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# **Open borders, transport links and local labor markets**

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# Open borders, transport links and local labor markets<sup>\*</sup>

by

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## Abstract

We study the labor market impact of opening borders to low-wage countries. The analysis exploits time and regional variation provided by the 2004 EU enlargement in combination with transport links to Sweden from the new member states. The results suggest an adverse impact on earnings of present workers in the order of 1 percent in areas close to pre-existing ferry lines. The effects are present in most segments of the labor market but tend to be greater in groups with weaker positions. The impact is also clearer in industries which have received more workers from the new member states, and for which across-the-border work is likely to be more common. There is no robust evidence on an impact on employment or wages. At least part of the effects is likely due to channels other than the ones typically considered in the literature.

Keywords: Migration policy, immigration, labor market outcomes  
JEL-codes: J16, J31, J61

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## 1 Introduction

Immigration policy is a hotly debated and multifaceted issue. A central dimension of the discussion considers the consequences of opening borders to low-wage countries. This issue is at the heart of the debate on the EU enlargement, and also relates to the US and European strategies for handling immigration pressure on the south borders. This paper investigates the labor market impact of immigration reform leading to increased exposure to countries with relatively lower wages and levels of economic development. The empirical analysis exploits variation provided by the 2004 EU enlargement in combination with pre-existing ferry lines between Sweden and new member states.

Opening a border may affect the labor market of present workers through a number of channels, e.g.: (i) the number of migrant workers (permanent, temporary, posted, irregular); (ii) overall economic activity (investments, firm location decisions, passenger and commercial transportation, tourism); (iii) the trade of goods and services; (iv) the bargaining power of employers and unions through potential competition. Some of these are hard if not impossible to capture in data. In other words, the analysis is almost by definition at least partly of a reduced-form character.

Mechanism (i)—the labor market consequences of inflows of migrant workers with certain characteristics—has been the topic of a rapidly expanding literature during the last decade. There is no consensus on the presence or magnitude of detrimental effects on present workers and there is an ongoing debate on how to best measure these effects. Those concluding that the impact is probably limited include e.g. Card (2005). Even more positive views are expressed by e.g. Ottaviano and Peri (2012) who argue that the native population could actually gain from immigration in the long run. However, other relatively recent studies conclude that immigration imposes significant harm to the labor market prospects of natives (see Borjas, Grogger and Hanson, 2008, 2010; Borjas, 2003). There is also recent Scandinavian evidence pointing toward negative wage effects from immigration. Bratsberg and Raaum (2011) show slower wage growth for occupations more exposed to immigration than for other occupations within the construction industry.

Pekkala Kerr and Kerr (2011) survey the literature and conclude that most studies suggest that the adverse labor market impact for natives is likely to be limited, but more pronounced for low-educated workers and previous migrants (who, the authors argue,

are close substitutes to the current immigration flows seen in Europe). Heterogeneous impacts is also the result in Dustmann, Frattini and Preston (2012) who find that immigration depresses wages at lower parts of the distribution, but slightly increases them in the upper part of the wage distribution. Furthermore, Bratsberg et al (2010) find that the wage impact of immigration depends on the region of origin of the inflow, with bigger influence for workers from neighboring countries who are likely to be closer substitutes to native workers.<sup>1</sup>

As for mechanisms (ii) and (iii), regions closer to the new markets may benefit from increased economic activity resulting from the opened borders. Proximity to new markets could affect location decisions of firms (see Niebur and Stiller, 2002, for a survey). One example is the experience from the North American Free Trade Agreement, where Mexican manufacturing industry reallocated towards the US border, which in turn resulted in an increase in manufacturing employment in US border cities (see Hanson, 1996, 1998, 2001).

On the other hand, the positive impact of increased activity on individual labor market opportunities might be counteracted by increased competition in the products and services markets. Increasing competition by opening a border to a country with lower average wages may put pressure on native wages even though actual migration flows are not much affected, i.e., through mechanism (iv). A credible threat of finding services or labor abroad may be enough to influence the outcomes. Tentative evidence supporting this idea is found in e.g., Blanchflower and Shadforth (2009) who study the effects of the EU enlargement on the UK economy. Such effects are also likely to be larger in local labor markets closer to the new competition.

Free movement of production factors, goods and services is perhaps the most important cornerstone of the European Union. The expansion on May 1st, 2004, meant that ten new states joined the European Union. Eight were Central or Eastern European countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia (hereafter labeled EU8 countries)) and two Mediterranean countries (Cyprus and Malta). Migration from the new member states to the old

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<sup>1</sup> Additional overviews include, e.g., Okkerse (2008) and Longhi et al, (2005). Dustmann, Glitz and Frattini (2008) discuss the mechanisms through which an economy can accommodate immigration. Recent contributions on the methodological problems are include Aydemir and Borjas (2011) and Dustmann and Preston (2012). Our quasi-experimental approach to some extent resembles those of e.g. Card (1990), Mansour (2010), Dustmann, Schoenberg and Stuhler (2012), and Glitz (2012).

increased after the enlargement, and there are indications that crowding out has occurred in certain sectors or within some occupations (Kahanec, Zaiceva and Zimmermann 2010).

The collected evidence of adverse effects is however limited and many studies are descriptive.<sup>2</sup> Some UK studies point in the direction of small or insignificant effects on native's labor market outcomes (see Reed and LaTorre, 2009, Lemos and Portes, 2008, Gilpin et al, 2006, and Portes and French, 2005). More closely related to our study is Braakmann and Vogel (2010) who studied the effects of the EU enlargement in 2004 on German firms located close to the Polish border. They found a negative impact on the turnover and export intensity of large German firms and falling profits for smaller firms despite an increase in the turnover following the Enlargement.

Using longitudinal population-wide micro data, we find that the earnings of present workers decreased by about 1 percentage point in regions close to the transport links after the reform, compared to regions somewhat further from the ports. The result is robust to a number of specification tests and robustness checks. The negative effects tend to be greater among the young and the low-educated, the foreign-born, and in the lower part of the expected earnings distribution. We also find the clearest impact in industries where the rise in EU8 workers has been most pronounced, and where cross-border competition is likely to be particularly strong. We find no robust effects on employment or on full-time wages.

Furthermore, our data show that the 2004 EU expansion indeed led to a drastic increase in permanent as well as temporary migrants from the new member states. But while the fraction of EU8 migrants was higher in regions close to the transport opportunities already before the enlargement, there is only weak evidence that there was an increased clustering as a result of the reform. The fact that we do find robust evidence on an impact on labor market outcomes despite no evidence on increased registered immigration into these areas suggests that other mechanisms are at work. Higher competition from foreign firms and posted workers is one potential channel. Another is the decreased bargaining power of workers more exposed to low-wage competition from the new member states. In any case, our findings are an indication that

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<sup>2</sup> For studies with a descriptive approach see e.g. Constant (2011) for an overview of effects on the European Union, on the UK, see e.g. Pollard, LaTorre and Sriskandarajah (2008), Blanchflower and Lawton (2010), Drinkwater, Eade and Garapich (2006), Blanchflower, Saleheen and Shadforth (2007). For Ireland see Hughes (2007) and Barret (2010) and for Sweden see Doyle, Hughes and Wadensjo (2006) and Gerdes and Wadensjo (2010).

the impact of the opening of a border does not solely arise through traditional labor migration.

The rest of the paper is organized as follows. Section 2 discusses the institutional background, the debate preceding the expansion, the recent history of immigration to Sweden and how the foreign-born fare on the Swedish labor market. Section 3 describes the empirical strategy and the data sources. Section 4 outlines the potential mechanisms at work and describes the characteristics and the development of permanent and temporary migration and some other key variables. Section 5 presents our empirical results and section 6 concludes.

## **2 Background and institutions**

### **2.1 Transitional arrangements, the debate preceding the eastern enlargement and post-accession migration flows**

The free movement of workers between member states of the European Union is regulated by the EC Treaty, article 39. The Treaty guarantees freedom of movement of workers within the EU and promotes the removal of barriers to mobility. In the debate preceding the eastern enlargement in 2004, fears of social dumping and immigration of cheap labor from the new member states lead to the inclusion of a clause in the Accession Treaty in 2003 to limit this freedom.<sup>3</sup> The clause gave individual member states the right to restrict access to their labor markets for a maximum of seven years. During the first two years after accession access to national labor markets were fully regulated by national law and policies. Restrictions could then be prolonged for three plus two years if there were any serious disturbances (Kahanec, Zaiceva and Zimmermann 2010). Hence, the transitional period could not end later than April 30, 2011.

The Swedish debate contained the above-mentioned arguments and also emphasized the risk of attracting welfare-seekers (Doyle, Hughes and Wadensjö 2006). Against this stood e.g. the argument that since Sweden had actively promoted the enlargement it was not reasonable to implement restrictions. In the end, failing to reach an agreement on

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<sup>3</sup> Individuals from Cyprus and Malta were not covered by these restrictions.



how to construct transitional arrangements, Sweden was one of only three countries who did not implement any (together with the UK and Ireland).<sup>4</sup>

As expected, the migration flow from the new member states increased after the enlargement (see also description below). The fears of mass immigration did not materialize and consequently most of the member states relaxed or abolished their transitional rules before the compulsory abolishment in 2011.<sup>5</sup> An early evaluation from the European Commission pointed out that there was no apparent direct link between migration flows and the transitional arrangements put in place (Commission of the European Communities 2006). This view was confirmed in a later report (Commission of the European Communities 2008).

Nevertheless there is clear evidence that the distribution of immigrants from the new member states throughout the European Union is uneven; Ireland and the UK have received the largest share of migrants in relation to population size (Commission of the European Communities 2008). The two countries alone received almost seventy percent of the migrants to the old member states since 2003, indicating that there has been some migration diversion to the countries that did not restrict access to their labor markets (Kahanec, Zaiceva and Zimmermann, 2010; Boeri and Brucker, 2005). The inflow to Sweden was more modest despite the open door policy (Gerdes and Wadensjö, 2010). We will return to this in section 4.

