall findings by relating, via a linear regression, percentage changes to a group of covariates specific to each region. This regression analysis underpins the aforementioned core-periphery pattern in that,

for example, welfare changes are stronger for regions closer to the center of Europe (higher market access effect).

Moreover, the regression results suggest that welfare gains are higher for regions that are small and/or belong to a small country (for smaller regions and/or countries trade in the SM is more important quantitatively) and regions with better technology (more productive and innovative regions gain more from trade). Overall these covariates explain about half of the variation in the data. The same regression analysis reveals that population gains are stronger for regions experiencing higher welfare gains, regions that are larger and regions that have less favourable climate amenities (especially Northern Europe).

3.2.1 Within-country analyses

Figures 1 and 2 capture the regional heterogeneity from an aggregate EU-view. Instead, looking at regions *within* individual countries allows us to capture even more within-country differences. It also enables us to uncover some patterns of regional divergence in gains from the SM that are specific to certain countries. In this section, we focus on the EU's largest economies – Germany, the UK, France and Italy – and discuss our results of regional SM gains and some of the potentially underlying factors owing to these results.

Figure 3 depicts our findings on per capita gains from the SM (in euros).[6] We first consider Germany, in panel (a). It is evident that regions in the western part of the country show significantly higher gains – with the region Oberbayern, which includes Munich and the Ingolstadt area (Audi's headquarters), exhibiting the strongest gains of 1,489 euros, followed by Hamburg (1,478 euros) and Stuttgart (1,304 euros), where Mercedes Benz is headquartered. Conversely, gains from the SM are significantly lower in the eastern part of the country, with Brandenburg, Saxony-Anhalt and Mecklenburg-West Pomerania exhibiting per capita gains ranging between just 672 and 699 euros. The east-west divide also broadly holds when assessing relative welfare gains, i.e., the gains from the SM relative to the current level of real incomes – we document relative income changes in Figure 6 (in the Appendix). These differences between gains in the eastern and western parts primarily stem from structural differences between the two sets of regions – with economies

[6] See Figure 6 (in the Appendix) for graphical depictions on relative income changes due to the SM.

Figure 1

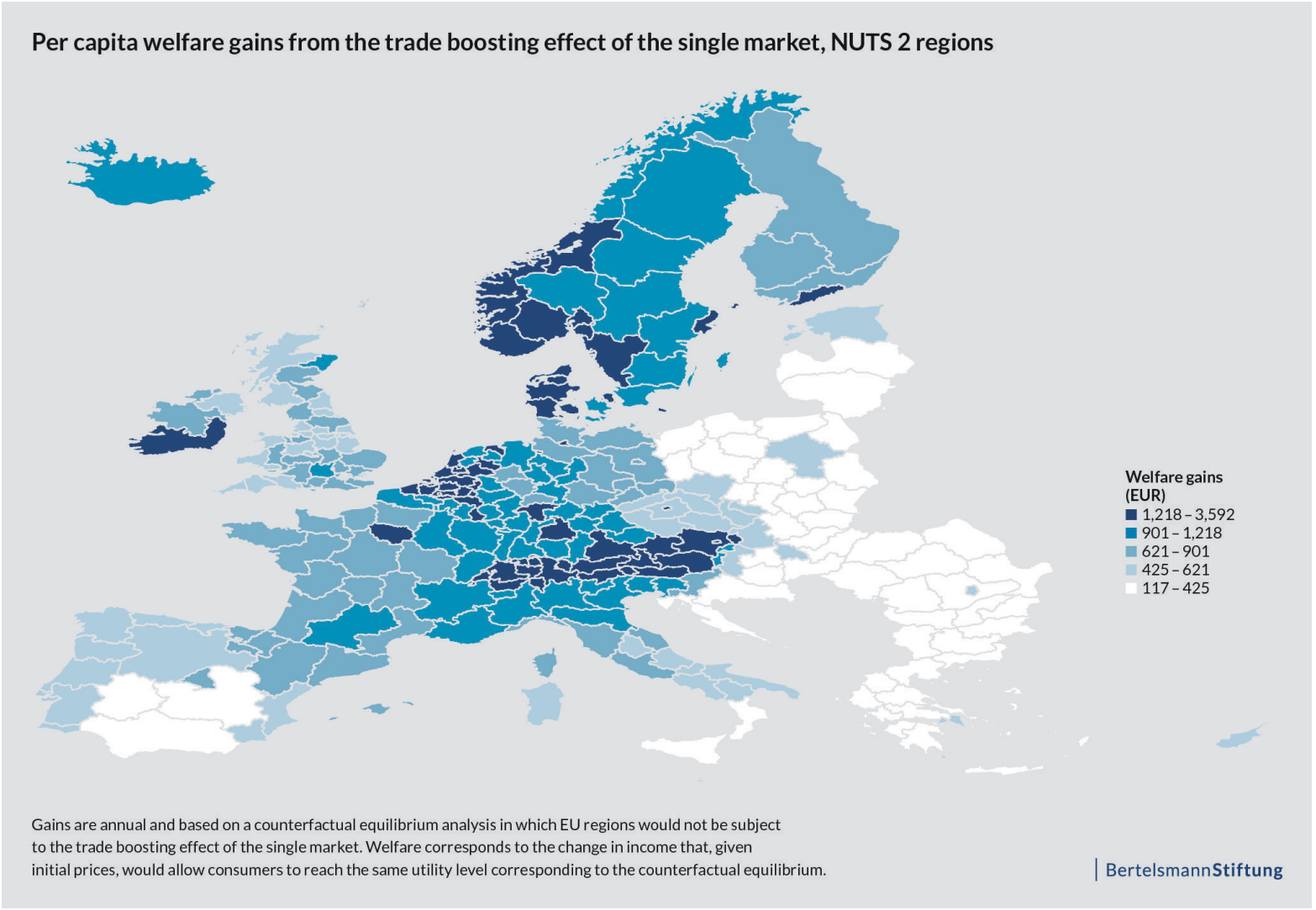
Per capita welfare gains from the trade boosting effect of the single market, NUTS 2 regions
Welfare gains (EUR)
1,218 – 3,592
901 – 1,218
621 – 901
425 – 621
117 – 425
Gains are annual and based on a counterfactual equilibrium analysis in which EU regions would not be subject to the trade boosting effect of the single market. Welfare corresponds to the change in income that, given initial prices, would allow consumers to reach the same utility level corresponding to the counterfactual equilibrium.
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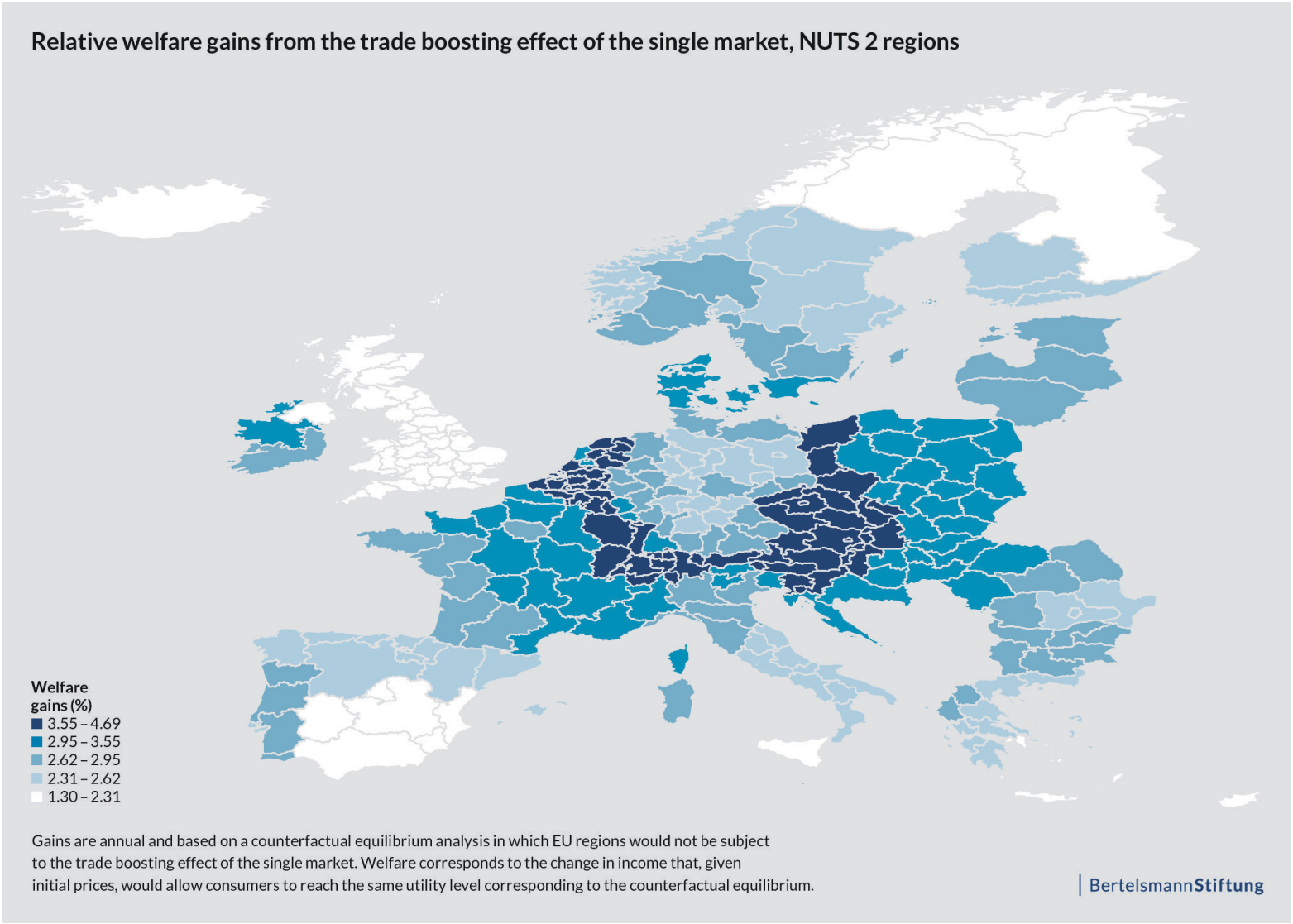
Figure 2


