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Abstract

Are inclusive welfare states compatible with free movement of people? For long the nexus between immigration and the welfare state has been perceived as fragile or even unsustainable. In this paper, we examine the fiscal impact of European Union (EU) immigration on the universalistic, tax-financed welfare state of Denmark, on the argument that it constitutes a crucial case within an exceptional system for examining the unsustainability thesis. On the basis of a unique dataset of administrative data, consisting of repeated cross sections of 100% of the population of EU citizens residing in Denmark on the December 31st of each year between 2002 and 2013, we analyse EU citizens' contribution to and consumption of welfare benefits, in order to research the evolution of net fiscal contribution to the welfare state over a long time span. We find that EU immigrants made a significant positive net contribution to the Danish welfare state. Not only have EU citizens paid their way through the welfare system. They have also made a considerable contribution to its fiscal sustainability.

Key words: Welfare state, free movement of persons, European Union, fiscal impact, sustainability

Introduction

Are inclusive welfare states compatible with free movement of people? For long, the nexus between immigration and the welfare state has been perceived as fragile or even unsustainable. But what is the de facto fiscal impact of migration inflows on the welfare state?

In general, the scholarly debate finds the relationship between free movement of people and the welfare state to be a tense, or even unsustainable, one. Milton Friedman is famously cited for the claim that open borders are incompatible with the modern welfare state (see Nannestad 2007, 514; Ruhs 2015, among others) and in 1986, Freeman concluded that national welfare cannot coexist with free movement of labour (Freeman 1986). The argument is that the welfare state relies on a profound logic of closure. It requires boundaries because it establishes some form of distributive justice, which departs from the logic of a free market. Furthermore, its historical development goes hand in hand with the nation-state (Freeman 1986, 52). In the institutional and historical setting of the welfare state, migration of labour constitutes the 'most important and directly relevant' challenge to the welfare state (Freeman 1986, 55) and high welfare standards depends on limiting access to benefits (Faist 1995). Ruhs identifies a tradeoff between countries' openness to admitting immigrants and the rights granted to immigrants after admission, including social rights (Ruhs 2013). The conclusion is that openness comes with a price in the sense that states with more liberal immigration policies are more restrictive regarding access to rights. According to Ruhs, the fiscal effect of immigration is critically dependent on whether and how migrants' social rights are restricted. Turning specifically to the welfare impact of the free movement rules in the European Union (EU), Ruhs suggests that in particular the more inclusive welfare states with flexible labour markets and a relative large share of non-contributory benefits are challenged (Ruhs 2015). These types of welfare states are more exposed than their European counterparts with more regulated labour market and more contributory welfare states are hardly compatible with the free movement regime of the EU (Ruhs 2015, 23).

The literature on 'welfare magnetism' has greatly contributed to this debate. The welfare magnet hypothesis poses that states with more generous welfare policies attract immigrants with high

preference for welfare benefits through two different mechanism (Borjas 1999).[1] First, migrants who seek to avoid the labour market and income risks move to those countries where welfare benefits are more attractive. Second, the safety net in such countries discourages unemployed immigrants from seeking employment in other countries, turning temporary work migrants into permanent welfare immigrants (Freeman 1986, 57). In particular the Scandinavian welfare states rank as the more generous ones in the EU (Nannestad 2007, 517). If welfare magnets attract welfare migration as the theory poses, more inclusive and generous welfare policies are not sustainable in open economies of free movement.

However, as noted by Nannestad, open borders and free immigration does not exist in full anywhere in the world (Nannestad 2007, 514). Most countries guard their borders, residence rights and/or access to their welfare schemes carefully. However, the European Union constitutes a case of 'exceptionalism' in this regard (Ruhs 2015). The Union has for long embarked on a 'radical experiment' with open borders and access to the welfare states of its members (Geddes and Hadj-Abdou 2016, 222). The viability of this exceptionalism has been questioned. Public and political concerns of welfare states' sustainability in a Community where Union citizens can move and reside freely have been loudly expressed. In particular, it was voiced in relation to the grand EU enlargement of 2004, where the 8 Central and Eastern European states (EU8)[2] became members (Dustmann et al. 2010, 2; Ruist 2014, 21). Concerns that EU immigrants 'take out more than they put in' have sounded loudly despite the fact that recent studies demonstrate a positive net

[1] This effect may not necessarily be limited to unskilled immigrants, since also high-skilled immigrants may prefer to live in countries with generous social benefit systems, e.g. because economic fluctuations might affect their employment perspectives irrespective of the skill level.

[2] In May 2004, 8 Central and Eastern European States became members of the European Union; the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia, hereafter termed as EU8. Also Malta and Cyprus became EU members in 2004.

contribution of EU citizens and migrants to the welfare state (Dustmann et al. 2010; Dustmann and Frattini 2014; Ruist 2014). UK studies based on survey information from the national Labour Force Survey have demonstrated positive fiscal consequences of different samples of EU immigrants in the UK. Dustmann, Frattini and Halls show that immigrants from EU8 countries that joined the European Union in 2004 had a higher net fiscal impact than similar UK citizens (Dustmann et al. 2010). EU8 immigrants made higher direct and indirect tax contribution as well as they claimed less public benefits and services than similar UK citizens. In their 2014 paper, Dustmann and Frattini considered the fiscal impact of two different populations; the population of migrants from the European Economic Area (EEA)[3] in UK between 1995 and 2011 and the immigrants from EU10 countries and rest of EU countries (called old EU) over the period between 2001 and 2011 (Dustmann and Frattini 2014).[4] Dustmann and Frattini found that EEA migrants contributed 10% more than UK citizens, and that immigrants arrived in the 2000's also made a positive fiscal contribution, irrespective of their country of origin. Moreover, a Swedish study based on administrative data of approximately 4300 immigrants from old EU countries and 3000 immigrants from EU10 countries in Sweden found a larger contribution of migrants from old EU countries than Swedish citizens and a similar contribution from migrants from new EU countries to that of Swedes (Ruist 2014).[5]

Together, the enlargements of 2004 and 2007 have implied an enormous increase in the institutional, economic and social heterogeneity of the Community (Hemerijck 2013, 290; Höpner and Schäfer 2012, 436-437), leading to a resurgence of nationalist and welfare chauvinist

[3] The EEA consists of the EU member states as well as Norway, Lichtenstein and Iceland.

[4] The EU10 countries investigated by Dustmann and Frattini are the EU8 countries plus Bulgaria and Romania (Dustmann and Frattini 2014).

[5] The EU10 countries investigated by Ruist are EU8 countries plus Malta and Cyprus (Ruist 2014).

sentiments in the old member states (Hjorth 2016; Hemerijck 2013, 320). In April 2013, the ministers of interior from Germany, Austria, the Netherlands and the UK sent a joint letter to the Council of the European Union stating the view that free movement of persons and access to welfare should not be unconditional.[6] Together with Denmark, these member states have since 2013 pushed for the European Commission to propose more restrictive rules on access to cross border welfare. Especially concerns about more immediate access to welfare have been expressed, where EU immigrants after a short period of residence and/or work would be granted benefits, before having earned their way into the system.[7] The politicization of the free movement and welfare nexus recently came to an extreme with the UK referendum on EU membership. 'Welfare tourism' was one of the main themes in the political debate and according to Reenan the most important reason for the UK exit decision (Reenen 2016). In sum, constitutive EU principles are increasingly contested and with the results of the UK referendum, the very fundament of the Union itself is indeed shattered. More member states may follow the UK exit path (Reenen 2016).

Thus theoretically, publicly and politically, the unsustainability thesis is recurrently articulated. It contains at least three claims: 1) The EU free movement rules are particularly unsustainable in more inclusive and generous welfare states. 2) Due to the increase of socio-economic heterogeneity, the 2004 and 2007 EU enlargements have a negative effect on welfare state sustainability. 3) Immigrants with short-term residence have a more negative effect on welfare state sustainability than immigrants with longer term residence as they may benefit from the system before they have earned their way into the system.

[6] The letter was send 23 April 2013 to the President of the European Council for Justice and Home Affairs.

[7] See for example the EU-UK deal made to make the UK remain within the Union, where the UK was promised that migrant workers' could be excluded from certain benefits up to the first four years of stay in the UK (European Council conclusions, 19 February 2016, EUCO 1/16, 19-24).

Below we examine these assumptions on the welfare state of Denmark in the period 2002-2013. Our purpose is to examine the extent to which EU immigrants 'pay their way in the welfare system' (Dustmann et al. 2010, 2) or make a negative fiscal impact on the public revenues. We argue that the Danish universalistic, tax based welfare state is a critical case for examining the relationship between open borders and the welfare system. First of all, because the EU rules in their own right constitutes a radical experiment for welfare state sustainability (Geddes and Hadj-Abdou 2016). Secondly, in particular the universalistic, tax-based welfare state is argued to be less sustainable in a system of open welfare borders because the link between contributions and entitlements is only indirect. Denmark is a rather pure example of this welfare state type, with the largest share of non-contributory benefits among its EU counterparts (Ruhs 2015).