A feature of recent intra-EU migration is that temporary migration is becoming increasingly more common (see e.g. Blanchflower and Lawton, 2010). Likewise is the posting of workers in other member states on the rise (Commission of the European Communities 2008; Dolvik and Eldring, 2008), and possibly also the presence of foreign firms (this is further discussed in Section 4.4).

## **2.2 Immigration to Sweden and the foreign-born in the Swedish labor market**

This section briefly sketches the recent immigration history to Sweden with a particular focus on migration from the EU8 countries. The period following the Second World

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<sup>4</sup> The UK and Ireland implemented some restrictions on access to social benefits. To qualify for welfare entitlements in the UK, workers from the new member states had to be in continuous employment for 12 months (Pollard, LaTorre and Sriskandarajah, 2008). In addition, migrants from the new member states in the UK were obliged to register on the Home Office administered Workers Registration Scheme (WRS). In Ireland, to gain employment or access state benefits, a personal identification number (Personal Public Service Number) was required.

<sup>5</sup> Greece, Spain, Portugal, Italy and Finland lifted their restrictions in 2006 followed by the Netherlands and Luxemburg in 2007. In 2008 France completely opened its labor market, Denmark and Belgium did so in 2009. Germany and Austria on the other hand did not lift their restrictions until the end of the transitional period in 2011.

War until the late 1970s was dominated by labor immigration from primarily Finland, Central and Southern Europe. Starting in the 1970s, there was a gradual shift toward immigration of humanitarian character. From the late 1980s, refugee migration and immigration for family reunification have been the predominant forms of migration to Sweden, although labor migration flows have remained non-trivial. Over the last four decades, the foreign-born population has been growing steadily, from 6.7 percent of the total population in 1970 to 14.3 percent in 2009. Parallel to the compositional change of the migrants to Sweden, the relative labor market performance of the foreign-born deteriorated. Sweden is now one of the OECD countries with the highest relative foreign-born to native unemployment rates.<sup>6</sup>

In the post WWII period, political turmoil in the EU8 countries caused some limited waves of refugees to Sweden, from Hungary (1956–1957), the former Czechoslovakia (1968–1969), and Poland (1982). Migration from the Baltic States was very limited until the collapse of the Soviet Union in the early 1990s. The inflow of migrants from the new member states increased somewhat due to the fall of the Soviet Union but remained on relatively low levels until the EU enlargement. Female marriage migration is and has for the last couple of decades been a relatively large part of the flows from Poland and the Baltic countries to Sweden. Until 2004, women outnumbered men by a factor of roughly 1.5–2.5. After the enlargement, the situation reversed due to increased flows of a majority of male labor migrants. This recent migration will be further described below.

### **3 Data sources**

#### **3.1 Data on the native population and permanent migrants**

Our main data come from administrative registers compiled into a database at the Institute for Evaluation of Labor Market and Education Policy (the IFAU database). The data we use cover the total population aged 16–64 years old for each year during 1994–2008 in the most southern part Sweden (counties of Skåne, Blekinge, Halland, Kronoberg and Kalmar). It was mainly collected by Statistics Sweden, with the registers including LOUISE, RAMS and RTB. LOUISE contains information on age, gender,

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<sup>6</sup> There are of course large discrepancies within the group of migrants, where those arriving for humanitarian reasons and succeeding family members perform substantially worse than labor migrants from EU and OECD countries. See e.g. Eriksson (2010) for an overview of studies on immigration and ethnicity in the Swedish labor market.

marital status, children, education, country/region of birth, immigration year, employment status, earnings, and region of residence. RAMS is a linked employer-employee database that contains individual information on employment spells and earnings from different employers. Employer information includes industry and the geographical location of firms and their respective workplaces. RTB is a population register containing information on country of birth. See appendix A1 for variable definitions.

The population-wide information on labor market outcomes comes from tax registers. These do not include wage information. The database however also contains wages (corresponding to full-time monthly) for all public sector employees and for a sample covering about 50 percent of private sector employees. The sample is stratified by firm size, so that small firms are underrepresented. We will use the wage data in a supplementary analysis.

The data cover the entire population of people living in Sweden on a permanent basis. Some countries of birth are grouped in the data for confidentiality reasons, but we are able to separately identify individuals from all of the new member states except from Slovenia, Malta and Cyprus. This is likely to be a small concern as the post-accession migration inflow is dominated by migrants from Poland and the Baltic States, i.e. our neighbours across the Baltic Sea (see section 4). Migrants from Malta, Cyprus and Slovenia make up less than one percent of the change in the total stock of migrants from the new member states between 2004 and 2010. All registers are linked by an anonymized personal identification number.

### **3.2 Data on temporary immigration and international mobility**

For an immigrant to enter the “registered population” and be included in the data described above, the basic rule is that the expected duration of the stay (given work and residence permits) should be at least 12 months. The foreign-born meeting this criterion enter the population described above. Temporary migrant workers enter on shorter work permits and are typically not included in the registered population. To describe the increasing presence of temporary workers, we also use data on short-term migrant workers, taken from Statistics Sweden. This information has to our knowledge not been used in previous academic work.

The primary data source for information on temporary immigrants is a tax register that includes tax payments of persons that pay Special Income Tax for Non-Residents (Särskild inkomstskatt för utomlands bosatta). All persons who stay in Sweden less than six months are entitled to pay lower taxes than permanent residents. The administrative records include data on gender, age, nationality, income, and employers. Our data also include information on persons that do not apply for the special income tax but stay no longer than six months, and persons that stay in Sweden longer than six months but less than a year, all of which are excluded from the regular population registers. The dataset is combined with firm-level data from FRIDA, a firm database managed by Statistics Sweden, which contains the geographical location of the firm and workplace, industry, sector and number of employees of the respective firms. The quality of the dataset is in some dimensions poor, e.g., the coverage of the origin of the workers is low, but it is useful for a description of the change in migrant characteristics that followed the enlargement.

### **3.3 Transports**

Finally, for descriptive purposes we also make use of travel statistics from the Swedish Institute for Transport and Communications Analysis (SIKA). The data contain information on passengers arriving to Sweden and is used to show how travel patterns between the new member states and Sweden have changed after the enlargement in 2004.

## **4 The studied regions and the development since the enlargement**

This section first presents the regions included in the analysis and the way these are classified into treatment and control areas. Then we present descriptive characteristics on the estimation sample and the populations of the treatment and control areas prior to the reform. This is followed by a brief characterization of the development of travel patterns between EU8 countries and Sweden and a somewhat more detailed description on temporary migrants.

### **4.1 The studied regions**

The broader question under study is whether the labor market outcomes of present workers are affected by changes in market conditions brought by migration policy

reform. It is very difficult to derive plausible estimates of the impact on the national workforce following a change at the national level. Our strategy is instead to investigate whether those who are likely to be more exposed to increased competition fare differently than those who are less exposed to the direct results of the reform. We use proximity to transport opportunities as an indication on potential exposure.

There are of course many ways to travel from the EU8 countries to Sweden. To avoid endogeneity and selection problems, we restrict the analysis to pre-existing transportation links. Since airlines are arguably more mobile, we focus on ferry lines. Furthermore, we exclude ferry lines to the Stockholm region, for which it is very hard to find a suitable comparison region. These restrictions leave us with ferry lines to four municipalities in southern Sweden: Karlskrona, Karlshamn, Ystad and Trelleborg (see Figure 1). We also restrict the dataset to Södra Götaland (south of the red areas in the figure).

Our baseline analysis uses 50 km as the divider; municipalities whose center is within this distance from a ferry line harbor are treated, areas further away (but in the Södra Götaland region) are in the control group. We will also present results using a 25 km delineation, and we will also discuss several variations and robustness checks defining the control group in different ways. Overall, the results are robust to these variations. We will also present results from an analysis restricting the overall sample to the county of Blekinge (in the southeast, including Karlskrona and Karlshamn).