Relative welfare gains from the trade boosting effect of the single market, NUTS 2 regions
Welfare gains (%)
3.55 – 4.69
2.95 – 3.55
2.62 – 2.95
2.31 – 2.62
1.30 – 2.31
Gains are annual and based on a counterfactual equilibrium analysis in which EU regions would not be subject to the trade boosting effect of the single market. Welfare corresponds to the change in income that, given initial prices, would allow consumers to reach the same utility level corresponding to the counterfactual equilibrium.
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in the western regions being much more export-oriented and also more competitive than those in the eastern regions. Thus, the trade boosting effect of the SM is particularly pronounced in the west – with productivity increases and markups reductions as the main drivers of the welfare effects.

Turning to the UK, we first note that the variance of regional welfare gains (in euros) is by far the highest among the largest EU economies – suggesting that regional differences are the highest in the UK. Moreover, we document another spatial pattern of SM gains in the UK. Specifically, by and large, regions in the south feature higher gains compared to regions in the north. Apart from the London NUTS2 regions with gains greater than 2,000 euros per capita, it is also regions like Oxfordshire (985 euros) and Surrey/West Sussex (804 euros) that benefit greatly. Note that the overall differences between the north and the south become even more evident when looking at relative welfare gains (see Figure 6 in the Appendix). That is, gains relative to income levels suggest that regions closer to the European continent gain significantly more, which may well be due to better market access. Note that inner London can be seen a special case in that per capita gains in euros are high, but its per capita GDP is disproportionately high, so that relative gains appear to be low. Strikingly, some UK regions that appear to have benefited quite strongly from the SM have overwhelmingly voted for the UK to leave the EU in the 2016 Brexit referendum. One example is the region of Kent, which features the highest relative gain from the SM in the UK, but which overwhelmingly voted leave.

France and Italy also reveal spatial patterns of welfare gains. In France, we observe that per capita gains appear to be higher in the east than in the west. Naturally, the Paris region (Île-de-France) benefits greatly as it is a multinational hub within the centralized France (yet, its high level of GDP implies a low relative change in welfare). The Champagne-Ardenne and Alsace regions, both close to Germany, also show high gains, essentially profiting from market access and positive spillovers from cross-country trade due to the SM. In the west, however, regions like Poitou-Charentes, Limousin and Basse-Normandie are all in the lowest quintile of gains ranging from 736 to 827 euros. In Italy, gains from the SM differ as to whether a region is part of the Mezzogiorno, the southern Italian regions, or the northern ones. Gains from the SM are consistent with the well-studied socioeconomic divide between the north and the south: While northern regions such as Bolzano (1,372 euros), Lombardy (1,081 euros) and Trento (1,073 euros) see strong welfare improvements, gains from the SM in southern regions such as Calabria (392 euros) and Sicily

(394 euros) are substantially lower. Since one of the channels through which welfare increases materialize is productivity, our results suggest that gains from the SM may have widened the productivity differences between the North and the South.

Finally, recall that our country analyses in the previous section show that regions in small nations like Switzerland indicate the highest welfare gains from the SM. Looking into Swiss regions, for instance, shows that the monetary gains are fairly consistent with little variation across the seven regions at NUTS2 level: While Zurich tops the ranking with welfare gains amounting to 3,592 euros per inhabitant, the lowest welfare gain is recorded in the region of Eastern Switzerland at about 2,800 euros and thus about a 20% difference. Clearly, smaller countries are less likely to exhibit strong regional differences in terms of the structure of the economy and socioeconomic factors.

3.3 The impact of Brexit

The UK's vote to leave the European Union (Brexit) is likely to exhibit a significant impact on the UK economy (e.g., Dhingra et al., 2016). Previous works suggest that living standards in the UK will strongly decline as a result of Brexit. In Mion and Ponattu (2019), we use a gravity model of trade to estimate the economic impact of both a soft and a hard Brexit for the same set of regions analyzed in this study. We find that the UK alone would incur per capita income lasses of almost 900 euros annually in case of a hard Brexit scenario. On aggregate, the UK would see income losses of about 57 billion euros annually – more than all other EU countries combined. In this sub-section, we analyze gains from the Single Market and at the same time investigate projected losses related to (a hard) Brexit – we thereby seek to uncover any remarkable pattern of SM gains and Brexit losses across countries and regions.