Our analysis on fiscal impact is carried out on basis of a unique dataset of individual Danish register data. We have gained access to a host of public administrative register data, i.e. individual data, for the full EU population's use of welfare benefits and services and their contributions to the public revenues, primarily by means of tax-payment 2002-2013. Danish register data are directly reported from the Danish tax agency and the municipalities to the Danish national statistical office 'Statistics Denmark'. The fact that data are reported directly by the public authorities, instead of by individuals themselves, to the national statistical office makes them highly reliable. Denmark is the only country where researches can merge information across sectors and have detailed information about benefits received and contributions made on a weekly and monthly basis. The level of information is thus remarkable and unique. Thus, on each year, we have computed contributions and expenditures from the 100% population of EU citizens residing in Denmark and estimated the net fiscal impact for the EU population as a whole and subdivided into different groups. Our analysis goes substantially beyond existing studies of EU immigrants' fiscal impact since it provides a comprehensive analysis of the full EU population over a long time span. Furthermore, it

should be noted that the 2002-2013 time span involves most important structural changes for the European Union which put the welfare sustainability of EU rules at test; three times enlargements with a considerable increase in the Union's socio-economic heterogeneity, financial and economic crises as well as important changes in EU rules and rights concerning EU migrants. As most other EU member states, Denmark had a transition agreement after the 2004 and 2007 enlargements according to which immigration from the new East European member states were conditioned on basis of a work permit. The Danish transition agreement ran from 1 May 2004 - 1 May 2009. Thus our time span examines fiscal impact more than four years after the end of the transition agreement.

Below, we first set out how EU free movement rules and the right to cross border welfare within the EU can be regarded as a case of exceptionalism. We then present the characteristics of the Danish universalistic, tax-based welfare state as exceptional in its own right, making it more likely to confirm the unsustainability thesis. The data of our study are subsequently presented, followed by the analysis of the fiscal impact of EU immigration on the universalistic welfare state of Denmark. We examine the evolution of EU immigration to Denmark, their fiscal impact in aggregate and on average as well as by different components; age, years since migration and country of origin. Finally, we examine the likelihood of out-migration of EU citizens in Denmark on the basis of individual socio-economic characteristics.

European Union exceptionalism; free movement and cross border welfare

Compared to other advanced economies, the European Union's free movement principle for persons is exceptional indeed (Ruhs 2015). Since the adoption of the Treaty of Rome in 1957, free

movement of workers has been a constitutive principle of the European Community.[8] The right to move and reside freely in the Union has subsequently been extended to all EU citizens, meaning all persons holding citizenship of one of the member states as well as their family members. This implies that member states in general cannot deny residence rights to citizens from their fellow member states. Exceptionalism stands even further out by the fact that the free movement right applies to all disregarding their worker status. Whereas there is a clear international tendency for countries to design their immigration policies so as to attract the highly skilled and well-educated (Chaloff and Lemaitre 2009), this is not possible according to the EU rules. Furthermore, EU free movement rights also applies to the economically inactive citizens, as long as they do not constitute an 'unreasonable burden' on the social assistance system of the host member state.[9]

The unique character of EU free movement stands even further out by the fact that when EU citizen use their free movement right, they will also have access to the welfare benefits of the hosting state. Not only did the Treaty of Rome adopt free movement for workers, but it also laid down that a worker moving from one member state to another has the right to access the social security schemes of other member states and to export previously earned social security rights to other member states.[10] From the very outset, Community rules have contradicted the negative trade-off between openness and welfare rights and are instead founded on the idea that effective free movement depends on access to welfare across borders. Two Community regulations are means to facilitate free movement. Already in 1958, regulation no. 3/58 was adopted by the Council which detailed the

[8] Adopted with article 48 of the Treaty establishing the European Economic Community (EEC) (now article 45 of the Treaty of the Functioning of the European Union (TFEU)).

[9] As laid down in article 14 (1) of Directive 2004/38/EC of the European Parliament and of the Council of 29 April 2004 on the right of citizens of the Union and their family members to move and reside freely within the territory of the Member States.

[10] Adopted with article 51 of the EEC Treaty (now article 48 TFEU).

rules for Community workers' right to cross-border welfare, including which benefits can be exported to other member states. The original regulation has later been reformed many times. The last major reform took place just before the grand enlargement in 2004 with the adoption of regulation 883/2004[11], where the regulation was reformed into covering not only workers but all EU citizens. Regulation 883/2004 grants access to and exportability of a wide range of social security benefits, including sickness benefits; maternity and equivalent paternity benefits; old-age benefits; unemployment benefits and family benefits, but not social assistance. Regulation 492/2011[12] (previously regulation 1612/68) further consolidates the rights of migrant workers. This regulation covers workers only, but relies on a broad definition hereof, including workers with low income and part-time work, as well as it grants the right to maintain workers status if loosing ones job. This regulation gives access to all 'social advantages' in a hosting member state, including social assistance and study grants. But these social advantages cannot be exported. The family member of EU citizens and workers are also covered by the right to free movement within the Union as well as the right to EU cross border welfare. In addition the Court of Justice of the European Union (CJEU) has had an important role in interpreting the scope of EU citizens' rights to the welfare benefits of a hosting member state and to be treated equally with that state's own nationals. Thus in a number of cases, the Court embarked on a more expansive line of interpretation, granting Union citizens right of residence and equal treatment as well as access to the welfare schemes of a hosting member state, despite being economically inactive.[13] In these cases the Court developed a distinct vision of Union citizenship as a fundamental status of Member State

[11] Regulation (EC) No 883/2004 of the European Parliament and of the Council of 29 April 2004 on the coordination of social security systems.

[12] Regulation (EU) No 492/2011 of the European Parliament and of the Council of 5 April 2011 on freedom of movement for workers within the Union.

[13] See the Sala (C-85/96), Grzelczyk (C-184/99) and Baumbast (C-413/99) cases among others.

nationals (Dougan 2013, 133). The Court stated that had a certain link been established between a citizen and a host member state, such link could justify the right to equal treatment to welfare benefits.

However, whereas the Union rules mark a fundamental intervention into the national prerogative to define the members of social communities (Cornelissen 1996; Ferrera 2005; Van der Mei 2003), it is not without limits. In 2004, the EU adopted the Residence Directive 2004/38[14], which further details the link between the right to reside and access to welfare benefits for the European migrant. The directive's article 24 sets out that the right to equal treatment is subject to the conditions laid down in the Treaty and in secondary law. The residence directive poses a number of conditions on the right to reside, of which the need for social protection is the most important one. The need for social protection may terminate the right to reside. Whether one qualifies for equal treatment depends on ones status as worker and/or the length of residence. In principle, European citizens are equal but de facto some European citizens are more equal than others.

Free movement and the universalistic welfare state

As the other Nordic welfare states, the Danish welfare state is often presented as distinct. It is characterised as universalist, largely de-commodified, residence-based, non-contributory and relatively generous (Cox 2004; Cornelissen 1997; Esping-Andersen 1990; Ruhs 2015; Korpi and Palme 1998; Andersen et al. 2015). Firstly, the Danish welfare state has traditionally been characterised as universalist, promoting equality of status among their citizens. In the Scandinavian systems of universalism, the needy is not distinguished from the non-needy. Welfare universalism benefits the middle class as well as the poor since most benefits are available to all citizens. Social

[14] Cf. n 9.

policies are not targeted to low income groups as in the residual welfare state as well as they are not dependent on labour market participation as in the insurance-based welfare state (Korpi and Palme 1998). Secondly, according to Esping-Andersen's famous welfare worlds, a key feature of the Nordic model is the high degree of 'de-commodified' welfare rights. A de-commodified welfare state will thus grant social rights on the basis of citizenship rather than on the basis of market performance, i.e. attachment to the labour market (Esping-Andersen 1990). Thirdly, social rights are granted on the basis of residence (Cornelissen 1997, 32). A person is entitled to welfare because s/he is a citizen or a habitual resident, and not qua individual contributions paid to a specific scheme. Fourthly, benefits have traditionally been tax-financed and not based on contributions. Yet, tax payment is not a direct requirement to receive a specific social benefit. The Scandinavian welfare state has thus traditionally had a much institutionalised principle of equal treatment for the members of its welfare communities. Finally, the Scandinavian model has also been characterised by relatively generous benefits as well as by extensive welfare services (Lindbom 2001).