## Göteborg

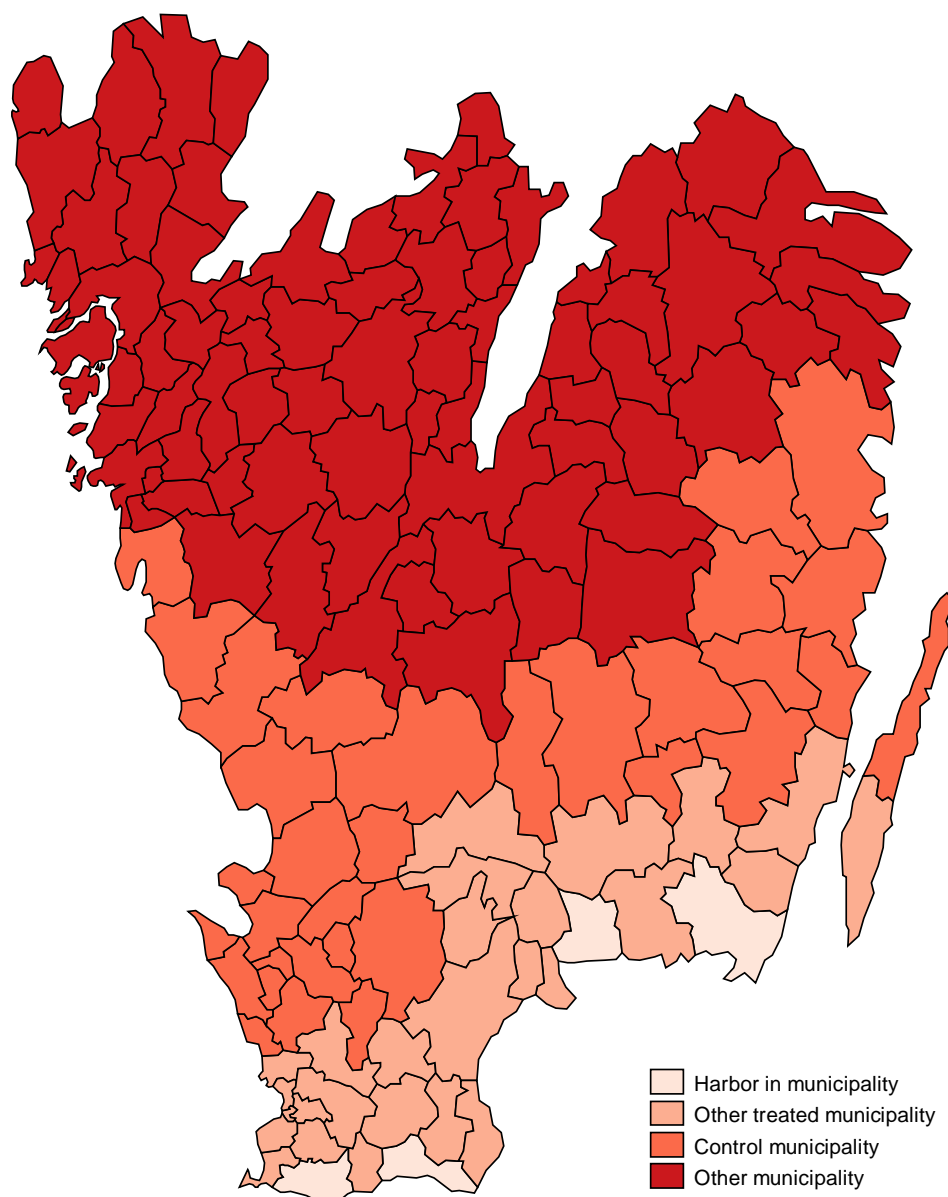


Figure 1 The studied regions.

### 4.2 Estimation sample and pre-treatment characteristics

Our baseline estimation sample consists of individuals born outside the EU8 countries (i.e. native Swedes and other foreign-born), 16–64 years old, living in Södra Götaland (the counties of Skåne, Blekinge, Halland, Kalmar, and Kronoberg). We draw repeated cross sections for the years 2000–2008, imposing these restrictions annually.<sup>7</sup> The first column of Table 1 describes this sample. Average age is close to 40, about 40 percent

<sup>7</sup> Exploiting the panel data including individual fixed effects yields very similar baseline results, but becomes cumbersome considering the number of individuals included.

have children living at home, and a slightly higher fraction is married. A quarter of the individuals have less than high school education, whereas approximately 30 percent have some tertiary education. The employment rate is 71 percent and annual earnings were on average 176,000 SEK during the period. The industry structure contains no big surprises; many people are employed in manufacturing, trade, health and education.

Our analysis hinges on the assumption that had the treatment and control regions been subject to the same shock, the development would have been the same. We will discuss and test the plausibility of this assumption below. But a starting point is to see whether the regions are similar in important dimensions. Columns two and three of Table 1 present characteristics for the baseline (50 km) treatment and control areas in the years prior to the EU enlargement. The demographic characteristics of the treatment and control areas are rather similar concerning age, gender, marital, and family characteristics. The level of education is slightly higher in the control group. The biggest difference is seen in the fraction foreign-born, which is higher in the treatment group as it includes Malmö, the largest and most immigrant dense city in the region. As for the individual economic outcomes, they are too quite similar across locations, although the employment rate is a bit higher in the control areas. Although there are some differences, the industry structure is also rather similar in the two groups. In other words, it does not seem like near-harbor areas are very different from the neighboring areas situated somewhat more distant from the transportation nodes.

Table 1 Estimation sample statistics

|   | Estimation sample<br>(2000–2008) | Pre-treatment<br>(2000–2003) |           |
|---|----------------------------------|------------------------------|-----------|
|   |                                  | Treatment                    | Control   |
|   | All                              |                              |           |
| Age   | 40.22                            | 39.87                        | 40.60     |
| Sex (1=man)   | 0.51                             | 0.51                         | 0.51      |
| Married   | 0.43                             | 0.43                         | 0.45      |
| Children under 18 in household                          | 0.41                             | 0.39                         | 0.42      |
| Foreign born  | 0.14                             | 0.14                         | 0.11      |
| No high school  | 0.25                             | 0.25                         | 0.28      |
| High school   | 0.46                             | 0.45                         | 0.49      |
| College   | 0.29                             | 0.30                         | 0.24      |
| Employed in November                                    | 0.71                             | 0.69                         | 0.72      |
| Annual earnings (SEK)                                   | 175,896                          | 167,124                      | 168,718   |
| Monthly earnings conditional on emp. in Nov.            | 19,305                           | 18,505                       | 17,955    |
| Monthly earnings conditional on emp.                    | 19,830                           | 18,915                       | 18,416    |
| <i>N</i>  | 11,239,356                       | 2,597,937                    | 2,289,626 |
| Industry (distribution cond. on empl. in November)      |                                  |                              |           |
| Not classified  | 1.46                             | 1.71                         | 1.64      |
| Agriculture, hunting, forestry, fishing                 | 2.46                             | 2.32                         | 2.87      |
| Mining and quarrying                                    | 0.10                             | 0.09                         | 0.10      |
| Manufacturing   | 19.15                            | 18.51                        | 22.34     |
| Electricity, gas and water supply                       | 0.78                             | 0.56                         | 0.99      |
| Construction  | 6.15                             | 5.63                         | 6.04      |
| Wholesale and retail trade                              | 12.96                            | 12.26                        | 13.13     |
| Hotels and restaurants                                  | 2.35                             | 2.23                         | 2.17      |
| Transport, storage and communication                    | 6.10                             | 6.32                         | 6.17      |
| Financial intermediation                                | 1.45                             | 1.58                         | 1.38      |
| Real estate, renting and business activities            | 10.52                            | 11.12                        | 8.46      |
| Public administration                                   | 4.91                             | 5.42                         | 4.36      |
| Education   | 10.94                            | 11.77                        | 10.46     |
| Health and social work                                  | 16.53                            | 16.32                        | 16.12     |
| Other community, social and personal service activities | 4.15                             | 4.16                         | 3.75      |
| Total   | 100                              | 100                          | 100       |

Note: Population aged 16–64 years old, excluding migrants from the EU8, residing in Södra Götaland in 2000–2008.

### 4.3 Permanent and temporary migration from EU8 countries

Following the 2004 enlargement, Södra Götaland experienced a rather rapid increase in the presence of permanent migrants from EU8. After increasing only slightly since the year 2000, the number of EU8 migrants (age 16–64) living in this part of Sweden rose from 19,000 in 2003 to more than 25,000 in 2008.<sup>8</sup> Still, this group of migrants constitutes only a limited part of the population, with the fraction going from 1.5 to

<sup>8</sup> Own calculations using the IFAU data. Nationally, the number of permanent residents age 16–64 born in a EU8 country rose from 55,000 to more than 75,000 from 2003 to 2008.



slightly more than 1.9 percent. In absolute terms, people of Polish origin constitute the majority of the previous and recent permanent migrants from EU8, but in relative terms there have also been substantial increases in the number of immigrants from the Baltic countries. Those that have arrived post-enlargement are younger, to a larger extent male and have less schooling compared to migrants still living Sweden that arrived prior to the enlargement (see Table A 2 in the appendix). Furthermore, in comparison with the earlier cohorts, the post-enlargement migrants were much more frequently represented in the agricultural sector, the construction sector and within real estate, renting and business activities and underrepresented within the health and social work sector.

In terms of our identification strategy, how different demographic groups are located relative to the ferry lines are also relevant. It turns out that while the EU8 migrants in southern Sweden are relatively more concentrated within the 50 km limit (47 percent compared to 33 percent of the natives), they are not overrepresented in the harbor municipalities themselves. However, the recent permanent migrants tend to settle in these locations slightly more frequently compared to previous cohorts.

Passenger traffic statistics provide another indication on the increased exposure of the harbor regions. Figure 2 below shows the development of the number of passengers arriving by ferry from Poland, Estonia, Latvia and Lithuania to Swedish ports. Clearly, there has been an increase after the enlargement. In absolute numbers, the largest increase in the number of travelers was from Poland and Estonia. In relative terms the increase was larger for passengers from Latvia and Lithuania. By contrast, passenger ferry traffic from other countries (Denmark, Finland, Germany and the UK) did not change much during the period (not in figure). Worth noting is also that a recent survey indicates that the by far most common mode of transport to Sweden for Polish visitors is by ferry (IBIS 2011).

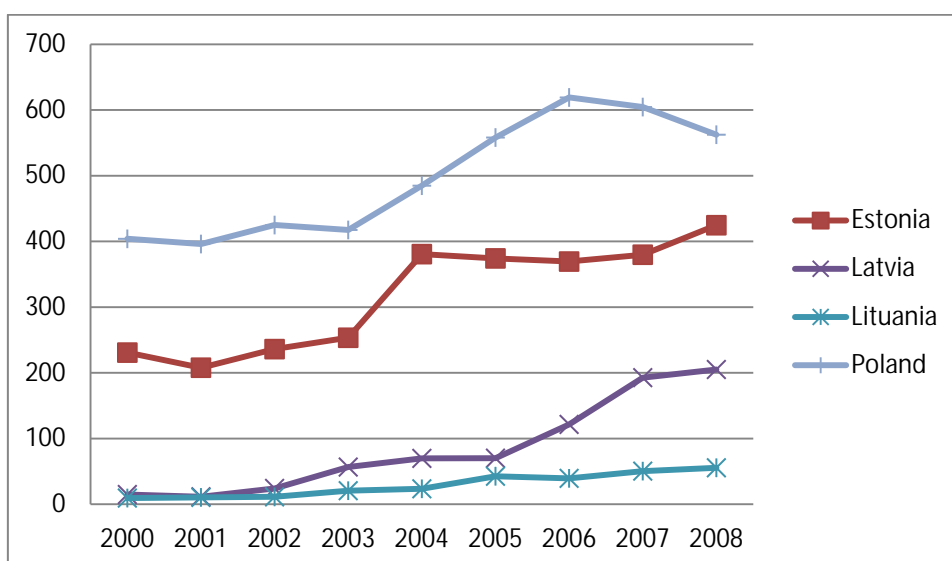


Figure 2 Number of arriving passengers (1000s) by ferry from EU8

Note: The graph shows the number of number of arrivals in thousands from the new member states on selected ferry lines 2000–2008 (no distinction between passengers from different countries is possible). Data source: SIKA, own tabulations.