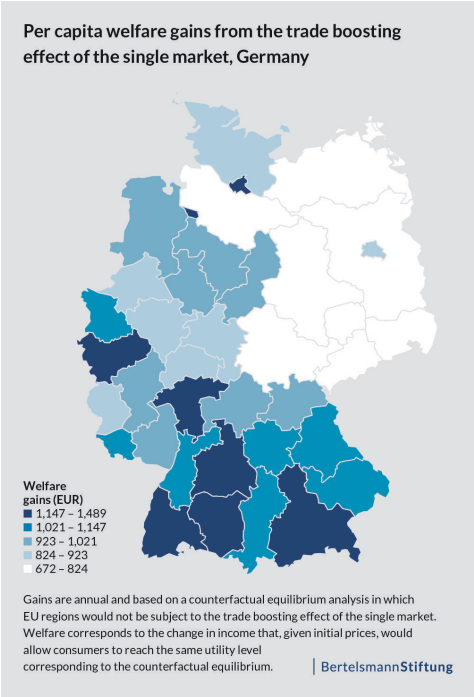
In Figure 4 we study the country level. First off, we observe that losses from Brexit make up a small portion relative to the gains in incomes from the SM for most countries. This reflects that, while the UK is an important trading partner, it is clearly not the only significant one for most countries. Moreover, we observe that, roughly, a decline in income gains from the SM is also associated with a decline in Brexit losses – this pattern is consistent with the idea that both Brexit losses and SM gains are sensitive to trade relationships and openness. However, among the upper half of the countries gaining from the SM, we can note some significant deviation

from this pattern. The UK and Ireland are clearly standing out, showing significant income losses. The UK is the only country for which losses from Brexit even exceed the gains from the SM. This of course reflects the country being hard hit by Brexit – however, it also reflects that gains for the SM are among the lowest among large economies in the EU. In the case of Ireland, high losses are clearly due to dense trade relationships with the UK, which would suffer as a result of a hard Brexit scenario.

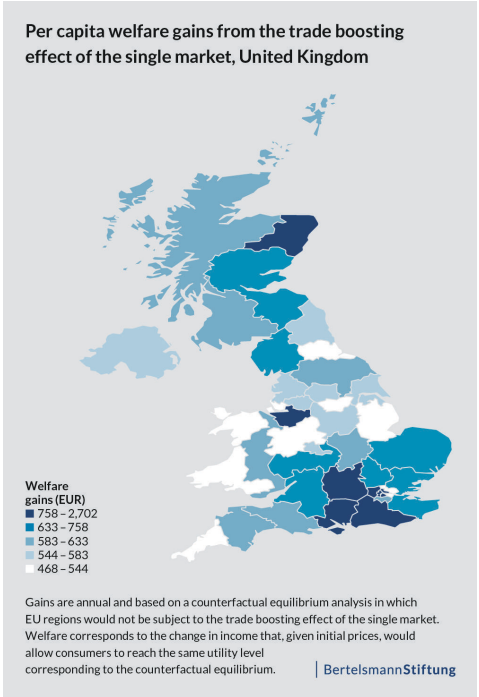
There are also other notable cases. For instance, Austria shows a particularly low level of loss relative to the strong income gain from the SM; countries with lower gains from the SM than Austria (e.g., the Netherlands, Sweden and Iceland) indicate about double the loss (in per capita terms) from a hard Brexit than Austria does. This finding could reflect the fact that Austria is, firstly, located further away from the UK, which is consistent with a gravity model of trade. Secondly, for Austria countries like Germany are a relatively more important trading partner than the UK. Conversely, for countries like the Netherlands and Sweden, the UK appears to be a more important trading partner than for Austria. To a weaker extent, this also holds for the country gaining the most from the SM, Switzerland. Compared to its followers in the SM ranking of income gains (Luxembourg, Norway and of course Ireland), Switzerland's Brexit losses are comparatively low.

Figure 5 takes a look at regional gains from the SM and Brexit losses. Here the picture appears to be even more inconsistent: With a decline of per capita income gains from the SM across regions, Brexit losses even slightly increase. This result, however, owes to the fact that seven out of the 20 strongest gaining regions are Swiss – where, as we state above, income losses due to Brexit are comparatively low. A similar logic holds for the Austrian regions of Voralberg and Salzburg, which also feature a low loss of Brexit relative to gains from the SM. Finally, we note that apart from Ireland, regions in Luxembourg as well as in Norway (like Oslo) and in the Netherlands (like Noord-Holland) appear to lose the most from Brexit relative to income gains from the SM.

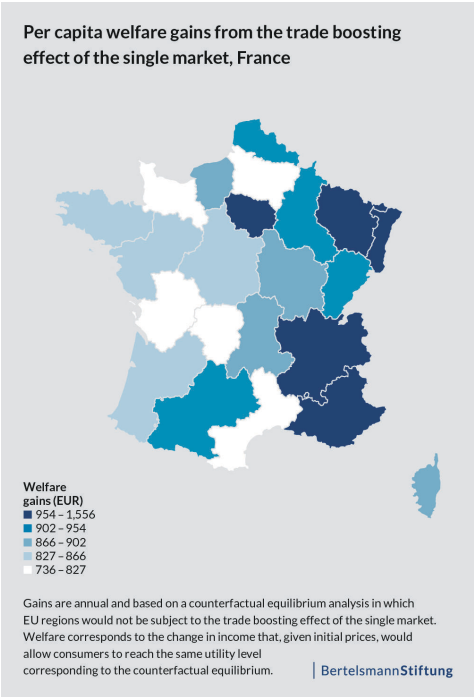
Figure 3



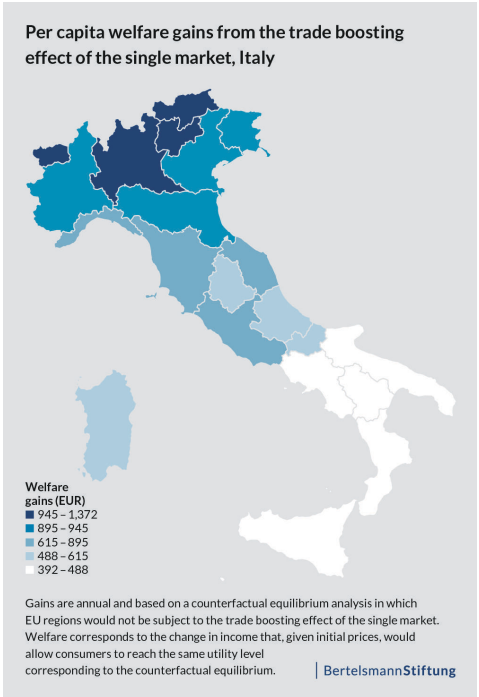
(a)



(b)



(c)

