Jobs at risk?

Task routineness, offshorability and attitudes toward immigration

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Abstract

A large body of literature has provided evidence that the distributional effects of globalization, technological change and deindustrialization shape people's values and policy preferences. Although it is widely accepted that these structural changes create winners and losers, there are some debates as to who these winners and losers actually *are,* and the mechanisms through which labour market and status changes manifest.

In this paper, we aim to shed light on these mechanisms by studying the link between job vulnerability and attitudes toward immigration in Western Europe. We draw influence from two fairly recent approaches in labour economics – *task routineness* and *offshorability* of occupations. Briefly speaking, the former is a proxy for worker's risk to be displaced by a machine or a computer and the latter measures whether a task requires face-to-face interaction or must be performed on-site.

The two theories suggest that workers in low (high) routine occupations benefit most (least) from economic globalization and trade liberalization. Previous empirical studies in political economy have shown that individuals' policy preferences echo these redistributive effects of globalization: high routine workers are most worried about their job market prospects and least supportive of free trade.

We find that attitudes toward immigration become considerably more negative as occupational task routineness increases. We do not find similar association with occupational offshorability and immigration attitudes. Direct exposure to global competition does not in general increase workers' worries about the economic effects of immigration. However, offshorability seems to be associated with polarization of attitudes between the routine and non-routine workers.

JEL classification: technological change, preferences, globalization

In recent times, some politicians from the radical right in Europe increasingly attempt to tie economic issues such as trade to issues on immigration. For instance, Marine Le Pen, the leader of the Front National (FN), put forth a policy package combining an increase in trade barriers and a clampdown on immigration during the 2017 French presidential elections. In an interview with Niek Stam, a leader of the FNV Haven labour union in Rotterdam, Champion and van der Schoot (2017) revealed that economic fears over unemployment due to automation potentially fueled opposition toward immigration, and consequently, support for the Dutch Party for Freedom, which campaigns for a crackdown on immigration.

A question these events raise is: are concerns over economic issues increasingly correlated with opposition to immigration? As Malhotra et al. (2013) noted, existing studies on attitudes to immigration tend to focus on two sources – economic and cultural. Scholars who argue that economic considerations drive opposition to immigration generally refer to labour market competition effects such as suppressed wages or competition over jobs associated with an increase in immigrant workers (see for example Scheve and Slaughter 2001; Mayda 2006; Dancygier and Walter 2015). By contrast, scholars who focus on cultural factors generally "dismiss the effect of economic self-interest and instead emphasize the importance of cultural factors in shaping people's views on immigration" (Malhotra et al. 2013, 392). This ethnocultural perspective posits that immigrants are perceived as a potential threat to existing traditions and the collective identity of the natives (see for example Albrow 1996; Hainmueller and Hiscox 2007; Kinder and Kam 2009).

Broadly speaking, the effects of economic considerations appear to be more contested than cultural considerations (Hainmueller and Hiscox 2010). More recent studies have however attempted to circumvent the binary between economic and cultural competition as drivers of opposition toward immigration. One approach subsets populations and examines the impact of labour market competition on opposition to immigration. For instance, Malhotra et al. (2013) discovered that labour market competition has a sizable impact on immigration attitudes in the high-technology sector in the United States, but is generally not a prevalent source of threat when aggregated at the level of wider population.

Another approach ties opposition to immigration to dwindling economic prospects, irrespective of whether poorer economic prospects are a direct result of immigration or not (Geraci et al. 2017. See also Colantone and Stanig 2016 for analysis on Brexit). This line of reasoning contends that migration, technological change and trade all involve labour market risks, but for the grand majority of people the exact mechanisms through which these risks manifest themselves are rather unclear. Individuals might blame immigration, because they misattribute the causes of their labour market risks or just simply channel their status anxiety into issues that are more easily controlled. Geraci et al. (2017) argue that people may perceive governments as powerless to control technological change and economic globalization, but have more ability to limit migration. Put together, this perspective suggests that changes in economic prospects caused by economic shocks could affect opposition toward immigration, even if there is no direct labour market competition.