The four ports we study are those in Ystad and Trelleborg in the county of Skåne and Karlskrona and Karlshamn in the county of Blekinge (see Figure 1). The passenger lines include e.g. the line between Ystad and Świnoujście in Poland which has been in place since at least the 1960s. The traffic from Trelleborg, situated close to Ystad, is more orientated towards Germany with passenger lines to various destinations, including Sassnitz located close to Polish border. The traffic directly to Poland has been more periodic with direct lines serving Świnoujście. In Blekinge, the ferry line between Karlskrona and Gdynia, the port city close Gdansk in Poland, has carried passenger during the last decades while the ferry lines from Karlshamn primarily serves different destinations in the Baltic countries.

#### 4.3.1 Temporary migrants

As an indication of increased labor market competition, the temporary labor migrants are of particular interest. Table 2 shows characteristics for EU8 nationals among the temporary workers during 2000–2008. From the upper panel of the table it is clear that the number of migrants has increased over time, starting before the EU expansion, but at an increased pace following the accession.<sup>9</sup> An increasing majority of the workers are males, on average around 30 years of age. After 2004, the temporary workers on

<sup>9</sup> The nationality information in the data is incomplete. While the broader picture should be correct, one should be cautious regarding interpretations of the detailed information. See also the discussion in Section 3.2.

average stay longer in Sweden and have higher income both in total and from their main employer. Note that the average total earnings are only slightly higher than the average income from the main employer, suggesting that most workers have only one employer. In other words, there is an increased presence of labor from the new member states, both in terms of individuals and in terms of effective labor.

The lower panel of the table also suggests that the distribution across industries has changed rather dramatically. Before 2004 most temporary workers from the EU8 countries were found in the agricultural sector. Short-term contracts for these workers have for a long time been an established part of the production, and this has been particularly common in southern Sweden. As the Swedish labor market became generally available for the new member states, the share working in agriculture has decreased a lot, even though the absolute number has actually increased somewhat. The table reveals major increases in construction, business services and trade (including retail). The increased presence in these industries is a pattern found also for permanent migrants.

Table 3 shows the distribution of EU8 temporary migrants relative to the ferry ports. Compared to the permanent population, the temporary migrants tend to be somewhat more concentrated to the areas close to the ports, but not necessarily in the harbor municipalities. The development over time is somewhat hard to interpret. There is an increase in concentration starting already in 2002 and then a tendency to a decline in the later periods. The table thus gives no clear indications that the EU enlargement affected the location patterns of these migrants.

Table 2 Characteristics of the temporary immigrant work force

|   | 2000   | 2001   | 2002   | 2003   | 2004   | 2005   | 2006   | 2007   | 2008   |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Age   | 32.33  | 32.68  | 31.13  | 30.30  | 29.91  | 29.71  | 29.46  | 29.45  | 29.53  |
| Male  | 0.63   | 0.64   | 0.62   | 0.63   | 0.65   | 0.71   | 0.74   | 0.75   | 0.75   |
| <Six months in Sweden                                   | 0.95   | 0.91   | 0.90   | 0.90   | 0.83   | 0.71   | 0.70   | 0.65   | 0.64   |
| Earnings main employer                                  | 26,769 | 34,707 | 34,248 | 36,429 | 36,531 | 49,655 | 56,707 | 63,774 | 72,451 |
| Total earnings  | 27,541 | 35,645 | 34,991 | 37,206 | 37,221 | 50,192 | 57,250 | 64,395 | 73,246 |
| N   | 3,366  | 3,594  | 4,306  | 4,876  | 6,211  | 6,560  | 7,312  | 8,917  | 10,756 |
| Distribution across industries                          |        |        |        |        |        |        |        |        |        |
| Not classified  | 4.84   | 5.01   | 5.23   | 8.00   | 11.61  | 12.93  | 9.11   | 8.05   | 11.03  |
| Agriculture, hunting, forestry, fishing                 | 78.76  | 78.38  | 76.50  | 76.05  | 66.90  | 57.30  | 52.72  | 50.30  | 48.61  |
| Mining and quarrying                                    | 0.62   | 0.75   | 0.39   | 0.53   | 0.53   | 0.82   | 0.33   | 0.26   | 0.77   |
| Manufacturing   | 2.53   | 2.14   | 3.86   | 2.85   | 4.70   | 5.44   | 6.80   | 7.58   | 8.61   |
| Electricity, gas and water supply                       | 0.00   | 0.00   | 0.07   | 0.02   | 0.02   | 0.00   | 0.00   | 0.02   | 0.07   |
| Construction  | 0.77   | 1.14   | 1.70   | 1.23   | 1.93   | 5.21   | 8.97   | 10.53  | 9.09   |
| Wholesale and retail trade                              | 1.37   | 2.48   | 2.67   | 2.44   | 3.69   | 4.16   | 6.10   | 8.65   | 7.52   |
| Hotels and restaurants                                  | 0.15   | 0.14   | 0.44   | 0.29   | 1.14   | 2.27   | 2.48   | 2.16   | 2.20   |
| Transport, storage and communication                    | 0.95   | 0.61   | 0.30   | 0.29   | 0.47   | 0.66   | 0.88   | 1.57   | 1.93   |
| Financial intermediation                                | 0.03   | 0.08   | 0.05   | 0.04   | 0.00   | 0.20   | 0.15   | 0.19   | 0.12   |
| Real estate, renting and business activities            | 1.54   | 1.98   | 2.07   | 2.11   | 4.04   | 7.55   | 8.26   | 7.39   | 7.74   |
| Public administration                                   | 0.45   | 0.45   | 0.53   | 0.88   | 0.24   | 0.14   | 0.26   | 0.15   | 0.00   |
| Education   | 1.13   | 1.20   | 1.09   | 1.03   | 0.85   | 0.73   | 1.14   | 0.95   | 0.18   |
| Health and social work                                  | 1.13   | 1.39   | 1.16   | 1.29   | 1.05   | 0.99   | 1.18   | 1.03   | 0.44   |
| Other community, social and personal service activities | 5.73   | 4.26   | 3.92   | 2.95   | 2.83   | 1.60   | 1.64   | 1.17   | 1.69   |
| Total   | 100    | 100    | 100    | 100    | 100    | 100    | 100    | 100    | 100    |

Notes: Sample used is the total population of temporary workers from the new member states observed in Sweden 2000-2008. Observe that for this population we do not have information on country of birth. Instead we use nationality. Note that the data for this table are national (and thus not restricted to Södra Götaland).

Table 3 Where do the temporary workers settle?

|                      | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|----------------------|------|------|------|------|------|------|------|------|------|
| Port in municipality | 0.02 | 0.03 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.03 | 0.02 |
| Port within 25 km    | 0.06 | 0.09 | 0.14 | 0.11 | 0.14 | 0.14 | 0.11 | 0.12 | 0.10 |
| Port within 50 km    | 0.33 | 0.41 | 0.45 | 0.46 | 0.47 | 0.40 | 0.42 | 0.40 | 0.40 |
| Port within 75 km    | 0.56 | 0.58 | 0.62 | 0.66 | 0.62 | 0.57 | 0.57 | 0.57 | 0.53 |
| Port within 100 km   | 0.63 | 0.72 | 0.73 | 0.76 | 0.75 | 0.76 | 0.74 | 0.77 | 0.71 |

Notes: Share of the total number of EU8 workers that is working (or whose workplace is registered) in a municipality within a given range from a port with ferry lines to the new member states in Södra Götaland. Sample used is the total population of the temporary workers observed 2000-2008 in Södra Götaland. Observe that we do not have information on country of birth. Instead we use nationality.

#### 4.4 Summary and interpretation of descriptive patterns

The statistics presented above clearly show that the 2004 EU accession meant a greater overall inflow and presence of workers from the EU8 countries to Sweden. What is not so clear from the data, however, is whether the increased immigration affected the

harbor regions to a greater extent. The location patterns of permanent migrants do not indicate that this would be the case, and the temporary migrant exhibit patterns that are hard to interpret.

On the other hand, travel statistics show a very marked increase in the numbers going to and from the new member states. It seems fair to argue that the economic impact of such changes should be larger in the areas where the transport links are located. It should also again be emphasized that we do not have information on the presence of posted workers or let alone irregular labor migration. Such workers are arguably more short-term by nature, and it is then reasonable to expect travel costs to play a bigger role. Of course, one could also hypothesize that the threat effect of cross-border competition is bigger the closer one gets to the competing firms and workers. The importance of such mechanisms is, however, extremely hard to quantify.

In sum, this means that whether the harbor regions were differentially affected by the EU expansion is an empirical question. Our description of the treated and non-treated areas above suggests that they fulfill reasonable requirements on similarity for the analysis.

## 5 Empirical analysis

This section presents the analysis. We begin by describing the empirical specification and discussing ways of strengthening its credibility. Then we turn to the baseline results studying individual labor outcomes in treated and non-treated regions, pre- and post-enlargement. We then proceed by presenting robustness checks and variations, and also discuss heterogeneous effects by background characteristics, across the earnings distribution, and across industries.

### 5.1 Empirical specification

Our approach to investigating the impact of migration policy reform is to compare those who are likely more exposed to the effects of the enlargement opening up national borders, to those who are arguably less affected. Our empirical model is essentially a difference-in-differences specification, comparing the development of labor market outcomes in treated areas to the development in non-treated areas. Our baseline model has the following structure:

$$y_{ijt} = \alpha + X_{it}\beta + \phi_t + \theta_j + D_{jt}\gamma + \varepsilon_{ijt} \quad (1)$$

where  $y_{ijt}$  is the labor market outcome (employment, log annual/monthly earnings or log wage) of individual  $i$  in municipality  $j$  at time  $t$ .  $X_{ijt}$  is a vector of individual control variables (age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born), and industry (60 categories)),  $\phi_i$  is a vector of time fixed effects, and  $\theta_j$  is a set of municipality fixed effects.  $D_{jt}$  is an indicator variable taking the value one in the treated regions after the EU expansion (from 2004 and onwards), zero otherwise.  $\gamma$  is thus the parameter of primary interest capturing the average difference in pre-post development across treatment and control areas. We also try augmenting the specification above by linear/quadratic municipality specific time trends. Throughout we will cluster the standard errors by municipality, thus allowing for dependence across individuals living in the same location (also in different years).