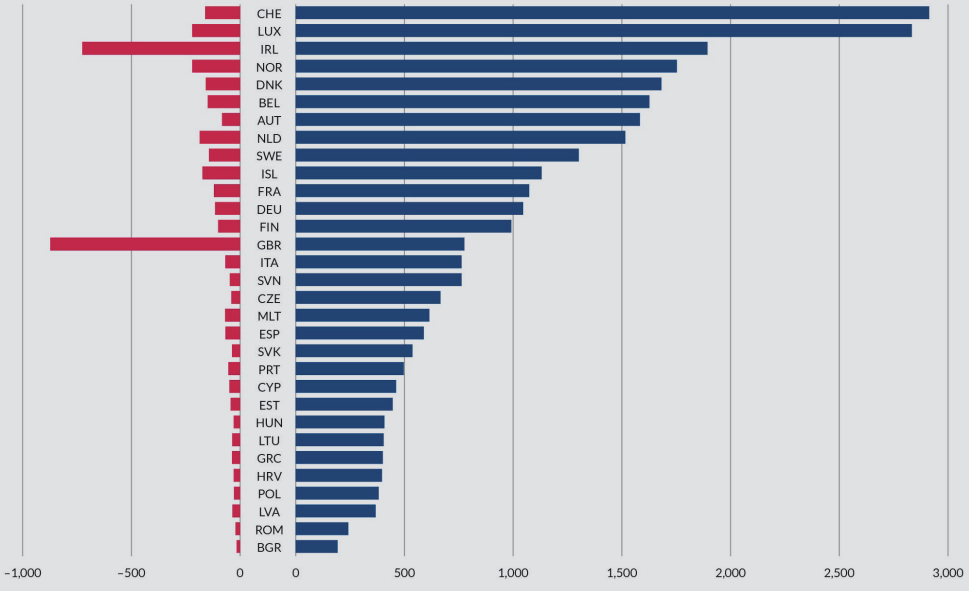


(d)

Figure 4

Estimated per capita welfare gains from the Single Market and projected losses from Brexit, country level

Per capita gains and losses, in euros



■ Loss from Brexit* ■ Gain from Single Market

Gains are annual and based on a counterfactual equilibrium analysis in which EU regions would not be subject to the trade-boosting effect of the single market. Welfare corresponds to the change in income that, given initial prices, would allow consumers to reach the same utility level corresponding to the counterfactual equilibrium.

*Losses from Brexit based on simulations of a hard Brexit scenario as in Mion and Ponattu (2019).

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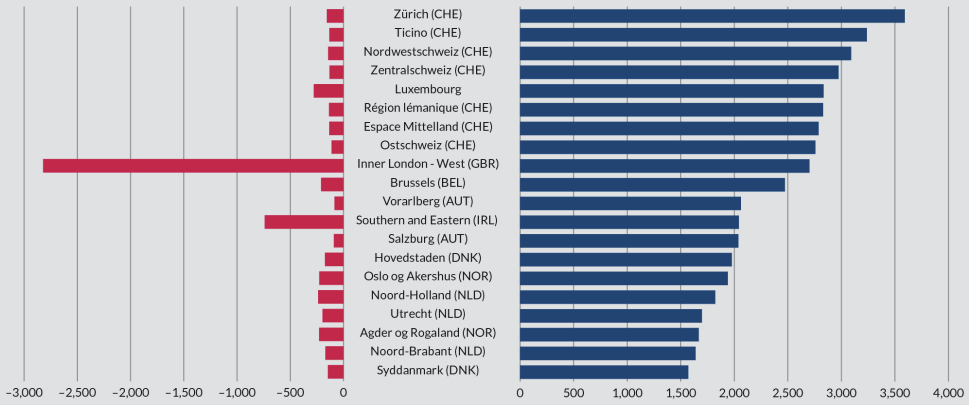
Figure 5

Estimated per capita welfare gains from the Single Market and projected losses from Brexit, regions

Per capita gains and losses in the 20 regions gaining the most from the EU Single Market, in euros



■ Loss from Brexit* ■ Gain from Single Market

Gains are annual and based on a counterfactual equilibrium analysis in which EU regions would not be subject to the trade-boosting effect of the single market. Welfare corresponds to the change in income that, given initial prices, would allow consumers to reach the same utility level corresponding to the counterfactual equilibrium.

*Losses from Brexit based on simulations of a hard Brexit scenario as in Mion and Ponattu (2019).

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4 Conclusion

In this paper we provide quantitative insights into the economic benefits of the European Single Market (SM) for countries and regions across Europe. More specifically, we evaluate the impact of the trade boosting effects of the SM on productivity, markups, product variety and welfare. We use a gravity model approach and a modern macroeconomic model of trade to estimate the value of the SM for citizens' welfare across European countries and regions.

The key highlights of our findings can be summarized as follows: First, the SM provides higher welfare, higher productivity and lower markups to all its members while at the same time countries outside are actually (slightly) worse off because of the existence of the SM. Second, per capita percentage welfare gains for members vary from 2.07% in Iceland up to 4.35% in Belgium while total aggregate welfare gains (computed as per capita gains times population) for members of the SM program amount to 461 billion euros. Yet, it is important to recall that these are yearly gains and so one-off equivalent gains related to SM membership would be considerably higher.

Third, we document some evidence for a core-periphery pattern in gains from the SM. Assessing regions, we find that welfare gains are stronger for regions closer to the geographic center of Europe (due to the effect of higher market access). Also, we find that regions that are small and/or belong to a small country benefit disproportionately (for smaller regions and/or countries trade in the SM is more important quantitatively). In addition, our results suggest that regions with better technology benefit to a greater extent from the SM – since more productive and innovative regions gain more from trade. Fourth, we also uncover and discuss regional differences within countries. Specifically, we document differential gains from the SM along differences between eastern and western regions (in Germany and France) as well as broad differences between northern and southern regions (in Italy and the UK). The results suggest that the SM may reinforce differential trends in productivity between regions and could thus contribute to widening regional disparities.

Our model is based upon assumptions that leave aside other, potentially equally, relevant factors. For example, we assume that trade is balanced and the model does not include investment and growth – so the impact of trade on, for example, the speed of innovation and other "second-round" effects is not accounted for. In addition, the effect of European integration on other relevant factors such as values,

political stability and national security are not part of our analysis either. Finally, we also abstract from the distribution of welfare gains due to changes in trade costs. Indeed, our model provides insights into overall gains, but does not specify *who* will be positively or negatively affected within a country or region. Studying such distributional effects of regional SM effects appears to be a promising avenue for future research.

While the limitations of our approach could affect the magnitude of the results, the relative differences between countries and regions are very likely to hold. These differences should be of relevance to policymakers. Our results suggest that gains from the SM may further reinforce pre-existing regional differences, this way adding to the core-periphery pattern and inequality more generally. Since the channels via which welfare effects operate in our model are productivity and markups, it is important for policy to focus on productivity-enhancing measures in regions where gains from the SM appear to be low. This includes investment in (digital) infrastructure and upskilling in these countries and regions. These measures should all be coherently put together in the context of the EU regional policy framework. In addition, these measures could also be assessed in the current debate on a EU-wide industrial policy approach. Moreover, promoting competition is vital to make sure that all countries and regions reap the benefits of the SM with respect to both higher productivity as well as lower prices. At the EU level, this calls for a level playing field in many areas of competition policy. All such measures are particularly important as some factors (like proximity to other economies) are unchangeable. Finally, the SM may allow for even more welfare gains to materialize in the future. Almost 75% of EU-wide value added are based on services, yet, only about a third of all EU exports are services. Better regulation on services trade could thus allow for an even greater size of the economic pie to be achieved through the SM.