The complicated link between labour market risks and preferences has been studied extensively in the political economy literature (e.g. Iversen and Soskice 2001; Kitschelt and Rehm 2014), but less so in studies focusing on immigration attitudes. In this broader literature, labour market risks are usually examined at the occupational level, based on the idea, that occupational hazards, such as job or wage loss and the likelihood of facing unemployment and regaining employment, influence people's preferences. In principle, adopting an occupational approach also entails accepting the intertemporal element of self-interest. More specifically, the link between preferences and economic considerations is not necessarily limited to current income or labour market status, but may include future income associated with labour market risks and prospects (e.g. Thewissen and Rueda 2017; Geraci et al. 2017).

Our paper contributes to this international political economy literature of labour market risks and prospects by looking at whether and how occupational characteristics are linked with immigration attitudes. More specifically, we apply the task approach (Autor et al. 2003; Acemoglu and Autor 2011) to test whether workers that are most vulnerable to technological change and offshoring are most anti-immigrant. We argue that occupational task routineness is associated with more negative views on immigration, whereas occupational offshorability has opposite and more heterogeneous effect.

The remainder of the paper is organized as follows. First, we review the literature on the causes and implications of the job polarization that has taken place in Western Europe in in the last few decades and how these changes affect workers in different occupations. Second, we argue that the link between technological change and offshoring depends on comparative advantage, especially at the occupational level. We also discuss how these labour market risks are associated with attitudes toward immigration. Next, we introduce our hypothesis, data, empirical strategy and results. The final section concludes.

Job Polarization, Technological Change and Offshoring

To fully understand the significance of the two focal points of this paper – occupational task routineness and offshorability - , we need to recognize how profoundly technological change and offshoring have shaped the European labour market structures in recent decades. In their influential paper, Goos et al. (2014) provide evidence on how the growth rates of different occupations have varied greatly in Western Europe between 1993 and 2010. They noted that job growth has been concentrated in high paid occupations such as professionals and managers, but also in low-paid jobs such as personal service, transport, and sales workers. By contrast, middling jobs such as craft workers, machine operators, and office clerks have seen relative declines.

Building on the task approach (Autor 2003 et al; Grossman and Rossi-Hansberg 2008; Acemoglu and Autor 2011; Autor 2013), the authors observed that the job growth has been analogous to the routine-intensity of the occupations. There is growth in the high-paid non-routine service jobs, and low-paid non-routine service jobs, but decline in middling jobs characterized by routine tasks. This U-shaped curve is thus also reflective of differences in economic vulnerability faced by different occupational groups. At both ends of the curve, individuals in those occupational groups face less economic vulnerability because of job growth. In the middle of the curve, individuals in routine occupations face more economic vulnerability because of the job decline. The authors note that while technological change is more important in explaining job polarization than offshoring, the two concepts are in fact not easily distinguishable (See also Blinder 2009; Blinder and Krueger 2013). Nevertheless, together technological change and offshoring can account for about three quarters of the witnessed job polarization in Western Europe.

The job polarization hypothesis is further confirmed in Figures 1 and 2, which plot the percentage change in job numbers relative to the base year of 2002 and 2011 respectively across 16 advanced capitalist Western European economies across 14 years.[1] These occupational categories employ the 1-digit categories used in the International System for Classification of Occupations 1988 and 2008. From 2002 to 2010, job growth is greatest among professional and managerial occupations, and decline is greatest among plant and machine operators and assemblers. Job growth has also taken place in categories of services and sales workers, technicians and associate professionals, and elementary occupations. By contrast, the number of jobs has declined in categories of clerical support workers, skilled agricultural, forestry and fishery workers, and craft and trades workers. These trends broadly correspond to the U-shaped curve found in Goos et al. (2009): high-paid non-routine and low-paid non-routine job experienced growth, but middling routine jobs experienced decline in numbers.