For our analysis to capture a causal parameter, it must be the case that had the treatment and control areas been exposed in the same way, we would have expected to see the same development in the treatment as in the control group. This is by definition an identifying assumption that cannot be tested strictly. The above-described similarity in terms of individual demographic and economic characteristics, as well as in industrial structure could however be taken to indicate that this is a plausible assumption.

Yet another way to get some notion of the credibility of the specification is to perform a “placebo analysis”. Table A 3 shows results from an analysis using data for the years 1994–2002 (rather than 2000–2008) and “moving” the time for the reform to 1998. The idea is of course that a specification that handles the development over time well, and does not find “effects” where there should be none, has some credibility in working well also in the actual reform period. As can be seen in the table, the estimates are all small, and none of them are statistically significant at conventional levels.

## 5.2 Baseline results

Table 4 below presents the baseline results on employment and earnings. Column (i) uses specification (1) above, columns (ii) and (iii) introduce also linear and quadratic trends respectively. In the interest of space, we display only the estimates of primary interest (full results are available upon request).

Starting with employment in the upper part of the table, column (i) suggests a small but statistically significant negative impact in the order of 0.6 percentage points on

those living closer to the ferry ports in the years following the enlargement. But this result is sensitive towards the inclusion of municipality specific trends; in columns (ii) and (iii) the point estimates are close to zero. There is thus no strong evidence that employment was at all affected.<sup>10</sup>

The picture changes when we turn to annual earnings, where also the quite demanding specification (iii) suggests a significant negative impact in the order of 1 percent. The estimates from specifications (i) and (ii) are somewhat larger in absolute terms, but the overall impression is that the results are quite stable across specifications. The third outcome measure used in Table 4 is monthly earnings in the main employment spell covering the month of November. The logic for using this measure is that it reflects the individual's position and connection to one employer at a time of the year when seasonal work is less common.<sup>11</sup> The results for this outcome confirm the negative impact found for annual earnings.

In sum, the estimates suggest a modest but rather robust impact of being closer to the recently accessed countries. It should be stressed that this is not an estimate of the average impact on the Swedish labor market of the EU 2004 enlargement; it is the difference in the impact between locations close to and a little further away from the transport links. The overall impact may be positive or negative, or for that matter zero.

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<sup>10</sup> The employment measure used in the main analysis is constructed by Statistics Sweden. It follows the ILO definition and is defined as having worked at least one hour per week in November when the information is collected. Using other definitions does not alter the results. See column one and two in appendix A6 for additional results.

<sup>11</sup> November is usually the month for measurement of annual employment and wage statistics in Sweden.

Table 4 Baseline estimates – employment and earnings

|  | < 50 km from ferry * post-enlargement |                      |                     |
|--|---------------------------------------|----------------------|---------------------|
|  | (i)                                   | (ii)                 | (iii)               |
| Employment   | -0.006 <sup>*</sup><br>(0.002)        | 0.001<br>(0.001)     | 0.002<br>(0.001)    |
| (log) Annual earnings<br>(cond. on earnings>0)                         | -0.015**<br>(0.004)                   | -0.012***<br>(0.003) | -0.009**<br>(0.003) |
| (log) Monthly earnings<br>main employer (cond. on<br>employed in Nov.) | -0.011*<br>(0.005)                    | -0.012*<br>(0.005)   | -0.010*<br>(0.004)  |
| No trend   | X                                     |                      |                     |
| Linear trends  |                                       | X                    |                     |
| Quadratic trends   |                                       |                      | X                   |
| Covariates   | X                                     | X                    | X                   |
| Municipality FE  | X                                     | X                    | X                   |
| Year FE  | X                                     | X                    | X                   |

Notes: OLS/LPM estimates, robust standard errors clustered on municipalities within parentheses. Treatment is defined as residing at most 50 km from a harbor measured by airplane interacted with time. Sample includes population aged 16–64 observed in 2000–2008 born in Sweden or elsewhere excluding individuals born in the new member states. Covariates include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born). For annual and monthly earnings, the specification also includes industry fixed effects. Sample size for employment (annual earnings) [monthly earnings] is 11,239,356 (8,919,620) [8,233,406].

\* <0.05 \*\* <0.01 \*\*\* <0.001

### 5.2.1 Wages

Many of the mechanisms discussed in the introduction would predict an opening of the border to influence the price of labor, e.g. through an increased supply or through a change in the bargaining power of the agents. But one could also hypothesize, particularly in a labor market with high union coverage and collective bargaining, that earnings could also be influenced through a change in hours.

Table 5 presents estimates of wage impacts using the sample data described in section 3. We choose to report the results by sector (and worker category where available), partly to get a more detailed picture, partly to reflect the differences in coverage (remember that the public sector is fully covered, but that the data for the private sector is a stratified sample where larger firms are overrepresented). As is clear, there is very limited evidence of any impact on (full-time equivalent) monthly wages. The only significant point estimate is found for workers in the municipal government, when using the model including quadratic municipality specific trends. One could argue that it is reasonable to find effects in this sector. The local governments are responsible for day care, schools, elderly homes, streets and parks, and are major employers hiring a lot of low-wage manual labor. Despite this, and the fact that model (ii) is arguably the



preferred specification, we would urge a great deal of caution in interpreting the evidence as saying that there is any impact on wages.

Table 5 Wage effects, by sector

|                               | Blue-collar worker, private sector | White-collar worker, Private sector | Municipal government | County Council    | Central government |
|-------------------------------|------------------------------------|-------------------------------------|----------------------|-------------------|--------------------|
| (i) No trends                 | -0.001<br>(0.003)                  | -0.005<br>(0.003)                   | 0.003<br>(0.002)     | -0.000<br>(0.003) | 0.008<br>(0.005)   |
| (ii) Quadratic trends         | 0.001<br>(0.004)                   | 0.002<br>(0.003)                    | -0.008**<br>(0.003)  | 0.003<br>(0.003)  | 0.004<br>(0.002)   |
| Annual earnings, wage samples |                                    |                                     |                      |                   |                    |
| Quadratic trends              | -0.012*<br>(0.005)                 | -0.012<br>(0.008)                   | -0.008<br>(0.007)    | -0.002<br>(0.006) | -0.001<br>(0.008)  |
| Covariates                    | X                                  | X                                   | X                    | X                 | X                  |
| Industry FE                   |                                    |                                     |                      |                   |                    |
| Municipality FE               | X                                  | X                                   | X                    | X                 | X                  |
| Year FE                       | X                                  | X                                   | X                    | X                 | X                  |

Notes: OLS estimates, robust standard errors clustered on municipalities within parentheses. Treatment is defined as residing at most 50 km from a harbor measured by airplane interacted with time. Sample includes population aged 16–64 observed in 2000–2008 born in Sweden or elsewhere excluding individuals born in the new member states. Covariates include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born). Sample size in parentheses; blue collar worker (980,218), white-collar worker (1,025,062), municipal workers (1,474,064), county council workers (463,173) and the central government (341,274).

\* <0.05 \*\* <0.01 \*\*\* <0.001

The difference between the estimates for wages and those for monthly earnings from the main employer is worth some attention. For a person working full-time the monthly wage and monthly earnings should be very similar. One interpretation is then that the negative influence on earnings is due to a reduction in hours. But there is at least one other possible source of the difference in the estimates: the coverage of the wage data. Table A 4 and Table A 5 in the appendix shows that among those for whom we observe monthly earnings, the fraction that is not found in the wage data strongly correlates negatively with age and education and is also concentrated in the bottom of the earnings distribution. In other words, for some segments of the labor market, the wage data do not seem to tell the whole story. For this reason and due to the advantage of having population-wide data, we focus on earnings rather than wages in the remainder of the analysis. Note, though, that the last row of results shows that there are earnings effects also in the wage samples; the baseline results are thus not purely driven by individuals for whom we do not observe wages. Precision is an issue, but finding a bigger impact in the private sector as compared to the public (in particular at the central and county levels) is expected.

### 5.3 Varying distances and regions

The 50 km line used to define treatment and control regions in the analysis above is of course somewhat arbitrary. This section presents variations on the distance criterion and also investigates whether the results are sensitive to the inclusion/exclusion of certain regions in the sample.

Table 6 Treatment effects by distance from harbor

| <i>Ferry line by distance*Period</i>   | Employment                      | Annual earnings                 | Monthly earnings                |
|--|---------------------------------|---------------------------------|---------------------------------|
|  | (i)                             | (ii)                            | (iii)                           |
|  | <u>No trends</u>                |                                 |                                 |
| Harbor municip.<br>(reference > 50 km) | -0.004<br>(0.003)               | -0.018 <sup>*</sup><br>(0.007)  | -0.018 <sup>**</sup><br>(0.005) |
| 0-25 km, excl. harbor<br>municip.      | -0.010 <sup>**</sup><br>(0.002) | -0.020 <sup>**</sup><br>(0.005) | -0.020 <sup>**</sup><br>(0.004) |
| 25-50 km                               | -0.004<br>(0.002)               | -0.009<br>(0.004)               | -0.001<br>(0.004)               |
|  | <u>Quadratic trends</u>         |                                 |                                 |
| Harbor municip.<br>(reference > 50 km) | 0.003<br>(0.002)                | -0.005<br>(0.004)               | -0.018 <sup>**</sup><br>(0.006) |
| 0-25 km, excl. harbor<br>municip.      | 0.002<br>(0.001)                | -0.008<br>(0.003)               | -0.013 <sup>*</sup><br>(0.004)  |
| 25-50 km                               | 0.002<br>(0.002)                | -0.012<br>(0.005)               | -0.004<br>(0.005)               |
| N                                      | 11,239,356                      | 8,919,620                       | 8,233,406                       |
| Covariates                             | X                               | X                               | X                               |
| Industry FE                            |                                 | X                               | X                               |
| Municipality FE                        | X                               | X                               | X                               |
| Year FE                                | X                               | X                               | X                               |

Notes: Robust standard errors clustered on municipalities within parentheses. Treatment is defined by distance from a harbor measured by airplane interacted with time. Sample includes population aged 16-64 observed in 2000-2008 born in Sweden or elsewhere excluding individuals born in the new member states. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born), municipality of residence, year of observation and quadratic municipality specific trends.