Due to these characteristics, the Danish welfare state has been viewed as 'unfit' for Union rules where EU citizens have a right to reside and access welfare across borders. According to the welfare-magnet hypothesis, its universalistic, relatively de-commodified and generous nature should make it particularly attractive to EU immigrants. Furthermore, it's residence and non-contributory character, would make it unsustainable in a Community of open welfare borders since the organising logic of the system does not ensure that those who benefit also contribute (Scharpf 2002, 2010). Basically, this type of welfare state is found to be out of tune in its current institutional set-up, but also for historical reasons. When the cross border welfare rules were originally designed, the six founding members all had insurance-based welfare systems. The Community rules came to match this insurance-based logic. Welfare rights were to be granted according to where one works, i.e. according to the 'lex loci laboris' principle and where one paid into the social security scheme

(Cornelissen 1997; Christensen and Malmstedt 2000). This would ensure a balance between contribution paid and benefits received. This contrast with the residence-based and non-contributory welfare state, which compared to the other member states has been perceived as most exposed to the rationales of EU cross-border welfare (Martinsen 2005) and as a distinct welfare state within an exceptional system presumed to be unsustainable (Ruhs 2015).

We now turn to the data presentation and subsequently to the empirical analysis of the fiscal impact of EU immigration on this type of welfare state.

Data

Our research design has common features with the recent literature on EU fiscal impact assessment. We adopt a static approach over a long period of time as Dustmann and Frattini to assess the evolution of fiscal contribution under very different degrees of EU mobility and accessibility to Danish welfare (Dustmann and Frattini 2014). However, we depart from the studies of Dustmann and coauthors, by estimating net fiscal impact directly on the basis of individual data (see Ruist 2014, for similar methods). Danish administrative register data allows us to directly ascribe to each EU citizen tax contributions, income transfers and public services covering a very high share of total taxes and public expenditures.

The main contribution of this study is the computation of fiscal impact for 100% population of EU citizens in another EU country. Our dataset includes repeated cross sections of 100% of the population of EU citizens in Denmark on the December 31st of each year between 2002 and 2013. We have been able to get access to the full population of EU citizens, which is seldom granted and have to our knowledge not been compiled before in Denmark or beyond. Thus, this unique dataset enables us to describe the evolution of EU citizens' welfare consumption and contribution over a

long period of time. Differently from other studies, we do not exclude EU citizens on the basis of their length of residence.[15] Instead, we estimate fiscal impact for the stock of EU population in Denmark, and for the subsamples of shorter term and longer term migrants. This separate analysis permits assessing eventual changes over time in the composition of inflow and outflow of EU migrants in terms of their contribution to Danish welfare. We study, in addition, the separate fiscal impact of migrants from old EU countries and new EU countries, as the migration population from central and eastern European countries is growing faster than that from traditional EU countries. Finally, we consider also the fiscal contribution of different age groups.

We construct a dataset for each year by merging a host of administrative registers to such populations of EU citizens. These data contain information on each person's total amount of public income transfers and total payment of personal income tax, labour market contribution and tax on real property. The dataset, in addition, contains individual information on the use of health care services, criminal charges, daycare, school, secondary and higher education. Finally, we use population and migration administrative register information to measure socio-demographic and income information as well as the length of residence in Denmark.

For EU citizens residing 31st December 2002-2013 in Denmark, we compiled their fiscal contribution and welfare consumption for each year. The fiscal contributions include income tax, property tax, labour market contribution and Value Added Tax (VAT). We have compiled most contribution items directly on basis of administrative information at the individual level, with the exception of contribution via VAT and levies. VAT is calculated indirectly as 24.5% of EU citizens' disposable income, a high reliable variable which we observe for the whole population.

[15] Ruist (2014) estimates the net fiscal impact of EU citizens in Sweden in 2007 with at most 4 years of residence. Jacobsen, Junge and Skaksen (2011) consider for the same purpose a sample of higher educated immigrants in Denmark in 2009 with at most 7 years of residence.

We here rely on the Danish authorities standard estimation of contribution via VAT, which is used in general across age groups and nationality.[16] It may, however, be argued that EU immigrants with shorter term residence in a host country save more or send part of their income to relatives in their country of origin and therefore do not contribute as much as the national population via VAT. To take this into account, we calculated a lower percentage of VAT contribution for the first five years of residence, starting with 12.25% VAT contribution during the first year of residence then increasing linearly to 24.5% VAT contribution after five years of residence.

Concerning the public expenditures from EU immigrants in Denmark, we compiled data for received cash benefits and benefits in kind. For cash benefits, it is possible to extract data on the exact paid out amount by means of Danish register data. The expenditures for all accessible cash benefits were compiled at an individual level; unemployment benefits, sick and parental benefits, social assistance, integration allowance, social pension, study grant, family benefits, pension benefits, early retirement benefit and housing allowance.

For welfare services, granted as benefits in kind, administrative individual data informs us of the consumption hereof, but not of the costs. As the use of welfare services are a relative important part of expenditures in the Danish public sector, we compiled data on EU immigrants use hereof at the individual level. The data on individual enrollment in daycare and elementary school, allows us to identify the individuals use of pre-school and school services. Our data set furthermore allow us to identify individuals enrolled in secondary education or higher education programs. In addition, our data allow us to identify the individual use of the healthcare sector; consultation at a general practioner, dentist as well as hospitalization. Finally, criminal charges against EU immigrants are

[16] For Danish authorities' standard estimation of contribution via VAT and levies, see section 6.1.3.1 of the Danish tax authorities methods for the calculation of tax revenues (2013) http://www.skm.dk/media/138783/provenu_og_metode.pdf.

also identifiable in our dataset. For the latter, it should be noted that our estimate of criminality costs can be considered as an upper bound, because not all charges end up with convictions. We have estimated the costs of welfare services for each year between 2002 and 2013 on basis of different sources. The cost per unit estimates of having a child enrolled in day care (i.e. cover crèche, family day care, nursery schools and age-integrated institutions) per year rely on the official estimates developed by the Ministry of Social Affairs and the Interior. The costs per unit estimates for being enrolled in elementary school per year rely on the official estimates developed by the Ministry of Social Affairs and the Interior. The cost per secondary education enrolment per year is proxied by the rate the state pays to each secondary educational institution per full-time equivalent (FTE) (i.e. 'Taxametertakst'). This data is retrieved from the Ministry for Children, Education and Gender Equality. Data on the cost per unit for higher education is proxied by the rate the state pays to each higher education institution per FTE (i.e. 'Taxametertakst'). This data is available from the Ministry of Higher Education and Sciences. The yearly total public expenditures to general practitioners have been extracted from the financial statement of the Regions. The number of consultations per year is retrieved from Statistics Denmark. The cost per unit is calculated by dividing total expenditures by the total number of consultations. Data on the total expenditures to dentistry is extracted from Statistics Denmark's data base. The data on consultations are likewise found in Statistics Denmark's data base. The cost per unit is calculated by dividing total expenditures by the total number of consultations. Data on the total hospital expenditures and number of hospitalizations have been extracted from Statistics Denmark's public expenditures section. The cost per unit estimate is the total expenditures divided by the number of hospitalizations (for the same method, see Jacobsen et al. 2011, 23). For the unit cost of criminal

charges, we base our estimates on the 2009-estimate in Jacobsen, Junge, and Skaksen (Jacobsen et al. 2011, 23). The 2009-estimate is used for the whole period under investigation.[17]

Concerning public goods, the ideal would be to be able to calculate the marginal costs for providing public goods for each arriving immigrant (see Dustmann and Frattini 2014, 599 for their considerations on using marginal versus average cost of public goods). However, no data are available for the marginal costs of providing public goods to immigrants. We therefore calculated the average costs of public goods, i.e. the ratio of total expenditures for public goods to the total population.[18] The public goods' costs covers a long list of items, including costs for legislative and administrative institutions, fiscal affairs, external affairs, defence, transport and infrastructure maintenance, fire-protection, public order and safety, waste management, environmental protection, etc. Many of the items are 'pure' public goods in the sense that costs are fixed irrespective of the size of the population. The average costs of public goods are therefore likely to overestimate the actual costs implied by the EU immigrant. In our analysis below, we therefore generally hold the

[17] The online appendix 'Estimations of welfare service costs in Denmark 2002-2013. A note on data collection' further details the procedures for the estimations. Table 1 in the appendix sets out the final estimations used for each services between 2002-2013.

[18] Data on yearly costs of providing public goods are extracted from Statistics Denmark, at http://www.statistikbanken.dk/statbank5a/SelectVarVal/Define.asp?MainTable=OFF24&PLanguage=0&PXSId=0&wsid=cfsearch (ID: 'OFF24'). Items of expenditure include row one through five (i.e. 'General Public Services', 'Defense', 'Public Order and Security', 'Economic Affairs', 'Environmental Protection'). Data on the population size are extracted from Statistics Denmark at http://www.statistikbanken.dk/statbank5a/SelectVarVal/Define.asp?MainTable=HISB3&PLanguage=0&PXSId=0 (ID: 'HISB3'). The unit cost of yearly public goods provision is calculated by dividing the total costs of public goods provision in the given year with the total population size in the same year.

marginal cost of public goods equal to zero but add a lower bound calculation of average fiscal impact where the marginal cost of public goods are equal to average cost (see figure 2.C below).