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Appendix

Table 2

Economic benefits of the single market, NUTS 2 regions

Country	Region	Change Productivity (%)	Change Markups (%)	Change Welfare (%)	Change Welfare in Euros (per capita)	Aggregate Welfare Change (Million EUR)
AUT	Burgenland	3.079	– 3.177	3.861	1,083	315
AUT	Niederösterreich	3.121	– 3.222	3.882	1,290	2,133
AUT	Wien	2.812	– 2.894	3.495	1,711	3,149
AUT	Kärnten	3.350	– 3.466	4.115	1,414	793
AUT	Steiermark	3.217	– 3.324	3.970	1,427	1,758
AUT	Oberösterreich	3.360	– 3.477	4.093	1,688	2,454
AUT	Salzburg	3.471	– 3.596	4.169	2,038	1,113
AUT	Tirol	3.679	– 3.819	4.409	1,937	1,432
AUT	Vorarlberg	3.856	– 4.011	4.586	2,062	792
BEL	Brussels	3.291	– 3.403	3.914	2,473	2,970
BEL	Prov. Antwerpen	3.720	– 3.864	4.446	1,969	3,600
BEL	Prov. Limburg (BE)	3.829	– 3.981	4.635	1,428	1,238
BEL	Prov. Oost-Vlaanderen	3.606	– 3.741	4.378	1,530	2,278
BEL	Prov. Vlaams-Brabant	3.471	– 3.596	4.207	1,705	1,914
BEL	Prov. West-Vlaanderen	3.655	– 3.794	4.420	1,625	1,924
BEL	Prov. Brabant Wallon	3.547	– 3.678	4.278	1,808	719
BEL	Prov. Hainaut	3.663	– 3.802	4.498	1,083	1,453
BEL	Prov. Liège	3.854	– 4.009	4.685	1,260	1,391
BEL	Prov. Luxembourg (BE)	3.845	– 3.999	4.695	1,110	315
BEL	Prov. Namur	3.753	– 3.900	4.584	1,185	583
BGR	Severozapaden	2.068	– 2.111	2.879	117	92
BGR	Severen tsentralen	1.975	– 2.015	2.777	129	105
BGR	Severoiztochen	1.907	– 1.944	2.701	146	138
BGR	Yugoiztochen	1.882	– 1.918	2.673	158	167
BGR	Yugozapaden	2.013	– 2.054	2.797	304	645
BGR	Yuzhen tsentralen	1.942	– 1.980	2.741	129	185
CHE	Région lémanique	3.482	– 3.608	4.079	2,829	4,509
CHE	Espace Mittelland	3.480	– 3.606	4.082	2,787	5,134
CHE	Nordwestschweiz	3.483	– 3.609	4.045	3,092	3,490
CHE	Zürich	3.485	– 3.611	3.982	3,592	5,268
CHE	Ostschweiz	3.625	– 3.761	4.243	2,758	3,181
CHE	Zentralschweiz	3.500	– 3.627	4.079	2,973	2,350
CHE	Ticino	3.627	– 3.764	4.185	3,238	1,140
CYP	Kypros	1.348	– 1.367	2.068	442	375
CZE	Praha	2.856	– 2.940	3.597	1,253	1,588
CZE	Střední Cechy	2.748	– 2.826	3.565	549	729
CZE	Jihozápad	3.284	– 3.396	4.145	609	740
CZE	Severozápad	3.358	– 3.474	4.238	509	570
CZE	Severovýchod	3.104	– 3.204	3.956	546	823
CZE	Jihovýchod	3.066	– 3.163	3.906	604	1,017
CZE	Střední Morava	2.971	– 3.062	3.814	519	633
CZE	Moravskoslezsko	2.938	– 3.027	3.775	537	652
DEU	Stuttgart	1.931	– 1.969	2.594	1,304	5,306
DEU	Karlsruhe	1.994	– 2.034	2.679	1,137	3,139
DEU	Freiburg	2.412	– 2.472	3.127	1,150	2,559
DEU	Tübingen	2.194	– 2.243	2.889	1,188	2,166
DEU	Oberbayern	2.065	– 2.108	2.717	1,489	6,833
DEU	Niederbayern	2.055	– 2.098	2.758	1,030	1,249
DEU	Oberpfalz	1.987	– 2.027	2.680	1,072	1,171
DEU	Oberfranken	1.920	– 1.958	2.625	930	985
DEU	Mittelfranken	1.932	– 1.970	2.619	1,089	1,894
DEU	Unterfranken	1.901	– 1.938	2.597	988	1,290
DEU	Schwaben	2.100	– 2.145	2.803	1,063	1,962
DEU	Berlin	1.607	– 1.633	2.299	848	2,986
DEU	Brandenburg	1.709	– 1.739	2.427	672	1,669