\* <0.05 \*\* <0.01 \*\*\* <0.001

Table 7 displays estimates from a model where the treatment group has been separated into three mutually exclusive categories: harbor municipalities; 0–25 km (excluding harbor municipalities); 26–50 km. We then allow the treatment effect to vary across these categories, but within one common regression per outcome. The first set of estimates is from a model not including any trends, the second allows for the municipality specific quadratic trends.

Regardless of distance, there is little to suggest that employment probabilities were at all affected. For annual and monthly earnings on the other hand, the results tend to show that the effects are stronger for those closer to the ferries. This pattern is more pronounced when trends are not included, but (with the exception of annual earnings in

harbor municipalities), it holds also in the models allowing for local trends. For annual earnings, there is also an impact in the 25–50 km category, but for monthly earnings the corresponding estimates are close to zero.

Another type of variation/robustness check is to investigate whether excluding certain cities and a county from the sample affects the results. Even though the placebo estimations discussed above lend support to our regions being suitable for the analysis, the choice of regions is of course a bit arbitrary. It is therefore reassuring to find that the overall pattern remains if we e.g., exclude Malmö (the largest city of the region and a major immigrant destination) or the counties of Skåne and Halland to create a geographically more coherent area that includes the ports situated in Blekinge only and bordering counties (see Figure 1).<sup>12</sup>

A further step in this direction is to study only the county of Blekinge (in the southeast of Sweden), which consists of five municipalities, two of which have ferry lines to the new member states. In other words, this means going even more local. Table 7 presents the results, largely confirming the picture from the baseline analysis of a zero impact on employment but a significant negative impact on earnings<sup>13</sup>. The point estimate for monthly earnings is larger than in the overall sample, but some caution is warranted since it is also the case that the placebo analysis (second set of estimates in the table) indicates that something may have been going on in this dimension already before the enlargement. If one is willing to make a DDD-type of inference (deducting the placebo effect from the main estimate), one ends up with a point estimate of  $-0.016$  ( $0.028-0.012$ ) for monthly earnings, closer to the  $-0.010$  found in the full sample.

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<sup>12</sup> Results are available on request. In some instances precision is lower and all estimates are not statistically significant when some regions are excluded.

<sup>13</sup> The county of Blekinge consist of five municipalities. This result in low precision of the estimates as we cluster on municipalities.

Table 7 Blekinge county only

|                                   | Employment       | Annual earnings   | Monthly earnings  |
|-----------------------------------|------------------|-------------------|-------------------|
| Ferry line in municipality*Period | ATE<br>(S.E.)    | ATE<br>(S.E.)     | ATE<br>(S.E.)     |
| Effect on full population         | 0.001<br>(0.003) | -0.010<br>(0.013) | -0.028<br>(0.010) |
| N                                 | 834,552          | 673,065           | 619,056           |
| Placebo                           | 0.001<br>(0.006) | -0.001<br>(0.009) | -0.012<br>(0.009) |
| Quadratic trends                  | X                | X                 | X                 |
| Industry FE                       |                  | X                 | X                 |
| Covariates                        | X                | X                 | X                 |
| Municipality FE                   | X                | X                 | X                 |
| Year FE                           | X                | X                 | X                 |

Notes: Robust standard errors clustered on municipalities within parentheses. Treatment is defined as residing at most 50 km from a harbor measured by airplane interacted with time. Sample includes population aged 16-64 years old born in Sweden or elsewhere excluding individuals born in the new member states observed 2000-2008. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign born), municipality of residence, year of observation and quadratic municipality specific trends. In the placebo regressions treatment is moved back to 1998, data from 1994-2002 used.

\* <0.05 \*\* <0.01 \*\*\* <0.001

## 5.4 Heterogeneous effects

The literature very briefly reviewed in the introduction suggests that while the labor market impact of immigration may be small for the total population, some workers may be more affected than others. In line with theoretical expectations, the empirical evidence tends to show that those who have a marginal position and/or are more likely to be closer substitutes to the recent migrants are also more affected by immigration. While realized permanent immigration is just one of the channels underlying our findings, the same type of argument is applicable here.

This section investigates whether the impact of the migration reform studied here varied across different parts of the population. First, we look at background characteristics of the incumbent population. Then we study whether the effects vary across the predicted earnings distribution. Finally, we perform separate analyses for different industries.

### 5.4.1 By background characteristics

Table 8 presents results from estimations on subsamples defined by basic individual characteristics: gender, age, level of education and region of birth. We focus here on annual and monthly earnings. For employment, the corresponding estimates are small and in almost every case statistically insignificant (results are available upon request). The table contains results using two definitions of treatment: the baseline 50 km limit, and the 25 km limit (including harbor municipalities but excluding those in the 26–50

interval). Note that since each cell represents a separate regression, the estimates for the subgroups do not necessarily add up to the average effect in the overall population (shown in the first row of the table).

The baseline (50 km) specifications displayed in the left columns of the table, suggests that the effect is quite uniform across demographic and educational groups. At face value the negative estimates are greater among men than among women. Perhaps surprisingly, this set of results does not indicate bigger effects for the young or the low-educated than for older or more skilled workers. However, precision is a problem in these estimations. But it is noteworthy that there is an impact also for the highly educated. In the origin dimension, the pattern is more expected given the segregated Swedish labor market (Åslund and Skans 2010): the foreign-born are more affected than native workers.

If we instead look at the right part of Table 8 focusing on the areas where we found the most significant effects (cf Table 6), the picture becomes more in line with expectations from theory and previous empirical work. In particular for monthly earnings, the point estimates are much larger in absolute terms for the youngest workers and for those with less than high school education. This is reasonable if one believes that part of the competition comes from an increase in short-term low-skill labor concentrated to the locations close to the ports. It is however also worth pointing out that when we move from the left to the right in the table, the gender pattern is blurred and for monthly earnings there is no longer any clear difference between natives and foreign-born.

Table 8 Heterogeneous effects – individual characteristics

| Treated:                            | <50 km from ferry |        |                  |        | <25 km (pop 25–50 excl.) |        |                  |        |
|-------------------------------------|-------------------|--------|------------------|--------|--------------------------|--------|------------------|--------|
|                                     | Annual earnings   |        | Monthly earnings |        | Annual earnings          |        | Monthly earnings |        |
|                                     | ATE               | (S.E.) | ATE              | (S.E.) | ATE                      | (S.E.) | ATE              | (S.E.) |
| Effect on full pop. (for reference) | -0.009            | (.003) | -0.010           | (.004) | -0.008                   | (.004) | -0.016           | (.005) |
| Women                               | -0.005            | (.004) | -0.007           | (.006) | -0.006                   | (.005) | -0.019           | (.007) |
| Men                                 | -0.013            | (.004) | -0.012           | (.004) | -0.009                   | (.006) | -0.013           | (.006) |
| 16-29 years old                     | -0.006            | (.010) | -0.011           | (.010) | -0.014                   | (.011) | -0.038           | (.011) |
| 30-64 years old                     | -0.011            | (.003) | -0.010           | (.003) | -0.012                   | (.005) | -0.013           | (.004) |
| 25-55 years old                     | -0.015            | (.005) | -0.010           | (.004) | -0.010*                  | (.004) | -0.011*          | (.005) |
| Less than high school               | .008              | (.015) | -0.010           | (.009) | -0.022                   | (.010) | -0.030           | (.011) |
| High school                         | -0.016            | (.004) | -0.007           | (.004) | -0.011                   | (.006) | -0.011           | (.008) |
| College                             | -0.015            | (.006) | -0.011           | (.005) | .004                     | (.005) | -0.018           | (.008) |
| Natives                             | -0.009            | (.003) | -0.009           | (.004) | -0.007                   | (.005) | -0.016**         | (.006) |
| Foreign-born                        | -0.016            | (.013) | -0.025*          | (.010) | -0.025                   | (.017) | -0.018           | (.028) |
| Covariates                          | X                 |        | X                |        | X                        |        | X                |        |
| Industry FE                         | X                 |        | X                |        | X                        |        | X                |        |
| Linear trends                       |                   |        |                  |        |                          |        |                  |        |
| Quadratic trends                    | X                 |        | X                |        | X                        |        | X                |        |
| Municipality FE                     | X                 |        | X                |        | X                        |        | X                |        |
| Year FE                             | X                 |        | X                |        | X                        |        | X                |        |

Notes: Robust standard errors clustered on municipalities within parentheses. A new row represents separate regressions. Treatment is defined as residing at most 50 (25) km from a harbor measured by airplane interacted with time. Sample includes population aged 16–64 observed in 2000–2008 born in Sweden or elsewhere excluding individuals born in the new member states. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born), municipality of residence, year of observation and quadratic municipality specific trends. Sample size in parentheses for annual earnings, left panel; full sample (8,919,620), women (4,382,406), men (4,537,214), 16–29 years old (2,359,626), 30–64 years old (6,559,994), 25–55 years old (5,997,501), <High school (1,763,908), High school (4,317,093), College (2,838,619), Natives (8,052,998), Foreign born (866,622). Monthly earnings, left panel; full sample (8,233,406), women (4,044,695), men (4,188,711), 16–29 years old (1,945,763), 30–64 years old (6,287,643), 25–55 years old (5,735,172), <High school (1,507,879), High school (4,059,310), College (2,666,217), Natives (7,463,423), Foreign born (769,983). Sample sizes for the right column are available on request.