For the examination of the net fiscal contribution for different populations of EU citizens in Denmark, this is obtained by the difference in means between contributions and expenditures. In this way, we can examine the extent to which EU immigrants in Denmark 'pay their way' in the welfare system (Dustmann et al. 2010, 2) through a long period of time.

Finally, it should be noted that we have not been able to take into account the contribution of EU citizens to corporate tax in Denmark, a feature that can underestimate the total contribution of EU citizens to the Danish welfare system.

EU Immigration to Denmark 2002-2013

We define an EU immigrant as an individual residing in Denmark in the observation year with citizenship from a country member of EU on 31st December of the observation year, irrespective of the year of arrival or length of migration. In Figure 1, we report graphically the population of EU immigrants in Denmark during the years between 2002 and 2013, by different individual characteristics. In this period, the number of EU citizens in Denmark has increased considerably from 53782 to 159857 people (see Panel A of Figure 1). Over the twelve years timespan, EU citizens residing in DK has increased with approximately 146%. However, this important increase in EU immigration to Denmark is not equally distributed across different age groups (Figure 1 Panel B).[19] Notably, the group of EU immigrants with age between 25 and 44 has grown at a much

[19] Figure A1 in the appendix present the age distribution of EU citizens during the last 5 years of our sample, disaggregated by country of origin. As in the Swedish case (Ruist 2014), immigrants for new EU countries are more concentrated in the younger half of working ages than immigrants

faster pace than the remaining age groups, such that the age distribution of EU immigrants in Denmark is increasingly more heavily concentrated in the first half of the working age, with the rest of age groups following similar trends. The groups of age retired EU immigrants and children are the smallest ones. These are also the groups with potentially most negative impact on fiscal contribution of EU citizens. Panel C of Figure 1 plots the evolution of the population of immigrants from old EU countries and from new EU countries. This plot clearly shows that in the future the number of EU citizens from the new member states will outnumber the more traditional population of EU immigrants.[20] Finally, the Panel D of Figure 1 shows the evolution of temporary (under 3 years since migration) and more permanent EU immigrants (at least 3 years since migration). This plot reveals that both groups are growing at similar pace, and that the stock of temporary immigrants is more sensitive to the business cycle. To sum up, over the examined time span we see a very important increase in the number of EU immigrants in Denmark that change the EU immigration pattern towards an immigrant population which to a higher extent originates in the new member states and is more concentrated in first half of working age.

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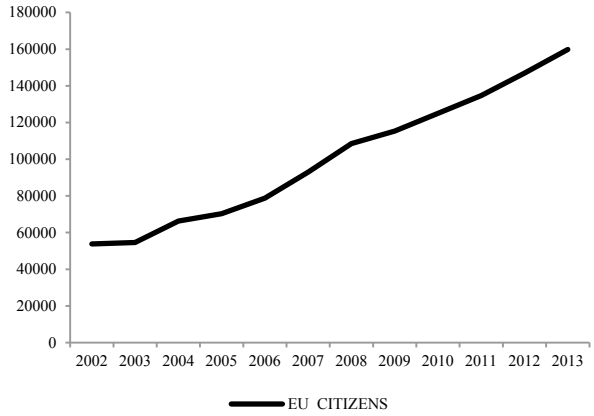
from old EU countries, and both groups are much more heavily concentrated than the population with Danish citizenship. As a consequence, the population of children and youth from new EU countries is also much more concentrated in the pre-school period than youth from old EU countries. In addition, there are very few age retired immigrants from new EU countries.

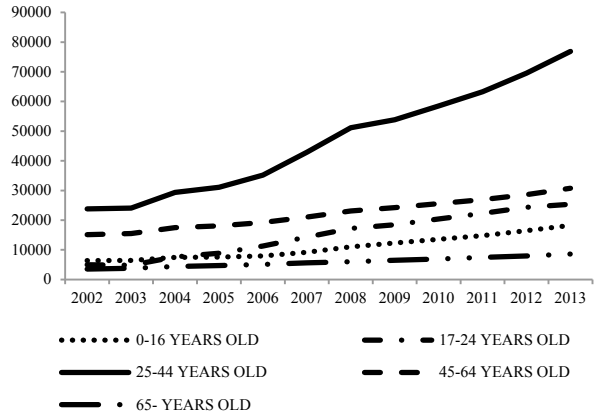
[20] Ultimo 2013, the five main states of origin for EU citizens in Denmark were Poland, Romania, Sweden, Germany and the UK.

Figure 1: Population of EU Citizens in Denmark, by Individual Characteristics

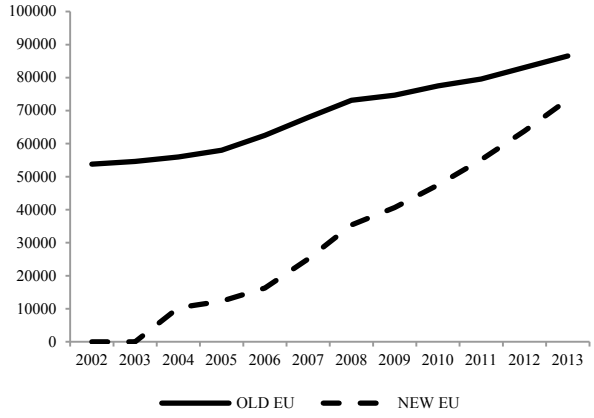
A.EU Citizens in Denmark



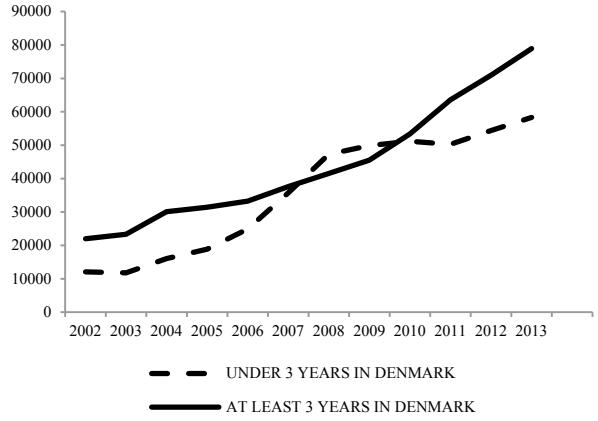
B.EU Citizens in Denmark By Age



C. EU Citizens in Denmark By Country of Origin



D. EU Citizens in Denmark By Years Since Migration



Notes: Panel A plots the number of residents in Denmark each 31st of December of the current year with citizenship from a member state of the European Union. Panel B plots the number of EU citizens in Denmark by age groups. Panel C plots the number of EU citizens with citizenship belonging to countries entering EU before May 2004 (solid line), and the number of EU citizens from countries that enter EU from May 2004 (dashed line). Finally, the panel D plots the number of EU citizens in Denmark for two subsamples according with their years since migration to Denmark. The solid line denotes the numbers of EU citizens who have been at least 3 years in Denmark, whereas the dashed line denotes EU citizens who have been under 3 years in Denmark.

Table 1 presents summary statistics for the overall EU population in Denmark, by year of observation and by length of residence. The table shows that on average an EU citizen is about 35 years old and has been 5.5 years in Denmark. However, the average age of EU citizens falls over the studied period from 38 in 2002 to 34 years old in 2013 due to the high presence of younger EU immigrants from the new member states. Despite the important increase in the number of EU

immigrants as well as the changes in age and country of origin, many characteristics of EU immigrants in Denmark have been stable. Residence length, presence of females, employment, hospitalization and criminal charges remain at very similar levels across 2002-2013. In fact, the percentages of main drivers of social expenditure such as unemployment insurance and social assistance are lower in 2013 than in 2002. When distinguishing EU citizens since years of residence in Denmark, we see that EU citizens with shorter term residence, i.e. at most three years in Denmark tend to be much younger, have less children and a smaller percentage of key social benefits such as study grant, unemployment insurance, social assistance, as well as being less frequent users of the health care sector than EU citizens with longer term residence, i.e. more than three years in Denmark. We thus see that 'social integration', denoting the extent to which the welfare system is used, is weaker for EU citizens with shorter term residence.