Continuation of Table 2

Country	Region	Change Productivity (%)	Change Markups (%)	Change Welfare (%)	Change Welfare in Euros (per capita)	Aggregate Welfare Change (Million EUR)
DEU	Bremen	1.916	– 1.954	2.586	1,247	837
DEU	Hamburg	1.745	– 1.776	2.379	1,478	2,642
DEU	Darmstadt	1.897	– 1.934	2.562	1,269	4,978
DEU	Gießen	1.920	– 1.958	2.633	849	883
DEU	Kassel	1.906	– 1.943	2.611	914	1,110
DEU	Mecklenburg-Vorpommern	1.976	– 2.016	2.711	699	1,127
DEU	Braunschweig	1.871	– 1.906	2.570	944	1,509
DEU	Hannover	1.891	– 1.928	2.594	926	1,974
DEU	Lüneburg	1.890	– 1.926	2.616	714	1,214
DEU	Weser-Ems	2.073	– 2.117	2.788	936	2,336
DEU	Düsseldorf	2.130	– 2.176	2.824	1,143	5,915
DEU	Köln	2.139	– 2.186	2.831	1,172	5,184
DEU	Münster	2.068	– 2.112	2.786	897	2,345
DEU	Detmold	1.902	– 1.939	2.603	947	1,949
DEU	Arnsberg	1.960	– 1.999	2.670	895	3,218
DEU	Koblenz	2.084	– 2.129	2.800	926	1,379
DEU	Trier	2.280	– 2.334	3.014	904	482
DEU	Rheinhessen-Pfalz	2.063	– 2.107	2.768	1,018	2,069
DEU	Saarland	2.286	– 2.339	3.002	1,062	1,058
DEU	Dresden	1.978	– 2.018	2.701	802	1,285
DEU	Chemnitz	1.946	– 1.985	2.675	729	1,068
DEU	Leipzig	1.897	– 1.934	2.614	808	821
DEU	Sachsen-Anhalt	1.881	– 1.917	2.609	692	1,555
DEU	Schleswig-Holstein	2.004	– 2.044	2.723	853	2,439
DEU	Thüringen	1.902	– 1.939	2.627	739	1,604
DNK	Hovedstaden	2.531	– 2.597	3.164	1,977	3,538
DNK	Sjælland	2.767	– 2.846	3.509	1,195	988
DNK	Syddanmark	2.850	– 2.934	3.555	1,570	1,902
DNK	Midtjylland	2.668	– 2.741	3.370	1,473	1,905
DNK	Nordjylland	2.606	– 2.675	3.317	1,347	788
ESP	Galicia	1.672	– 1.700	2.405	517	1,406
ESP	Principado de Asturias	1.782	– 1.814	2.522	524	546
ESP	Cantabria	1.841	– 1.876	2.583	556	324
ESP	País Vasco	1.851	– 1.886	2.565	816	1,765
ESP	Comunidad Foral de Navarra	1.893	– 1.929	2.613	785	500
ESP	La Rioja	1.789	– 1.821	2.517	637	199
ESP	Aragón	1.791	– 1.824	2.518	656	865
ESP	Comunidad de Madrid	1.433	– 1.453	2.130	701	4,505
ESP	Castilla y León	1.687	– 1.716	2.418	547	1,343
ESP	Castilla-la Mancha	1.520	– 1.544	2.252	423	867
ESP	Extremadura	1.525	– 1.548	2.262	373	405
ESP	Cataluña	1.898	– 1.934	2.621	756	5,603
ESP	Comunidad Valenciana	1.583	– 1.608	2.312	490	2,419
ESP	Illes Balears	1.758	– 1.790	2.486	627	712
ESP	Andalucía	1.408	– 1.428	2.136	380	3,194
ESP	Región de Murcia	1.501	– 1.524	2.230	444	650
ESP	Ciudad Autónoma de Ceuta (ES)	1.344	– 1.363	2.067	397	34
ESP	Ciudad Autónoma de Melilla (ES)	1.365	– 1.384	2.092	368	31
EST	Eesti	2.007	– 2.048	2.775	445	585
FIN	Länsi-Suomi	1.758	– 1.789	2.462	858	1,184
FIN	Helsinki-Uusimaa	1.730	– 1.761	2.393	1,241	2,010
FIN	Etelä-Suomi	1.801	– 1.834	2.507	867	1,007
FIN	Pohjois- ja Itä-Suomi	1.582	– 1.607	2.287	739	959
FIN	Åland	2.106	– 2.151	2.785	1,315	38
FRA	Île de France	2.127	– 2.173	2.774	1,556	18,886
FRA	Champagne-Ardenne	2.671	– 2.745	3.435	922	1,233
FRA	Picardie	2.527	– 2.593	3.291	824	1,592
FRA	Haute-Normandie	2.405	– 2.465	3.150	900	1,677

Continuation of Table 2

Country	Region	Change Productivity (%)	Change Markups (%)	Change Welfare (%)	Change Welfare in Euros (per capita)	Aggregate Welfare Change (Million EUR)
FRA	Centre (FR)	2.266	– 2.318	3.008	827	2,134
FRA	Basse-Normandie	2.380	– 2.438	3.132	827	1,222
FRA	Bourgogne	2.502	– 2.566	3.257	878	1,439
FRA	Nord – Pas-de-Calais	2.746	– 2.824	3.515	935	3,817
FRA	Lorraine	2.932	– 3.021	3.714	958	2,239
FRA	Alsace	3.041	– 3.136	3.808	1,155	2,177
FRA	Franche-Comté	2.783	– 2.862	3.555	927	1,094
FRA	Pays de la Loire	2.184	– 2.232	2.916	866	3,240
FRA	Bretagne	2.191	– 2.240	2.928	834	2,760
FRA	Poitou-Charentes	2.176	– 2.225	2.919	764	1,380
FRA	Aquitaine	2.172	– 2.220	2.904	862	2,929
FRA	Midi-Pyrénées	2.213	– 2.264	2.944	903	2,732
FRA	Limousin	2.251	– 2.303	2.995	806	594
FRA	Rhône-Alpes	2.459	– 2.520	3.190	1,051	6,906
FRA	Auvergne	2.321	– 2.376	3.064	867	1,182
FRA	Languedoc-Roussillon	2.253	– 2.305	3.005	736	2,056
FRA	Provence-Alpes-Côte d'Azur	2.390	– 2.449	3.127	965	4,852
FRA	Corse	2.493	– 2.556	3.247	893	295
GBR	Tees Valley and Durham	1.321	– 1.339	2.031	498	593
GBR	Northumberland and Tyne and Wear	1.320	– 1.338	2.023	565	814
GBR	Cumbria	1.288	– 1.304	1.980	647	322
GBR	Greater Manchester	1.146	– 1.159	1.836	580	1,603
GBR	Lancashire	1.223	– 1.238	1.921	549	812
GBR	Cheshire	1.189	– 1.203	1.859	814	748
GBR	Merseyside	1.182	– 1.196	1.880	521	795
GBR	East Yorkshire and Northern Lincolnshire	1.362	– 1.380	2.067	562	521
GBR	North Yorkshire	1.317	– 1.335	2.014	622	505
GBR	South Yorkshire	1.238	– 1.254	1.944	479	660
GBR	West Yorkshire	1.213	– 1.228	1.907	580	1,327
GBR	Derbyshire and Nottinghamshire	1.254	– 1.270	1.952	560	1,215
GBR	Leicestershire, Rutland and Northamptonshire	1.291	– 1.307	1.984	632	1,128
GBR	Lincolnshire	1.410	– 1.431	2.123	521	385
GBR	Herefordshire, Worcestershire and Warwickshire	1.241	– 1.256	1.928	672	890
GBR	Shropshire and Staffordshire	1.239	– 1.254	1.939	530	848
GBR	West Midlands	1.171	– 1.185	1.866	548	1,560
GBR	East Anglia	1.532	– 1.556	2.232	724	1,793
GBR	Bedfordshire and Hertfordshire	1.286	– 1.303	1.969	744	1,363
GBR	Essex	1.471	– 1.493	2.176	636	1,141
GBR	Inner London – West	0.810	– 0.817	1.302	2,702	3,120
GBR	Inner London – East	0.928	– 0.937	1.577	902	2,121
GBR	Outer London – East and North East	1.096	– 1.108	1.793	468	881
GBR	Outer London – South	1.122	– 1.134	1.809	585	756
GBR	Outer London – West and North West	1.003	– 1.013	1.668	761	1,583
GBR	Berkshire, Buckinghamshire and Oxfordshire	1.265	– 1.281	1.922	985	2,336
GBR	Surrey, East and West Sussex	1.435	– 1.456	2.120	804	2,290
GBR	Hampshire and Isle of Wight	1.428	– 1.448	2.116	776	1,521
GBR	Kent	1.513	– 1.536	2.218	655	1,187
GBR	Gloucestershire, Wiltshire and Bristol/Bath area	1.322	– 1.340	2.006	758	1,857
GBR	Dorset and Somerset	1.428	– 1.449	2.134	603	793
GBR	Cornwall and Isles of Scilly	1.478	– 1.501	2.197	516	286
GBR	Devon	1.460	– 1.481	2.169	590	691
GBR	West Wales and The Valleys	1.349	– 1.367	2.062	478	935
GBR	East Wales	1.304	– 1.321	1.999	631	727
GBR	Eastern Scotland	1.280	– 1.297	1.969	687	1,424
GBR	South Western Scotland	1.263	– 1.280	1.959	609	1,425
GBR	North Eastern Scotland	1.303	– 1.321	1.968	956	473
GBR	Highlands and Islands	1.257	– 1.273	1.952	610	286
GBR	Northern Ireland (UK)	1.312	– 1.329	2.016	554	1,029