\* <0.05 \*\* <0.01 \*\*\* <0.001

#### 5.4.2 Impact across the predicted earnings distribution

An alternative route to investigating heterogeneity in the impact of migration policy reform is to see if it varies across the predicted earnings distribution. In other words, do those whom we expect to have a strong labor market position fare differently than those with a weaker position? Table 9 shows results from regression where the sample has been divided into quartiles of predicted earnings (predicted by a Mincer-style regression, see table notes for details). The upper panel uses the 50 km threshold, the lower panel the 25 km limit (excluding individuals in the 25–50 km locations). Each panel contains results for the entire 16–64 age interval, as well as for a sample excluding the youngest workers (25–64 years of age).

Table 9 Heterogeneous effects – predicted earnings

|  | ATE<br>(S.E.)        | ATE<br>(S.E.)        | ATE<br>(S.E.)        | ATE<br>(S.E.)     | ATE<br>(S.E.)      |
|--|----------------------|----------------------|----------------------|-------------------|--------------------|
|  | All                  | 1 <sup>st</sup> Q    | 2 <sup>nd</sup> Q    | 3 <sup>rd</sup> Q | 4 <sup>th</sup> Q  |
| <u>Ferry line within 50 km</u>                       |                      |                      |                      |                   |                    |
|  |                      |                      | <u>Ages 16–64</u>    |                   |                    |
| Annual earnings                                      | -0.009**<br>(0.003)  | -0.001<br>(0.012)    | -0.024***<br>(0.007) | -0.003<br>(0.005) | -0.009*<br>(0.004) |
| Monthly earnings                                     | -0.010<br>(0.004)    | -0.015<br>(0.009)    | -0.009<br>(0.007)    | -0.009<br>(0.004) | -0.008<br>(0.004)  |
|  |                      |                      | <u>Ages 25–64</u>    |                   |                    |
| Annual earnings                                      | -0.015***<br>(0.004) | -0.033***<br>(0.007) | -0.013*<br>(0.005)   | -0.003<br>(0.008) | -0.012*<br>(0.005) |
| Monthly earnings                                     | -0.012**<br>(0.003)  | -0.027***<br>(0.008) | -0.000<br>(0.007)    | -0.010<br>(0.006) | -0.011<br>(0.005)  |
| <u>Ferry line within 25 km<br/>(pop 25–50 excl.)</u> |                      |                      |                      |                   |                    |
|  |                      |                      | <u>Ages 16–64</u>    |                   |                    |
| Annual earnings                                      | -0.013**<br>(0.004)  | -0.019*<br>(0.008)   | -0.024**<br>(0.008)  | -0.002<br>(0.006) | -0.007<br>(0.005)  |
| Monthly earnings                                     | -0.009<br>(0.005)    | -0.013<br>(0.011)    | -0.010<br>(0.006)    | -0.013<br>(0.005) | -0.004<br>(0.005)  |
|  |                      |                      | <u>Ages 25–64</u>    |                   |                    |
| Annual earnings                                      | -0.013**<br>(0.004)  | -0.030**<br>(0.010)  | -0.012*<br>(0.006)   | -0.004<br>(0.009) | -0.012*<br>(0.005) |
| Monthly earnings                                     | -0.012*<br>(0.004)   | -0.023*<br>(0.009)   | -0.006<br>(0.007)    | -0.010<br>(0.007) | -0.007<br>(0.005)  |
| Covariates   | X                    | X                    | X                    | X                 | X                  |
| Industry FE  | X                    | X                    | X                    | X                 | X                  |
| Quadratic trends                                     | X                    | X                    | X                    | X                 | X                  |
| Municipality FE                                      | X                    | X                    | X                    | X                 | X                  |
| Year FE  | X                    | X                    | X                    | X                 | X                  |

Notes: Robust standard errors clustered on municipalities within parentheses. Treatment is defined as residing at most 50 km from a harbor measured by airplane interacted with time. Sample includes population aged 16-64 observed in 2000-2008 born in Sweden or elsewhere excluding individuals born in the new member states. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born), industry, municipality of residence, and year of observation. The earnings measures used to divide the sample into quartiles are predicted by a “Mincer” regression including the above covariates excluding industry and quadratic trends.

\* <0.05 \*\* <0.01 \*\*\* <0.001

The overall picture from the table is that the impact tends to be bigger in the lower part of the earnings distribution. In the 50 km specification using the entire 16–64 sample, the biggest effects are found for the second quartile, i.e. people with low but not the lowest expected earnings. When we exclude the youngest individuals, among which many are primarily in education and whose work consists of small part time jobs or employment during holidays, the impact is most significant in the bottom quartile of the

earnings distribution<sup>14</sup>. We get similar (although somewhat clearer) results using the 25 km specification. Higher up in the predicted earnings distribution the estimates are typically smaller and only sometimes significant, although not miniscule even for the top quartile, which may seem a bit surprising.

### **5.4.3 By industry**

The increase in competition following the enlargement is unlikely to be uniform across industries. First, as shown by Table 2 the greater presence of migrant workers is clearly concentrated to certain industries. Second, the latent threat following an opened border is arguably stronger in some parts of the labor market than in others. In this section we approach this issue by performing the analysis by industry. Table 10 displays results for annual earnings. Looking at the left part of the table (the 50 km specification), a first observation is that most of the estimates are negative, and none are significant and positive. Quite strikingly, we find substantial negative effects in manufacturing and business services, two industries which have seen marked increases in EU8 labor in the years following the enlargement (cf. Table 2). For construction, a third industry with a strong rise in the supply of labor from EU8, the point estimate is negative and relatively sizable, although not statistically significant. Transport is the third industry where we find significant negative effects on earnings. Even though there appears to be no big inflow of people being hired in Swedish transport companies, the effects seems reasonable given the mobile nature of the services. Indeed, the Swedish Transport Workers Union and media have reported that the competition from foreign firms has increased following the enlargement (see e.g., Svenska Dagbladet, 2011, or Sveriges Radio, 2004, Sydsvenskan, 2011). This type of mechanism is also likely to be a partial explanation to the impact on the business service industry, where foreign staffing companies is sometimes portrayed as important competitors (Petersson 2012).

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<sup>14</sup> This is in line with the fact that when we exclude individuals from the sample with “low” annual earnings the size of the estimate becomes smaller. See column 3 in appendix table A6.



Table 10 Effects by industry

|   | Annual earnings    |        |                        |                                  |        |                        |
|---|--------------------|--------|------------------------|----------------------------------|--------|------------------------|
|   | Ferry within 50 km |        |                        | Ferry within 25 km (25–50 excl.) |        |                        |
|   | ATE                | (S.E.) | Number of observations | ATE                              | (S.E.) | Number of observations |
| Effect on full pop. (for reference)                     | -.009**            | (.003) | 8,919,620              | -.008                            | (.004) | 7099869                |
| Agriculture, hunting, fishing and forestry              | .024               | (.039) | 163,663                | -.018                            | (.042) | 142941                 |
| Mining and quarrying                                    | -.057              | (.059) | 8,496                  | -.057                            | (.078) | 7805                   |
| Manufacturing   | -.018**            | (.006) | 1,678,295              | -.007                            | (.010) | 1383989                |
| Electricity, gas and water supply                       | -.008              | (.019) | 67,449                 | -.014                            | (.029) | 57107                  |
| Construction  | -.013              | (.011) | 495,262                | .008                             | (.013) | 407724                 |
| Wholesale and retail                                    | -.002              | (.008) | 1,143,977              | -.003                            | (.011) | 910857                 |
| Hotels and restaurants                                  | -.015              | (.016) | 273,257                | .025                             | (.026) | 209114                 |
| Transport, storage and communication                    | -.031**            | (.009) | 534,165                | -.049***                         | (.013) | 414508                 |
| Financial intermediation                                | -.014              | (.026) | 129,719                | -.014                            | (.045) | 98807                  |
| Real Estate, renting and business services              | -.034*             | (.016) | 985,490                | -.019                            | (.017) | 729359                 |
| Public adm. and defense                                 | -.009              | (.017) | 424,032                | .011                             | (.022) | 335061                 |
| Education   | .008               | (.008) | 983,537                | -.004                            | (.013) | 787619                 |
| Health and Social work                                  | .024               | (.024) | 1,468,833              | .006                             | (.012) | 1182418                |
| Other community, social and personal service activities | .003               | (.019) | 392,003                | -.021                            | (.033) | 299654                 |
| Covariates  |                    | X      |                        |                                  | X      |                        |
| Industry FE   |                    | X      |                        |                                  | X      |                        |
| Quadratic trends  |                    | X      |                        |                                  | X      |                        |
| Municipality FE   |                    | X      |                        |                                  | X      |                        |
| Year FE   |                    | X      |                        |                                  | X      |                        |

Notes: Robust standard errors clustered on municipalities within parentheses. Each row represents two separate regressions. Treatment is defined as residing at most 50 (25) km from a harbor measured by airplane interacted with time. Sample includes population aged 16-64 observed in 2000-2008 born in Sweden or elsewhere excluding individuals born in the new member states. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born), municipality of residence, year of observation and quadratic municipality specific trends. Some industries with too few observations are excluded from the analysis.

\* <0.05 \*\* <0.01 \*\*\* <0.001

## 6 Conclusions

The individual labor market impact of immigration policies are likely to operate through several channels and vary depending on individual and regional characteristics. The 2004 EU enlargement meant that the Swedish labor market immediately became much more accessible for workers and firms from neighboring countries with substantially lower wage levels. We investigate whether workers living close to pre-existing ferry links to the new member states were differentially affected by this policy reform.