[Figure 1 about here]

The pattern is relatively similar in Figure 2, which charts change in employment numbers from 2011. Professionals, technicians and associate professionals, and elementary occupations once again see the greatest growth in employment relative to 2002. While there is a decline in employment of managers relative to 2011, the trend rebounded after 2015. By contrast, the occupations, which are in decline in Figure 1 continue to experience relative decline in the number of employed since 2011.

[Figure 2 about here]

International Trade and the Level of Distributive Conflict

The empirical evidence (e.g. Goos et al 2014) suggest that routine-biased technological change is the primary cause of job polarization. In an open economy, however, job polarization and occupational vulnerability to automation may also depend on the global supply and demand of routine and non-routine tasks. To understand the interaction between technological change and offshoring, we need first to turn our attention to the distributional consequences of international trade. Scholars tend to agree that international trade creates distributional conflicts (see for example Kriesi et al. 2006; 2008; Feenstra 2010; Autor et al. 2013; Owen and Johnston 2017) but there is no academic consensus as to which level the gains from trade and

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[1] These 16 countries are the focal point of this paper. Note that the change in base years is due to changes in the ISCO system used in the Eurostat data. Prior to 2011, occupational categories were classified using the ISCO-88 system. ISCO-08 was used from 2011 onwards.

internationalization of production take place. Choosing the right level analysis is crucial in order to distinguish who the "winners" and "losers" of globalization actually are.

Traditional trade theories focus on comparative advantage at the level of sectors (Ricardo-Viner models) or at the level of factors of production (Stolper-Samuelson models). In the former (RV), the distributive conflict takes place at the level of industries. From this perspective, the labour market effects of international trade, and correspondingly the economic risks facing different groups of workers, is dependent on (a) the industries these workers belong to and (b) the extent of comparative advantage these industries enjoy in advanced economies (e.g. Gourevitch 1986; Walter 2017). In the latter (SS), the effects of trade occur at the level of factors of production and are distributed according to the skill level of individual workers.[2] Trade increases relative returns to country's abundant factors and relative fall in returns to scarce factors. As advanced economies are abundant with skilled labour, the model predicts that skilled workers benefit from trade whereas the unskilled workers face more economic hardships in these countries (Feenstra and Hanson 1999; Kriesi et al. 2008; Dancygier and Walter 2015).

While micro level studies have given partial support for both of the traditional theories (Dancygier and Walter 2015), their explanatory power has been increasingly questioned for several reasons. First, empirical firm-level research has provided evidence of substantial within-industry variation in productivity and wage levels, which is neglected in sectoral models (Walter 2017). Second, there is considerable heterogeneity in the distributional consequences of trade even among workers with nominally same skill levels (Walter 2017; Rodrik 2018), which is contrary to what factor-endowment models predict. Third and most importantly, trade today consists of "*bits of value being added in many different locations*" and increasingly fragmented production chains, which crosscut industrial sectors and skill-specific factors. This calls for a shift from thinking about trade in final goods and services to "*trade in tasks*" (Grossman and Rossi-Hansberg 2008, 1978.).[3]

The new trade models that study the heterogeneous labour market consequences of trade at the *occupational level* build on the task approach (Autor et al 2003; Grossman and Rossi-Hansberg 2008) and are thus

[2] Note that the Varieties of Captialism (VoC) framework argued in Estevez-Abe et al. (2001), Hall and Soskice (2001) and Busemeyer (2014) showed that skills should not be measured simply in terms of the level of education, but rather the type of skill formation depending on the type of institutional framework – liberal or coordinated market economies. While this precision is optimal to an analysis of different Western European countries, numerous authors do not take up such a conceptualisation (see Hainmueller and Hiscox 2010; Dancygier and Walter 2015; Häusermann and Kriesi 2015) due to data limitations in individual level survey datasets such as the European Social Survey. While the Survey of Adult Skills (PIAAC) may allow researchers to precisely decompose these different skills, these surveys do not have variables measuring political behaviour or political attitudes. For these reasons, we do not discuss or apply the VoC.