Table 1: Descriptive Statistics on EU Citizens in Denmark, 2002-2013

	All	2002	2013	Under 3 years since migration	At least 3 years since migration
Percentage of citizens from Old EU (%)	69	100	54	53	77
Average age	35	38	34	28	39
Percentage aged 0-16 (%)	11	12	11	9	12
Percentage aged 17-24 (%)	15	9	16	30	6
Percentage aged 25-44 (%)	46	44	48	51	44
Percentage aged 45-64 (%)	22	28	19	8	30
Percentage aged at least 65 (%)	6	7	5	1	9
Percentage females (%)	47	45	47	45	48
Average number of children in the family	0.7	0.9	0.7	0.4	0.9
Average years since migration	5.5	5.5	5.6	0.8	9.3
Percentage with study support (%)	2	2	3	1	3
Percentage employed (%)	68	66	68	63	72
Percentage passive unemployed (%)	2	3	3	0.9	3
Percentage other unemployed (%)	2	2	2	1	2
Percentage with social assistance (%)	3	4	3	1	4
Percentage visiting GP or specialists (%)	58		66	41	68
Percentage hospitalization (%)	13	11	11	6	17
Percentage with criminal charges (%)	3	3	3	2	4
Average Fiscal Impact (€2013)	12777	13876	12378	6488	16259
Average Contribution (€2013)	7388	7104	6698	2549	10067
Average Expenditure (€2013)	5389	6772	5680	3939	6192
Observations	1207098	53782	159857	430750	776348

Notes: Percentage with study support denotes the fraction of EU citizens with study support for at least 6 months among citizens aged 16-64. Percentage employed denotes the fraction of EU citizens with positive wage earnings among citizens aged 16-64. Percentage passive unemployed is the fraction of EU citizens with unemployment insurance for at least 6 months among citizens aged 16-64. Percentage other unemployed is the fraction of EU citizens with unemployment insurance under active labour market policy program, under sickness benefit, under parental leave or under job leave for at least 6 months among citizens aged 16-64. Percentage with social assistance is the fraction of EU citizens with social assistance for at least 6 months among citizens aged 16-64. Percentage with criminal charges is the fraction of EU citizens with at least one charge for offense among citizens aged 15 and beyond. Percentage visiting GP or specialists is the fraction of EU citizens with at least one visit to a GP or a specialised doctor among all EU citizens. Percentage hospitalization is the fraction of EU citizens with at least one visit to a hospital among all EU citizens. The fiscal impact and their components are expressed in EURO from 2013, denoted €2013.

The fiscal impact of EU citizens in Denmark during 2002-2013

For the fiscal impact of EU citizens, we computed this by directly ascribing individuals their public transfer and estimated cost for each public service and their contribution to each of the revenue sources in the dataset. This allows us to calculate for each year overall net fiscal impact of the 100% of population of EU citizens registered in Denmark. The fiscal impact is attained by calculating the difference in contributions and expenditures (for similar methods, see Dustmann and Frattini 2014; Ruist 2014). Below figure 2 presents the contribution, expenditure and net fiscal impact for the full EU population each year 2002-2013, in aggregated and average figures.[21] Our estimates show that over the entire period, immigrants from EU countries contribute with €15538 million to Danish welfare, expended €8905 million in public income transfer and services and therefore made a positive fiscal contribution to Denmark of €6633 million. As shown in Figure 2 Panel A, the aggregated contribution and expenditure increase substantially over time, driven by the fast grow in EU immigration to Denmark. The figure also shows that the total fiscal contribution has grown practically each year, with the only exception of period 2008-2010.

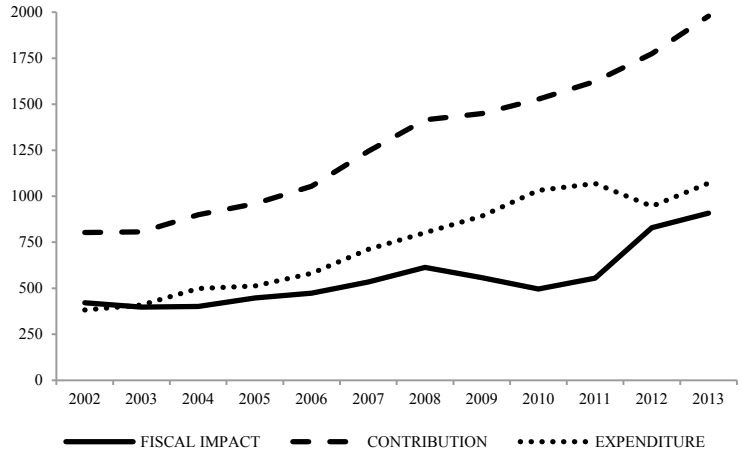
Figure 2 Panel B, which reports the average figures, demonstrates that the upward trend in net fiscal impact is driven by EU population growth. During the studied period, the average fiscal impact has dropped somewhat when comparing 2002 with 2013. However apart from the years of crisis 2008-2010, it is also remarkable that average fiscal impact remained pretty constant around €6000 per EU citizen. The 2004 enlargement slightly reduced individual contribution. Average expenditure increased temporarily during the worst years of economic downturn, but individual expenditure came back to pre-crisis levels in 2012-2013. To sum up, the fiscal contribution of EU citizens in Denmark improves steadily over time driven by very fast growing immigration population. EU

[21] The tables in appendix A report the amount pr. year in €2013 for the full EU population and for the different groups considered in this paper.

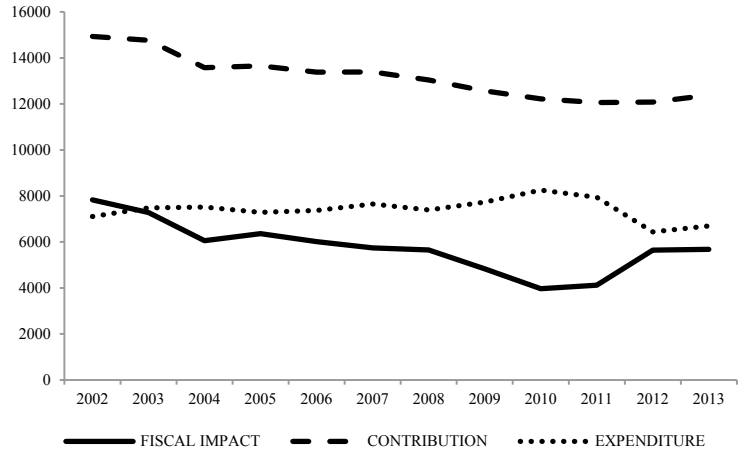
citizens' extended access to Danish welfare, enlargements and the onset of one of the most severe economic crises in Europe have had a limited and temporary impact on individual's reception of public income transfers and consumption of public services.

Figure 2: The fiscal impact of EU citizens in Denmark 2002-2013

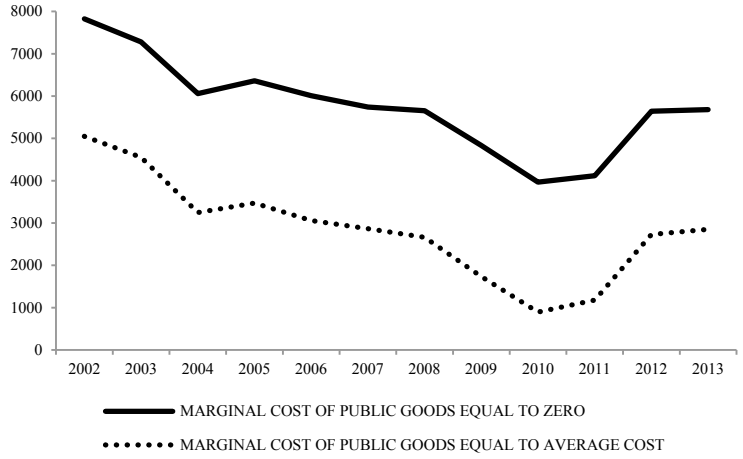
A. Total Fiscal Impact, in Million €2013



B. Average Fiscal Impact, in €2013



C. Lower bound for Average Fiscal Impact, in €2013



The fiscal impact by components; age, years since migration and country of origin

As discussed previously, the evolution of EU immigration to Denmark clearly shows a very fast increasing trend in the presence of EU citizens at the first half of their working age. Not surprisingly, figure 3 Panel A, which reports average fiscal impact by age groups, shows that the net fiscal impact of EU immigrants is driven by working age population of EU citizens. When we focus on children and youth groups, their average contribution is very stable across the period, with children costing about €5000 to the Danish welfare state and the youth group (17-24) practically having no fiscal impact due to the presence of both students and workers on their first years on the labour market. A very different picture arises for the group of age retired EU citizens. In this case, their negative fiscal impact drops between 2007 and 2011 and returns to pre-2007 levels in 2012-2013. The differences in the fiscal impact across age groups show the importance of the age distribution of a population. EU citizens in Denmark are, however, overrepresented in the age groups, which make a positive fiscal impact.

We now turn our focus on the different contribution of temporary, e.g. immigrants with residence under 3 years, and those with longer residence in Denmark, e.g. more than three years of residence. Figure 3 demonstrates that both groups of EU citizens have a positive contribution to Danish welfare. However, the contribution of EU citizens with shorter term residence in Denmark is on average €4000 lower than that of immigrants with more years in Denmark. Nevertheless, the consumption of public income and services of more recently arrived EU citizens is also much lower.