Continuation of Table 2

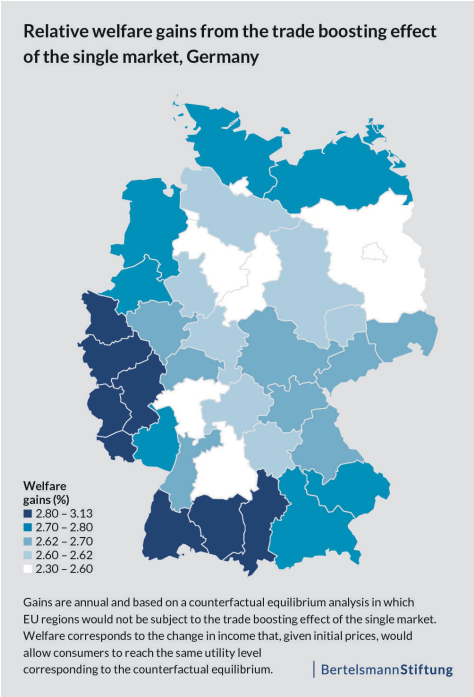
Country	Region	Change Productivity (%)	Change Markups (%)	Change Welfare (%)	Change Welfare in Euros (per capita)	Aggregate Welfare Change (Million EUR)
GRC	Attiki	1.496	– 1.518	2.220	490	1,853
GRC	Voreio Aigaio	1.643	– 1.670	2.398	294	58
GRC	Notio Aigaio	1.536	– 1.560	2.273	400	134
GRC	Kriti	1.508	– 1.531	2.252	308	195
GRC	Anatoliki Makedonia, Thraki	1.807	– 1.840	2.577	286	173
GRC	Kentriki Makedonia	1.826	– 1.860	2.593	328	618
GRC	Dytiki Makedonia	1.913	– 1.950	2.681	377	103
GRC	Ipeiros	1.891	– 1.927	2.665	304	102
GRC	Thessalia	1.765	– 1.797	2.528	312	228
GRC	Ionia Nisia	1.844	– 1.878	2.605	387	80
GRC	Dytiki Ellada	1.770	– 1.802	2.535	298	199
GRC	Sterea Ellada	1.680	– 1.708	2.432	347	193
GRC	Peloponnisos	1.620	– 1.647	2.372	314	182
HRV	Jadranska Hrvatska	2.658	– 2.731	3.490	369	515
HRV	Kontinentalna Hrvatska	2.620	– 2.691	3.447	390	1,090
HUN	Közép-Magyarország	2.498	– 2.562	3.291	579	1,734
HUN	Közép-Dunántúl	2.641	– 2.713	3.471	381	404
HUN	Nyugat-Dunántúl	2.784	– 2.864	3.617	459	451
HUN	Dél-Dunántúl	2.609	– 2.679	3.450	262	236
HUN	Észak-Magyarország	2.499	– 2.563	3.332	255	294
HUN	Észak-Alföld	2.435	– 2.496	3.263	240	354
HUN	Dél-Alföld	2.461	– 2.523	3.288	271	342
IRL	Border, Midland and Western	2.379	– 2.437	3.130	839	1,057
IRL	Southern and Eastern	2.320	– 2.375	2.930	2,043	7,083
ISL	Ísland	1.336	– 1.354	1.993	1,087	361
ITA	Piemonte	2.415	– 2.475	3.159	927	4,085
ITA	Valle d'Aosta/Vallée d'Aoste	2.667	– 2.740	3.401	1,185	151
ITA	Liguria	2.182	– 2.230	2.911	895	1,406
ITA	Lombardia	2.240	– 2.292	2.952	1,081	10,821
ITA	Abruzzo	1.747	– 1.778	2.477	597	792
ITA	Molise	1.725	– 1.756	2.465	492	154
ITA	Campania	1.628	– 1.655	2.367	432	2,527
ITA	Puglia	1.655	– 1.683	2.397	426	1,736
ITA	Basilicata	1.642	– 1.670	2.377	488	280
ITA	Calabria	1.596	– 1.622	2.337	392	773
ITA	Sicilia	1.559	– 1.584	2.297	394	1,999
ITA	Sardegna	1.894	– 1.931	2.643	535	887
ITA	Provincia Autonoma di Bolzano/Bozen	2.509	– 2.574	3.209	1,372	715
ITA	Provincia Autonoma di Trento	2.347	– 2.403	3.068	1,073	578
ITA	Veneto	2.150	– 2.197	2.875	910	4,470
ITA	Friuli-Venezia Giulia	2.266	– 2.318	3.000	907	1,108
ITA	Emilia-Romagna	2.018	– 2.060	2.729	945	4,203
ITA	Toscana	1.921	– 1.959	2.643	792	2,966
ITA	Umbria	1.835	– 1.869	2.569	615	548
ITA	Marche	1.880	– 1.916	2.609	693	1,069
ITA	Lazio	1.710	– 1.740	2.420	764	4,499
LTU	Lietuva	2.166	– 2.214	2.952	395	1,142
LUX	Luxembourg	3.725	– 3.869	4.334	2,834	1,632
LVA	Latvija	2.019	– 2.061	2.798	354	697
MLT	Malta	1.899	– 1.936	2.644	582	262
NLD	Groningen	3.005	– 3.098	3.724	1,538	898
NLD	Friesland (NL)	2.917	– 3.005	3.687	1,060	685
NLD	Drenthe	3.021	– 3.115	3.795	1,097	536
NLD	Overijssel	3.020	– 3.114	3.770	1,287	1,473
NLD	Gelderland	3.032	– 3.127	3.779	1,314	2,675
NLD	Flevoland	2.872	– 2.957	3.624	1,162	470
NLD	Utrecht	2.834	– 2.917	3.518	1,698	2,162
NLD	Noord-Holland	2.759	– 2.837	3.424	1,822	5,075