[3] For instance, an Apple iPhone is designed in the USA, with its components sourced from different suppliers produced in Japan and South Korea, and finally assembled in China before being exported to the test of the world (The Economist, 2011).

arguably better suited for analysing trade in the setting of fragmented production chains. Since each occupation consist of a bundle of tasks (Owen and Johnston 2017; Frey and Osborne 2017) of which each occupation's task structure is largely different from another occupation's, a trade in task approach suggests that the effects of international trade are distributed at the level of occupations. [4] The approach acknowledges that people move across occupations, but relaxes the assumption of full labour mobility, since there are costs and hurdles associated with changing jobs (Ritter 2014; Owen and Johnston 2017). Some occupations require licensing and accreditation and other long occupational tenure (Kambourov and Manovskii 2008). Because human capital is to some degree skill-specific, skills are not easily transferable between occupations (Kambourov and Manovskii 2009). Changing an occupation destroys occupation-specific human capital (Ritter 2014), which may push workers either to occupations with lower wage or to occupations, which have comparatively similar task content to the previous occupation.

The occupational approach suggests that the effects of international trade crosscuts industrial sectors and skill-specific factors. The key takeaway in terms of distributional conflict is that the occupational task content determines whether and how individuals benefit from or are hurt by trade. In countries that have comparative advantage in routine production, trade should benefit people in routine intensive occupations. Correspondingly, in countries that have comparative advantage in abstract and cognitive tasks – such as the advanced capitalist countries of Western Europe – trade in tasks should benefit people in non-routine occupations (Owen and Johnston 2017).[5]

Occupational Characteristics and the Task Approach

As suggested above, the two main reasons behind the rise of job polarization in Western Europe are technological change and offshoring. At the occupational level, the likelihood of being disposed to automation and offshoring depends mainly on occupation's a) *task routineness*, which measures how easily tasks are replaced by technology and b) *offshorability*, which demonstrates how tradable or mobile an

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[4] For an opposing account of task structure similarity within occupations, see Arntz et al. (2016) and Autor and Handel (2013). For us, data limitations in the European Social Survey dataset which does not field specific questions about individual's work task structures means to bypass the problem of heterogeneity in task structure within similar occupations.

[5] The aggregate productivity gains from technological change and offshoring tend to exceed the negative economic effects greatly. Even some of the displaced workers are likely to benefit as the productivity gains raise demand for native workers in more skill-intensive and non-routine occupations (Ottaviano et al. 2013). Thus, instead of high unemployment these structural changes might lead to occupational upgrading and workers shifting from manual-intensive occupations to communications-intensive occupations (Peri and Spraber 2009; D'Amuri and Peri 2014; Cattaneo et al 2015). In our framework, this movement from routine to non-routine occupation improves job security on individual level, but does not change the hypothesis of routine workers being more vulnerable than non-routine workers.

occupation is. These characteristics are not fixed over time, since technological advances change the task content of occupations. Therefore, they should not be considered as precise measures of labour market risks that actualize when a certain level is exceeded. Rather, they function as proxies for occupational threat of unemployment, which in turn may affect wages and job descriptions whether or not the technological displacement of jobs or offshoring actually takes place.

Task routineness

In their seminal work, Autor et al. (2003) suggested that routine tasks are more likely to be replaced by technology than non-routine tasks, because computers and automation can substitute for tasks, which are well defined, limited and follow explicit rules, but are complements for tasks, which involve a lot of problem solving and complex communication. Routine tasks include typically activities like calculation, repetitive customer service, record keeping, picking and sorting and repetitive assembly. By contrast, non-routine tasks require creativity, persuasion hypothesis formation, but may also require physical flexibility, adaptability and visual recognition (Autor et al. 2003; Acemoglu and Autor 2011; Autor 2013). To illustrate, routine tasks are typically abundant in occupations such as office clerks and machine operators, while non-routine tasks are typical in occupations such as professionals, personal service workers and drivers.