When comparing citizens from old versus new member states, figure 3 shows that citizens from old member states contribute more but also benefit more, i.e. social expenditures are higher. The aggregated fiscal impact from the two groups of countries are positive for both throughout the examined period but as shown by Dustmann and Frattini as well as Ruist (Dustmann and Frattini

2014; Ruist 2014), the net fiscal contribution is higher from EU citizens from old member states than from new member states. The fiscal impact from EU citizens from the new member states increases considerably from the EU10 enlargement in 2004 to 2008, then drops 2008-2010. From 2011-2013 we see a more modest increase again. The evolution is different for citizens from the old member states. We see a decrease in the net fiscal contribution onto 2010, followed by an increase 2011-2013.

Figure 3 reveals the different contribution of several subpopulations of interest. Obviously, it is difficult to identify the separate role of individual characteristics, as we do not have access to natural experimental data. However, we go a bit further in an attempt to disentangle the role of individual heterogeneity on fiscal contribution, and we assess the strength of association of key socio-economic characteristics of EU immigrants given we control for time effects. Columns 1 to 3 of Table 2 display the results of regressing the individual fiscal impact, contribution and expenditure on year dummies (time dummy for 2013 excluded), age, gender, country of origin, years since migration, income, criminality, health, social assistance and study support. These results (columns 1-3 of Table 2) thus account for time variation and individual heterogeneity in fiscal contribution. These estimations, therefore, represent the hypothetical differences between similar EU immigrants in included covariates who depart in particular characteristics. The estimated results show that fiscal contribution increases with age at a decreasing pace, because public expenditure decreases, and therefore suggest that the lack of difference in average fiscal impact between age groups 25-44 and 45-64 is due to differences between these two groups which compensate for the influence of age. Females with similar observable characteristics tend to contribute and expend more than males but due to their much higher public expenditure, their average fiscal impact is lower than that of males. Citizens from old EU countries contribute on average €1330 more than citizens from new EU countries due to their higher contribution. Interestingly, the longer EU

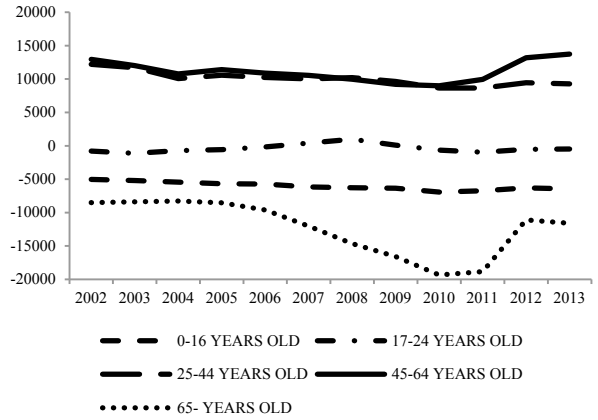
citizens stay in Denmark, the lower their contribution, a result that is in apparent contradiction with the results presented in Figure 3. We turn back to this result with an analysis of out-migration. In addition, the estimations of Table 2 show that the average fiscal impact is determined in a higher extent by income due to its central role in direct and indirect taxation, but income has a relatively much minor influence on public expenditure. The last rows of Table 2 reflect the negative impact on fiscal contribution of health problems, criminal charges, social assistance and study support claimants.

The last column in Table 2 displays the estimated probability to leave Denmark, e.g. outmigration, as a function of time dummies and the characteristics of individuals including contribution and expenditure measured in the preceding year.[22] This regression improves the understanding of the role of years in Denmark on fiscal impact. Obviously, the longer the individual stays in Denmark the higher the cumulated contribution of the individual to Denmark. However, as shown in columns 1-3 of the table, lengthy residence in Denmark tends to both reduce contribution and increase public expenditure, this apparently revealing the presence of the second mechanism of welfare magnet hypothesis. However, the first two rows of column 4 of Table 2 strongly suggest that the negative relation between residence length and fiscal contribution is mainly driven by much stronger tax repulsion than benefit-attraction effect on EU citizens' out-migration behaviour. Thus, EU immigrants who pay more tax will leave to a greater extent than EU migrants who receive fewer benefits, and this selective out-migration contributes to the negative relation between net fiscal impact and length of residence in Denmark, as those who decide not to leave the country pay potentially lower taxes than those who decide to leave.

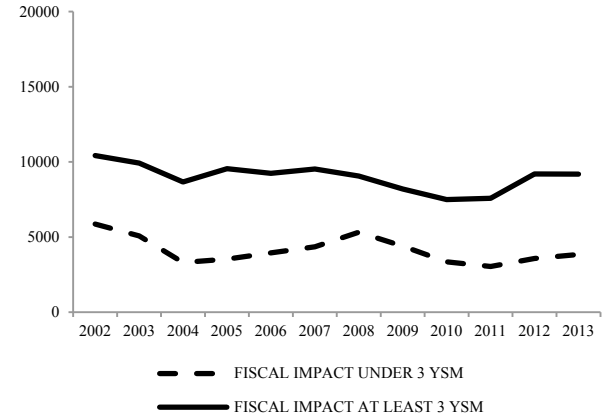
[22] This regression excludes 2002 from the sample as we do not have individual information for year 2001.

Figure 3: The average fiscal impact of EU citizens in Denmark 2002-2013 by age, years since residence and country of origin, in €2013

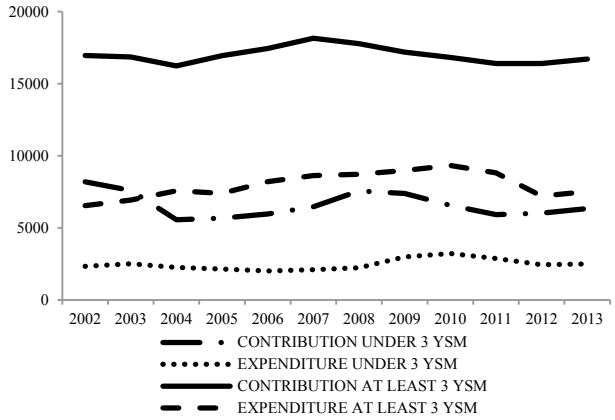
A.Fiscal Impact By Age



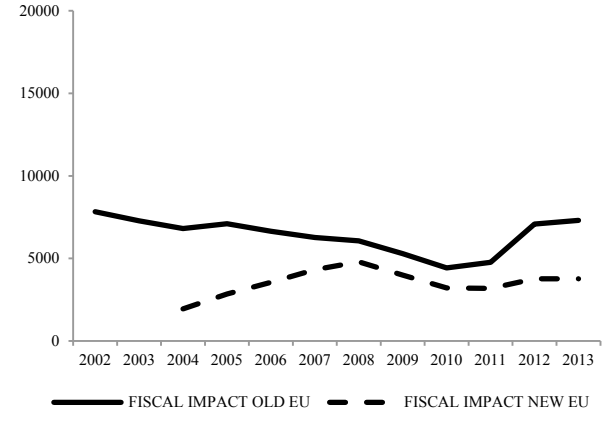
B.Fiscal Impact By Years Since Migration



C.Fiscal Impact Components By Years Since Migration



D.Fiscal Impact By Country Of Origin



E.Fiscal Impact Components By Country Of Origin

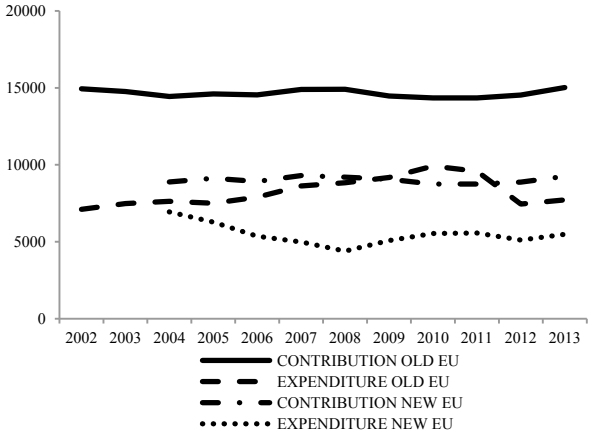


Table 2: Dependency of Fiscal Impact, Contribution, Expenditure and Outmigration on characteristics of EU citizens