Continuation of Table 2

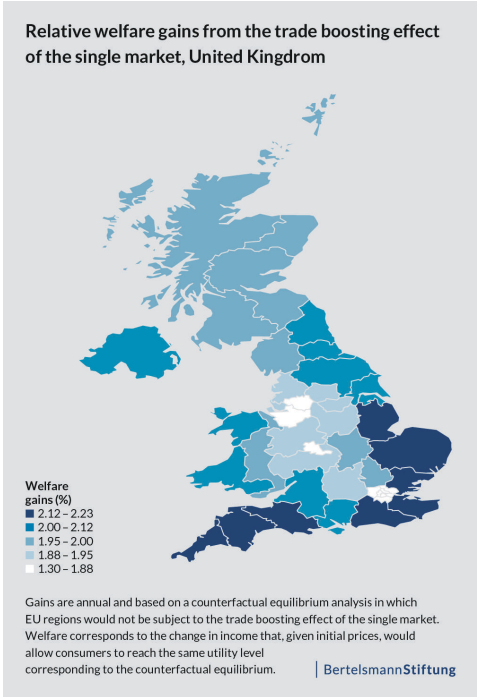
Country	Region	Change Productivity (%)	Change Markups (%)	Change Welfare (%)	Change Welfare in Euros (per capita)	Aggregate Welfare Change (Million EUR)
NLD	Zuid-Holland	2.855	– 2.939	3.567	1,484	5,374
NLD	Zeeland	3.145	– 3.247	3.910	1,256	479
NLD	Noord-Brabant	3.082	– 3.180	3.794	1,638	4,094
NLD	Limburg (NL)	3.326	– 3.441	4.084	1,439	1,606
NOR	Oslo og Akershus	1.991	– 2.032	2.595	1,939	2,427
NOR	Hedmark og Oppland	1.983	– 2.023	2.673	1,132	435
NOR	Sør-Østlandet	2.128	– 2.174	2.818	1,225	1,206
NOR	Agder og Rogaland	2.193	– 2.242	2.840	1,668	1,281
NOR	Vestlandet	1.937	– 1.975	2.588	1,478	1,317
NOR	Trøndelag	1.773	– 1.804	2.437	1,255	564
NOR	Nord-Norge	1.469	– 1.491	2.138	1,043	502
POL	Lódzkie	2.442	– 2.503	3.258	338	839
POL	Mazowieckie	2.297	– 2.351	3.076	546	2,907
POL	Malopolskie	2.443	– 2.504	3.260	333	1,107
POL	Slaskie	2.518	– 2.583	3.335	387	1,751
POL	Lubelskie	2.239	– 2.290	3.050	235	498
POL	Podkarpackie	2.312	– 2.367	3.128	250	520
POL	Swietokrzyskie	2.373	– 2.431	3.194	256	318
POL	Podlaskie	2.242	– 2.293	3.052	246	285
POL	Wielkopolskie	2.658	– 2.730	3.483	425	1,466
POL	Zachodniopomorskie	2.851	– 2.935	3.704	349	588
POL	Lubuskie	2.919	– 3.007	3.777	356	358
POL	Dolnoslaskie	2.827	– 2.909	3.664	456	1,307
POL	Opolskie	2.663	– 2.736	3.502	324	308
POL	Kujawsko-Pomorskie	2.512	– 2.577	3.339	306	631
POL	Warminsko-Mazurskie	2.361	– 2.419	3.181	255	361
POL	Pomorskie	2.515	– 2.580	3.335	363	827
PRT	Norte	2.161	– 2.209	2.941	444	1,602
PRT	Algarve	1.892	– 1.928	2.644	498	220
PRT	Centro (PT)	2.042	– 2.085	2.813	440	992
PRT	Área Metropolitana de Lisboa	1.790	– 1.823	2.524	597	1,679
PRT	Alentejo	1.953	– 1.991	2.715	456	330
ROM	Nord-Vest	2.154	– 2.201	2.959	224	578
ROM	Centru	1.999	– 2.040	2.792	224	524
ROM	Nord-Est	1.911	– 1.949	2.706	142	462
ROM	Sud-Est	1.790	– 1.823	2.569	189	467
ROM	Sud - Muntenia	1.781	– 1.813	2.561	174	527
ROM	Bucuresti - Ilfov	1.716	– 1.746	2.455	504	1,154
ROM	Sud-Vest Oltenia	2.032	– 2.074	2.833	177	353
ROM	Vest	2.201	– 2.250	3.005	268	483
SVK	Bratislavský kraj	2.864	– 2.948	3.603	1,298	822
SVK	Západné Slovensko	2.788	– 2.868	3.616	503	922
SVK	Stredné Slovensko	2.704	– 2.779	3.534	421	566
SVK	Východné Slovensko	2.567	– 2.635	3.394	353	571
SVN	Vzhodna Slovenija	3.058	– 3.154	3.895	630	688
SVN	Zahodna Slovenija	3.165	– 3.268	3.974	931	905
SWE	Stockholm	1.740	– 1.770	2.368	1,569	3,501
SWE	Östra Mellansverige	1.897	– 1.934	2.589	1,055	1,730
SWE	Småland med öarna	2.079	– 2.123	2.778	1,116	931
SWE	Sydsverige	2.337	– 2.393	3.045	1,208	1,764
SWE	Västsverige	2.202	– 2.252	2.885	1,335	2,622
SWE	Norra Mellansverige	1.894	– 1.930	2.594	979	821
SWE	Mellersta Norrland	1.785	– 1.817	2.479	981	364
SWE	Övre Norrland	1.629	– 1.656	2.313	983	504

Columns 3 to 7 provide counterfactual changes in productivity and product diversity (column 3; % changes), markups (column 4; % changes), welfare (columns 5,6 and 7; % changes, per capita changes in euros and aggregate changes in million euros, respectively). Productivity corresponds to value added per worker. Welfare corresponds to the change in income that, given initial prices, would allow consumers to reach the same utility level corresponding to the counterfactual equilibrium. Markups (as defined in the model) are equivalent to price over marginal cost.

Figure 6



(a)



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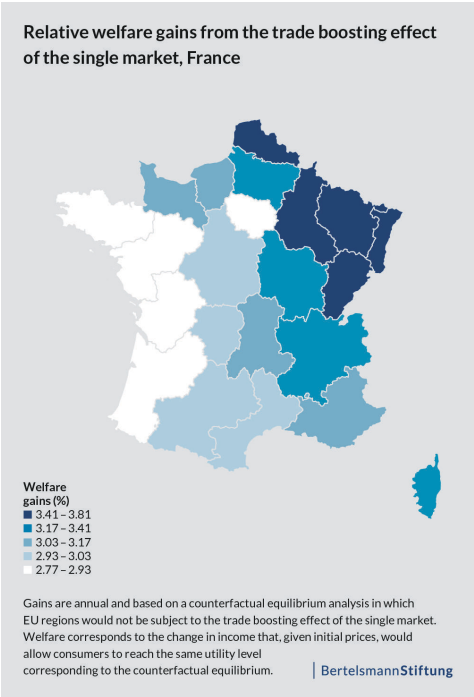

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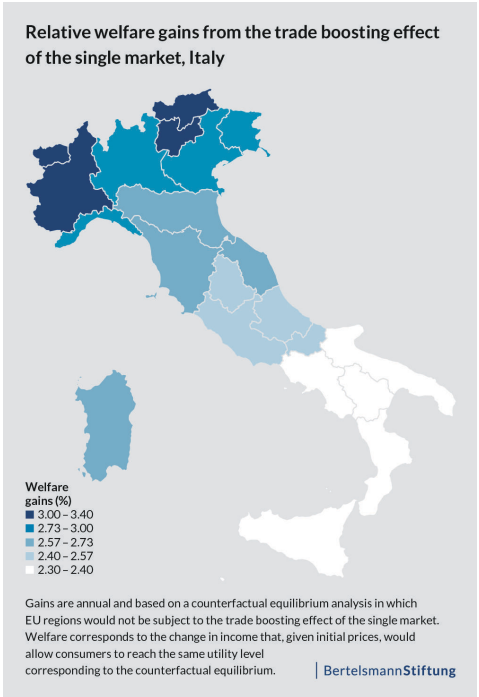

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