Conceptually, the approach depends crucially on differentiating tasks and skills, as well as reconceptualizing occupations. Tasks here need to be understood as *"units of work activity that produce output"* while skills refer to a *"worker's stock of capabilities for performing various tasks"* (Autor 2013). Another key difference is that skills measure human capital, which is largely acquired before entering the labour market, whereas tasks are integral part of job description. While many non-routine tasks require high-skill and many routine tasks do not, there is no systematic link between skills and tasks. Especially the non-routine tasks include occupations that require very high-skill (e.g. professors) and occupations that are low-skill intensive (e.g. cleaners).

Offshorability

There is a close, but not identical relationship between task routineness and offshorability. Occupational offshorability (Blinder 2009; Blinder and Krueger 2013) measures the degree to which a task can be provided from abroad. The key determinants of occupational offshorability are whether the occupation (1) requires a specific location (miners, cleaners, taxi drivers) and whether it (2) requires face-to-face interaction (childcare workers, management).

Even though offshoring tends to have a negative connotation (Blinder 2006), occupational offshorability simply refers to tradability of an occupation. Offshorable occupation can be either offshored to another country or onshored to the "home country". In other words, offshorable occupations are open to global competition whereas the non-offshorable occupations face only domestic competition and are thus more protected. The labour market consequences of offshorability depend on other occupational and individual level characteristics – mainly the skill-level of a worker and task routineness of an occupation. Whether an individual benefits from the reallocation of tasks globally depends on whether or not her/his skill-task combination enjoys a comparative advantage in the global market.

Empirical studies on the interaction of technological change and offshoring support the hypothesis of the heterogeneous effects of globalization. Ebenestein et al (2014) show that in the U.S. offshoring has increased occupational wage differentials significantly and has pushed manufacturing sector workers to lower-paid jobs elsewhere. The authors conclude that workers in occupations that involve many routine tasks and whose tasks are easily copied by workers elsewhere are particularly vulnerable to the negative effects of trade and offshoring. Similarly, Hummels et al (2014) use matched worker-firm dataset from Denmark to measure how offshoring affects wages at the worker level. They find that unskilled workers in routine occupations are most likely to suffer wage losses from offshoring, but workers in non-routine occupations interact positively with offshoring. Furthermore, the authors show that offshoring increases the skill premium within firms.

Labour Market Risks and Immigration Attitudes

We have argued that in advanced capitalist countries routine workers in offshorable occupations are most likely to face unemployment and wage losses, because of automation and trade. Non-routine workers on the other hand, are relatively safe from automation and may benefit from the global competition and increased demand because of their comparative advantage. Furthermore, they are less vulnerable to job displacement since the cost of offshoring increases with the increasing task complexity of an occupation (Ottaviano et al. 2013). These occupational labour market risks and opportunities may affect the perceived ethnic threat and thus the attitudes toward immigration (e.g. Billiet et al 2014).

The associations between economic insecurity and value formations have been studied extensively. Despite disagreements on the exact mechanisms and magnitudes, most scholars agree that economic self-interest affects political preferences. Papers that exploit the task approach have found that occupational task content and exposure to automation and/or offshoring is associated with views on trade (Owen and Johnston 2017), redistribution (Walter 2017; Thewissen and Rueda 2017) and immigration (Geraci et al 2017). These studies share the assumption that values and attitudes are not fixed over time. People are perhaps not likely to change their views completely based on economics, but economic shocks at micro or macro level may trigger latent cultural concerns and social envy (Gest et al 2018). The less well-off might feel that they are not getting what they deserve (Roduijin and Bourgoon 2018). This might cause bitterness, which according to Poutvaara and Steinhardt (2018) has a causal effect on worries about immigration. Bitterness is not necessarily associated as much with absolute levels of income as it is with relative deprivation. For example, Rooduijn and Burgoon (2018) find that individual level economic suffering fosters radical right voting when the economic conditions are favourable at the aggregate level.