	Dependent Variable			
	Fiscal Impact	**Contribution**	**Expenditure**	**Outmigration**
Contribution (€1000)				0.14***
Expenditure (€1000)				-0.00
Year 2002	-1092***	-1322***	-229**	
Year 2003	-1296***	-1295***	2	-0.25
Year 2004	-1441***	-1469***	-28	-0.44
Year 2005	-1009***	-1239***	-230***	-2.86***
Year 2006	-1389***	-1216***	173	-3.72***
Year 2007	-1222***	-1225***	-2	-2.56***
Year 2008	-1219***	-1183***	36	0.31
Year 2009	-1166***	-999***	167**	-2.88***
Year 2010	-1262***	-824***	438***	-2.87***
Year 2011	-868***	-680***	188***	-3.95***
Year 2012	-411***	-361***	50	-3.98***
Age	281***	-54	-334***	-0.31***
Age^2	-4***	0	5***	0.00***
Female	-332	721**	1053***	-1.23***
Citizen from Old EU	1528***	1149***	-379***	-2.41***
Years Since Migration	-508***	14	522***	0.08***
Years Since Migration^2	12***	-0	-12***	-0.00***
Income (€1000)	546***	535***	-10***	-0.08
Charged	-7336***	-43**	7293***	-2.41***
Hospitalization	-20147***	-301***	19847***	-3.44***
Social Assistance	-10972***	-207	10765***	-4.53***
Study Support	-4872***	-344	4528***	-0.31***
Observations	925829	925829	925829	790468

Notes: Column entitled 'Fiscal Impact' reports OLS regression estimates of fiscal impact measured in €2013 on individual characteristics. Column entitled 'Contribution' reports OLS regression estimates of contribution of EU citizens measured in €2013 on their individual characteristics. Column entitled 'Expenditure' reports OLS regression estimates of expenditure on EU citizens measured in €2013 on their individual characteristics. Finally, the column entitled 'Outmigration (%)' is a regression of the percentage of EU citizens who out-migrate on individual characteristics. Note that contribution and expenditure are measured in 1000 €2013 in the out-migration regression. Standard errors are robust and clustered at the individual level. * denotes statistically significant at 5%, ** denotes statistically significant at 1%, and *** denotes statistically significant at 0.1%.

Conclusion

The sustainability of the welfare state in a Union where citizens can reside freely is increasingly

contested. The nexus between the welfare state and EU immigration became high politics in the UK referendum and has cast the EU into its worst crisis ever. Also beyond the European Union, the welfare-immigration unsustainability thesis stands strong and appears largely undisputed. The current re-articulation of the thesis calls for an empirical test which has been the research endeavor of this paper.

In this paper, we have examined the fiscal impact of EU immigration on the universalistic, tax-financed welfare state of Denmark. In the exceptional system of EU free movement for persons and cross border welfare, Denmark constitutes a crucial case with the largest share of non-contributory social benefits among other key characteristics. According to the theoretical claims of both the unsustainability thesis and that of welfare magnetism, the Danish welfare state should be particularly vulnerable in the EU setting, because immigrants will be attracted by generous and inclusive welfare provisions and will tend to stay in such institutional setting. Welfare attraction will place a heavy fiscal burden on the welfare budget as immigrants will be entitled to benefits without being obliged to contribute.

The main contribution of this paper has been an empirical inquiry into a solid theoretical claim – on the basis of a unique dataset, a long time span and for a 100% of EU citizens residing in Denmark. The main conclusion is that even in this type of exposed welfare state – and even during a time span of considerable structural changes – EU immigrants made a significant positive net contribution to the Danish welfare state. Not only have EU citizens paid their way through the welfare system but they have also made a considerable contribution to its fiscal sustainability through tax payment. The unsustainability thesis disregard that inclusive, generous welfare states also oblige its residents to high tax payments. Also disregarded is that EU rules permit member states to condition residence rights on EU immigrants not being a 'unreasonable burden' on the social system of a hosting state.

During the twelve years timespan examined, the EU immigration pattern in Denmark changed substantively – but reliance on welfare remained rather stable. EU citizens residing in DK increased with approximately 146% and the EU immigrant population became increasingly from the new member states and more concentrated in the first half of working age. However, the average fiscal impact of EU citizens remained positive – even during the economic downturns of 2008-2010. Contributions decreased during the crisis years and expenditures went up, but stayed positive on a net balance - also when taking average cost of public goods into account. The differences in the fiscal impact across age groups showed the importance of the age distribution of a population. EU citizens in Denmark are, however, overrepresented in the age groups, which make a positive fiscal impact. EU citizens with shorter term residence proved to contribute less but also benefit less from the welfare state than those with longer term residence. Moreover, our study compared the fiscal impact of EU citizens from old member states with citizens from the new member states. The net contribution from citizens from new member states was positive since their Union membership and onwards but slightly lower than citizens from old member states. The latter group makes higher contributions due to higher earnings but also benefits more from the welfare state than citizens from the new member states. Finally, examining the likelihood of out-migration of EU citizens in Denmark on the basis of individual socio-economic characteristics, we identified a tax repulsion mechanism rather than a welfare benefit attraction effect. The results on outmigration suggest that the negative relation between residence length and fiscal contribution, i.e. tax payment, is mainly driven by much stronger tax repulsion than benefit-attraction effect on EU citizens' out-migration behaviour. EU immigrants who pay more tax tend to leave to a higher extent than EU migrants who receive fewer benefits.

Our findings challenge the conventional theoretical assumption – and currently politically articulated concern - that welfare sustainability relies on a strong element of closure. At least the universalistic, tax-

based welfare budget of Denmark has benefitted considerably from EU immigration through a period of paramount political and economic change. Our findings did not support the three key claims of the welfare unsustainability thesis. Between 2002 and 2013 1) EU free movement rules did not prove unsustainable in the more inclusive and generous welfare state examined. 2) Despite the grand enlargements within the period, the fiscal impact remained positive – also when examined for different components of the immigrating population; age, years since migration and country of origin. 3) Immigrants with short-term residence proved to contribute less to the welfare budget but also benefit less here from. Also this group of EU citizens proved to pay their way into the Danish welfare state. These findings strongly suggest that welfare states are more resilient to open borders than theoretical and political claims articulate.

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Appendix A Additional Tables and Figures

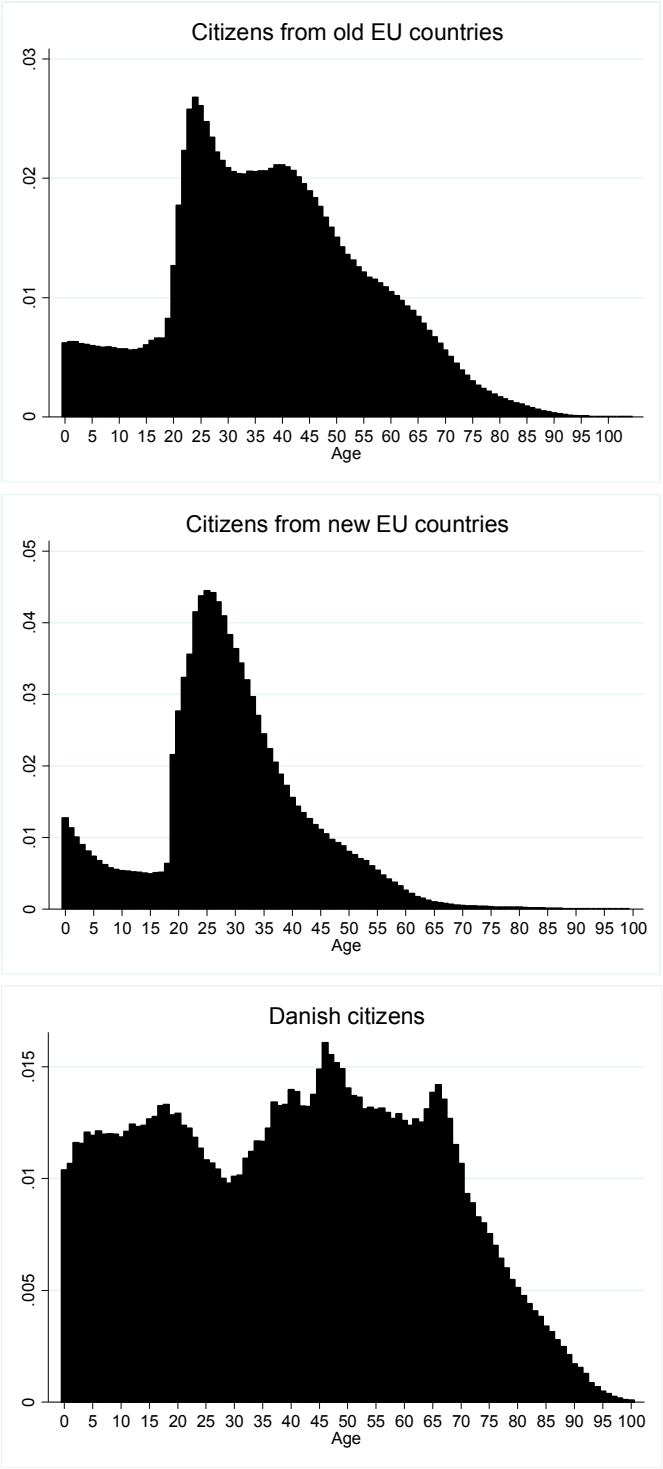
Table A1: Fiscal impact of EU citizens in Denmark by age, country of origin and years since migration, on average per individual, in euro