The data clearly show that the 2004 EU enlargement implied a greater presence of foreign workers, permanent and temporary, on the Swedish labor market. However, for permanent and registered temporary migrants, there are no strong signs that there was increased clustering in areas close to ferry lines. On the other hand, passenger traffic increased substantially and it is reasonable to think that the economic impact of such a development is to some extent regionally concentrated. Also, posted workers and firms operating on very short-term assignments are more likely to be sensitive to travel costs, and thus more likely to cluster close to the transport links. The same is of course true for irregular labor migrants. These groups are not easily observed in data, neither can we quantify the potentially differential threat effect of labor competition across a proximate border.

Our analysis of the impact on individual worker outcomes of being close to the transport links when borders were opened, suggests a small but robust adverse impact in the order of 1 percent on total annual earnings, as well as on monthly earnings from the main employer. In our treatment areas, the negative effects tend to be greater the closer to the ports one gets. We also present findings which by and large are consistent with previous studies concluding that workers who are closer substitutes to the new competition will also be more affected (see e.g. Bratsberg and Raaum 2011; Pekkala Kerr and Kerr 2011; Dustmann, Frattini and Preston 2012). The effects are to some extent greater among younger people, those with less education, the foreign-born, and in the lower tail of the predicted earnings distribution. Furthermore, we find the clearest negative impact in industries which have seen a greater increase in the presence of EU8 workers, or who are likely to be exposed to greater competition.

It should be emphasized that we do not estimate the total impact of the EU 2004 enlargement on the Swedish labor market, but rather the difference in the impact between those closer to transport links and those somewhat further away. The total impact may be positive or more negative. We believe that the relatively modest size of the estimated impact appears plausible. The reform implied a major increase in the openness to neighboring countries with substantially lower GDP and wage levels, and it seems reasonable to see some impact of being more exposed to this competition. Yet, given the previous literature, we would not expect to see huge effects on the labor market outcomes of present workers.

As we have stressed above, registered permanent and temporary migration is just one of several channels through which migration policy reform may affect the labor market. Indeed, our data only give limited support to the idea that the supply of this type of migrant labor increased more in the treatment as compared to the control locations in our study. The fact that we still see robust evidence of an impact on the labor market, suggests that other channels, e.g. posted/unregistered/irregular migrant workers, or competition from foreign firms operating from abroad, contribute to the impact. These are areas where data are scarce, but disentangling the mechanisms appears to be important for understanding the potential labor market effects of migration policy reform.

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## Appendix

Table A 1. Variable definitions

| Variable                  | Definition   |
|---------------------------|--|
| Ln(Yearly earnings)       | = logarithm of annual earnings from labor.   |
| Ln(Monthly earnings)      | = logarithm of monthly income from labor. Measure constructed by the use of an employer-employee register (RAMS). Conditional on employment in November, an individual's primary employer is identified and the monthly income is given by dividing the total income from the main employer over the length of the employment spell. |
| Ln(Wage)                  | = Full-time monthly wages covering all public sector employees and around fifty percent of private sector employees. Sample is stratified by firm size so that small firms are underrepresented.   |
| Employment                | = 1 if an individual is employed in November.  |
| Sex                       | = 1 if male, 0 if female.  |
| Civil status              | = 1 if married.  |
| Children in household     | = 1 if child under the age of 18 is present in the household.  |
| Region of birth           | = 1 if born outside Sweden.  |
| Age                       | Years of age.  |
| Industry                  | A vector of 60 industry dummies.   |
| Municipality of residence | A vector of region dummies.  |
| Educational attainment    | A vector of educational dummies, 0<High school, 1=High school and 2=College.   |

Table A 2. Characteristics of the permanent EU8 population in 2008

|  | Pre-Enlargement<br>immigrants | Post-Enlargement<br>immigrants |
|--|-------------------------------|--------------------------------|
| Age  | 45.52                         | 33.99                          |
| Sex (1=man)  | 0.36                          | 0.53                           |
| Married  | 0.45                          | 0.48                           |
| Children under 18 in household                           | 0.32                          | 0.38                           |
| No high school   | 0.16                          | 0.42                           |
| High school  | 0.49                          | 0.28                           |
| College  | 0.35                          | 0.30                           |
| Employed in Nov.   | 0.63                          | 0.46                           |
| Annual earnings (SEK)                                    | 156,037                       | 92,982                         |
| Monthly earnings conditional on emp. in Nov.             | 19,950                        | 16,278                         |
| Monthly earnings conditional on emp.                     | 20,635                        | 16,863                         |
| <i>N</i>   | 16,701                        | 8,620                          |
| Industry (distribution conditional on empl. in November) |                               |                                |
| Not classified   | 1.59                          | 1.39                           |
| Agriculture, hunting, forestry, fishing                  | 0.85                          | 11.90                          |
| Mining and quarrying                                     | 0.03                          | 0.05                           |
| Manufacturing  | 15.99                         | 17.96                          |
| Electricity, gas and water supply                        | 0.32                          | 0.00                           |
| Construction   | 3.67                          | 19.17                          |
| Wholesale and retail trade                               | 11.51                         | 10.51                          |
| Hotels and restaurants                                   | 3.35                          | 4.36                           |
| Transport, storage and communication                     | 6.02                          | 4.05                           |
| Financial intermediation                                 | 0.71                          | 0.10                           |
| Real estate, renting and business activities             | 12.91                         | 17.02                          |
| Public administration                                    | 3.97                          | 0.20                           |
| Education  | 9.89                          | 2.08                           |
| Health and social work                                   | 25.25                         | 8.89                           |
| Other community, social and personal service activities  | 3.92                          | 2.30                           |
| Activities of households                                 | 0.00                          | 0.00                           |
| Extra-territorial organizations and bodies               | 0.02                          | 0.00                           |
| <i>N</i>   | 100                           | 100                            |

Note: Population aged 16-64 years in Södra Götaland old born in the new member states observed in 2008.

Table A 3. Placebo analysis – baseline specification

|                                | Employment |         | Annual earnings |         | Monthly earnings, emp. nov. |         |
|--------------------------------|------------|---------|-----------------|---------|-----------------------------|---------|
|                                | ATE        | (S.E.)  | ATE             | (S.E.)  | ATE                         | (S.E.)  |
| Ferry line within 50 km*Period |            |         |                 |         |                             |         |
| Effect on full population      | 0.000      | (0.002) | 0.005           | (0.008) | 0.005                       | (0.006) |
| N                              | 10,713,058 |         | 8,527,581       |         | 7,740,380                   |         |
| No trend                       | X          |         | X               |         | X                           |         |
| Linear trends                  |            |         |                 |         |                             |         |
| Quadratic trends               |            |         |                 |         |                             |         |
| Industry FE                    |            |         | X               |         | X                           |         |
| Covariates                     | X          |         | X               |         | X                           |         |
| Municipality FE                | X          |         | X               |         | X                           |         |
| Year FE                        | X          |         | X               |         | X                           |         |

Notes: Robust standard errors clustered on municipalities within parentheses. Treatment is defined as residing at most 50 km from a harbor measured by airplane interacted with time. Sample includes population aged 16-64 year-olds born in Sweden or elsewhere excluding individuals born in the new member states. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth (native/foreign-born), municipality of residence, year of observation and quadratic municipality specific trends. Treatment moved back to 1998, data from 1994-2002 used.

\* <0.05 \*\* <0.01 \*\*\* <0.001

Table A 4. Correspondence of wage and earnings data – baseline specification

|                | Control municipalities |                 |      | Treated municipalities |                 |      |
|----------------|------------------------|-----------------|------|------------------------|-----------------|------|
|                | 16-29 years old        | 30-64 years old | All  | 16-29 years old        | 30-64 years old | All  |
| No high school | 0.56                   | 0.86            | 0.64 | 0.53                   | 0.85            | 0.62 |
| High school    | 0.48                   | 0.63            | 0.51 | 0.46                   | 0.63            | 0.50 |
| Tertiary       | 0.34                   | 0.54            | 0.37 | 0.33                   | 0.58            | 0.39 |
| Total          | 0.45                   | 0.67            | 0.50 | 0.42                   | 0.66            | 0.48 |

Note: The entries show the fraction in each category for which there is an observation of monthly earnings conditional on employment in November, but no wage data in year 2000-2008. Since the wage data are sampled, the fraction should be smaller than one. For details about the sample see note Table 4.

Table A 5. Correspondence of wage and monthly earnings data divided by income group

|              | Control municipalities |  | Treated municipalities | All  |
|--------------|------------------------|--|------------------------|------|
|              |                        |  |                        |      |
| 1st Quintile | 0.81                   |  | 0.82                   | 0.82 |
| 2nd Quintile | 0.46                   |  | 0.46                   | 0.46 |
| 3rd Quintile | 0.40                   |  | 0.36                   | 0.38 |
| 4th Quintile | 0.41                   |  | 0.37                   | 0.39 |
| 5th Quintile | 0.41                   |  | 0.38                   | 0.40 |
| All          | 0.50                   |  | 0.48                   | 0.49 |

Note: See note Table A4.

Table A 6. Variation of outcome measures

|                                      | Employment defined as<br>annual earnings > 0 | Employment defined as<br>earnings > 2 86,000 SEK | Log (Annual earnings) ><br>86,000 SEK |
|--------------------------------------|--|--|---------------------------------------|
| Ferry line in<br>municipality*Period | ATE<br>(S.E.)                                | ATE<br>(S.E.)                                    | ATE<br>(S.E.)                         |
| Effect on full population            | 0.002<br>(0.001)                             | 0.000<br>(0.001)                                 | -0.005<br>(0.001)                     |
| N                                    | 11,239,356                                   | 11,239,356                                       | 6,916,652                             |
| Quadratic trends                     | X  | X  | X                                     |
| Industry FE                          |  |  | X                                     |
| Covariates                           | X  | X  | X                                     |
| Municipality FE                      | X  | X  | X                                     |
| Year FE                              | X  | X  | X                                     |

Notes: Robust standard errors clustered on municipalities within parentheses. Treatment is defined as residing at most 50 km from a harbor measured by airplane interacted with time. Sample includes population aged 16-64 years old born in Sweden or elsewhere excluding individuals born in the new member states observed 2000-2008. Controls include age, age squared, educational attainment, civil status, children in household, sex, region of birth.

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