Year	All	Age 0-16	Age 17-24	Age 25-44	Age 45-64	Age 65-	Old EU	New EU	Under 3 YSM	At Least 3 YSM
2002	7827	-5027	-797	12214	12948	-8503	7827		5862	10423
2003	7282	-5210	-1128	11710	12016	-8382	7282		5084	9927
2004	6057	-5431	-719	10065	10755	-8279	6815	1942	3306	8662
2005	6361	-5680	-579	10579	11416	-8531	7104	2850	3532	9549
2006	6011	-5725	-163	10243	10894	-9601	6650	3552	3955	9243
2007	5739	-6171	410	10022	10556	-12038	6265	4316	4357	9527
2008	5652	-6278	985	10223	9981	-14655	6066	4798	5324	9059
2009	4833	-6358	88	9644	9201	-16594	5294	3986	4399	8202
2010	3967	-6919	-652	8667	8990	-19353	4429	3213	3349	7492
2011	4120	-6741	-963	8662	9949	-18835	4769	3182	3042	7577
2012	5643	-6308	-527	9444	13180	-11107	7086	3766	3572	9200
2013	5680	-6440	-475	9290	13737	-11605	7302	3765	3847	9186
2002-13	5764	-6024	-377	10063	11135	-12290	6407	3537	4136	9004

Table A2: Contribution and expenditure by country of origin and years since migration, on average per individual, in euro

	Contribution					Expenditure				
Year	**All**	**Under 3 YSM**	**At Least 3 YSM**	**Old EU**	**New EU**	**All**	**Under 3 YSM**	**At Least 3 YSM**	**Old EU**	**New EU**
2002	14934	8189	16958	14934		7107	2328	6535	7107	
2003	14764	7592	16860	14764		7482	2508	6933	7482	
2004	13576	5558	16238	14438	8886	7518	2253	7576	7624	6944
2005	13651	5679	16939	14610	9125	7290	2147	7390	7505	6275
2006	13385	5967	17443	14546	8914	7373	2012	8200	7896	5362
2007	13388	6457	18152	14895	9306	7649	2100	8625	8630	4990
2008	13042	7559	17775	14902	9198	7390	2235	8716	8836	4400
2009	12565	7386	17190	14469	9068	7732	2987	8988	9175	5082
2010	12222	6566	16817	14350	8750	8254	3216	9326	9920	5536
2011	12058	5916	16396	14349	8751	7938	2873	8819	9580	5569
2012	12079	6020	16402	14537	8880	6436	2448	7202	7451	5114
2013	12378	6346	16708	15024	9254	6698	2499	7523	7722	5489
2002-13	13170	6603	16990	14651	9013	7406	2467	7986	8244	5476

Figure A1. Age distributions of EU citizens in Denmark, by citizenship



Notes: The histograms reported in both panels are constructed on the basis of age distribution among population of EU citizens from both groups of countries during the period 2009-2013.

Online Appendix: Estimations of welfare service costs in Denmark 2002-2013. A Note on Data Collection

This note describes the procedures for data collection, including the calculation of the costs per unit of providing a given service within the public service sectors in Denmark; hospitalization, enrolment in day care, elementary school, secondary education, studying at an institution of higher education, as well as a consultation with a general practitioner, consultation with a dentist as well as the cost assessed for crime. In order to analyse a complete time series, estimates are extrapolated from the existing data through a simple linear extrapolation. As shown in Figure B1 the available data shows a general linear tendency. This way, linear extrapolation seems feasible.

Hospitalization:

Data on the total hospital expenditures has been extracted from Statistics Denmark's public expenditures section, and covers the period from 2007-2013. The data can be found on the webpage, http://www.statistikbanken.dk/ESSPROS1, by following the path: '1.2 Sygehusvæsenet' >> 'Sociale Udgifter I Alt'. Data on number of hospitalizations is retrieved from http://www.statistikbanken.dk/IND03. The cost per unit estimate is the total expenditures divided by the number of hospitalizations. The same procedure is followed in Jacobsen, Junge and Skaksen (Jacobsen et al. 2011, 23).

Day Care Enrolment:

The cost per unit estimates of having a child enrolled in day care (i.e. cover crèche, family day care, nursery schools and age-integrated institutions) per year rely on the official estimates developed by the Ministry of Social Affairs and the Interior. The estimates can be retrieved at http://www.noegletal.dk/, by selecting 'Alle kommuner' >> 'Dagtilbud' – udgifter og tilskud' >> 'Udg. (brutto) til dagtilbud pr. 0-13-årige'.

Elementary School Enrolment:

The cost per unit estimates per pupil enrolled in elementary school per year rely on the official estimates developed by the Ministry of Social Affairs and the Interior. The estimates represent the sum of the cost pr. 6-16 year old of attending public or private elementary school. These estimates can be retrieved at http://www.noegletal.dk/, by selecting 'Alle kommuner' >> 'Undervisning' >> 'Udg. til folkeskolen pr. 6-16-årig' // 'Udg. til privatskoler, efterskoler m.fl. pr. 6-16-årig'.

Secondary Education Enrolment:

The cost per secondary education enrolment per year is proxied by the rate the state pays to each secondary educational institution per full-time equivalent (FTE) (i.e. 'Taxametertakst'). The data is retrieved from the Ministry for Children, Education and Gender Equality at http://www.uvm.dk/Administration/Takstkatalog-og-finanslov/Takstkatalog/Tidligere-takstkataloger. The estimates are an average across vocational schools, general upper secondary schools, and vocational colleges. Data is available from 2007 onwards.

General Practitioner:

The yearly total public expenditures to general practitioners have been extracted from the financial statement of the Regions and cover the years 2007-2013. The excel spreadsheet can be found at http://www.regioner.dk/aftaler-og-oekonomi/udgifter-og-finansiering/regnskab. The estimates are found under the header 'praksissektor eksl. medicin'. The number of consultations per year is retrieved from Statistics Denmark, at http://www.dst.dk/da/statistik/nyt/relateret?pid=1316, ID: SYGK, and covers the same period. The cost per unit is calculated by dividing total expenditures by the total number of consultations.

Dentist:

Data on the total expenditures to dentistry specifically is extracted from Statistics Denmark's data base, at http://www.statistikbanken.dk/SYGUS, by selecting 'Tandplejer – før 2007 histopatologiske undersøgelser' and 'Tandlægehjælp' under 'Ydelsesarter'. Data covers the period 2006-2013. The data on consultations are likewise found in Statistics Denmark's data base, at http://www.dst.dk/da/statistik/nyt/relateret?pid=1316, ID: SYGK, by selecting 'Tandlæge and Tandplejer' under 'Ydelsesarter'. The cost per unit is calculated by dividing total expenditures by the total number of consultations. The data is available from 2006 onwards.

Higher Education:

Data on the cost per unit for higher education is proxied by the rate the state pays to each higher education institution per FTE (i.e. 'Taxametertakst'). The data is available at the Ministry of Higher Education and Sciences' webpage: http://ufm.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/economics-of-university-sector?set_language=en&cl=en. The estimates represent an average over the rates of university

students, thus leaving out short term and medium term higher education due to data shortages. However, a comparison of the university estimates with the estimates of short- and medium term higher educations for the available years 2012 and 2013 (retrieved from http://ufm.dk/uddannelse-og-institutioner/videregaende-uddannelse/erhvervsakademier/okonomi/tilskud) indicates that the estimates represent the total higher education system well.

Crime:

For the unit cost of criminal charges, we base our estimates on the 2009-estimate in Jacobsen, Junge, and Skaksen (Jacobsen et al. 2011, 23). The 2009-estimate is used for the whole period under investigation. Their cost per unit of crime is estimated to be 49.500 DKK, i.e. 6653 Euro per criminal ruling. Register data provides us with information on the number of charges, the cost of which we approximate by the cost per unit of a criminal ruling. Our estimates are thus expected to be upper-bound estimates compared to the actual expenditure.

Table B1: Final Estimates

Cost per Unit (FTEs, €)	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Elementary School	6.695	6.937	7.182	7.399	7.673	7.819	8.188	8.673	8.700	8.516	8.609	8.532
Day Care	4.834	4.966	5.123	5.285	5.466	5.593	5.789	6.213	6.428	6.306	6.364	6.377
Hospitalization	1.598	1.672	1.747	1.821	2.268	1.703	1.860	2.064	2.205	2.292	2.390	2.465
Upper Secondary	9.652	9.829	10.006	10.183	10.360	11.129	9.920	10.698	11.486	11.171	11.507	11.566
Higher education	8.866	8.760	7.751	11.480	8.669	8.250	8.616	9.022	9.280	9.273	9.291	9.122
Dentist	34	36	37	39	39	40	42	49	50	50	52	45
GP	27	28	28	29	30	30	31	32	33	33	33	34

Figure B1: Linear Extrapolation