Another key assumption that links economic insecurity to immigration attitudes is that people are not always able to detect causal links behind their economic conditions, let alone act rationally accordingly.

People may either misattribute the causes of their labour market risks or simply blame and scapegoat outgroups in the search of culprits. This line of thought maybe reinforced by the fact that theoretically the labour market effects of offshoring are comparatively similar to those of immigration (Ottaviano et al 2013). Similarly to workers in less developed countries, immigrants are more often than not less skilled than the "natives" and have thus comparative advantage in routine tasks.

People's misconceptions of immigration are not surprising given the fact that there is no distinct consensus on the effects of immigration on wages and employment. While most scholars seem to agree that the labour market effects of immigration are rather small and tend to lead to occupational upgrading rather than increased unemployment (e.g. Card 2005; Ottaviano and Peri 2012) there are some competing views (e.g. Aydemir and Borjas 2007). Interestingly, if we take for granted that immigration generally does not increase unemployment, increase labour market risks or push natives out of labour market, the opposition toward immigration on economic terms must stem from other sources than direct labour market competition. Geraci et al. (2017) argue that is easier to blame immigrants than machines for employment loss and that immigration is something that can be controlled by the incumbents whereas globalization, offshoring and technological change are not.

One key question is of course, how immigration is perceived and discussed by politicians (especially from populist right-wing parties) and to a lesser extent in the media. Alesina et al (2018, 35) argue that debate about immigration takes place *"in a world of misinformation*". These strong misperceptions of immigration are likely to affect how people link immigration and labour market changes. For example, increases in unemployment seems to increase economic-based opposition toward immigration (Algan et al. 2017) even if there is no causal link between unemployment and immigration. To sum up previous research on the economic explanations of immigration attitudes, it seems that the rationality behind people's views on immigration does not follow simple economic reasoning even though economic reasons would be at play.

The Argument and Hypotheses

To sum up our theoretical expectations, we argue that labour market risks and prospects associated with occupational characteristics shape policy preferences and people's views on immigration. From the perspective of labour market risks, the expected implications of technological change are rather evident: routine-biased technological change should increase labour market risks in occupations whose task content is high. Therefore, we expect individuals to become more sceptical about economic consequences of immigration as their occupational task routineness increases.

> *H1: The routine workers should be more worried about economic effects of immigration than non-routine workers in spite of the level of offshorability (unconditional effect).*

The impact of offshorability on labour market risks and thus political preferences is more ambiguous. Recent studies suggest that the effect of offshoring is conditional on worker's skill-level or on task routineness the occupation (Hummels et al. 2014; Ebenstein et al 2014; Dancygier and Walter 2015; Walter

2017; Owen and Johnston 2017). In this paper, we focus on the latter, which means that we expect offshorability to have heterogeneous effect based on the task routineness of worker's occupation. Workers whose jobs are routine-heavy and easily offshorable should face the biggest labour market risks whereas the workers in low-routine occupations should be rather safe from competition from poorer countries because of their comparative advantage (remember that occupational offshorability means simply international mobility of an occupation). Offshoring provides opportunities to high-skilled workers who perform non-routine tasks (Rommel & Walter 2017), but increases risks of low-skilled workers in routine tasks (Hummels et al 2014).

Therefore, we expect higher occupational offshorability to increase scepticism toward the economic benefits of immigration in high-routine occupations, but higher offshorability increase optimism toward immigration in low-routine occupations. Which of these mechanisms dominate is an empirical question and we therefore agnostic on the unconditional effect of offshorability.

> H2: *In comparison to workers in non-offshorable occupations the workers in offshorable occupations should be relatively more anti-immigration if their occupational task routineness is high and relatively more pro-immgiration if their occupational task routineness is low (conditional effect).*

As technological change is considered to shape labour markets more profoundly than offshoring (Goos et al 2009; 2014), we expect that the association between task routineness and immigration attitudes to be stronger and the association between occupational offshorability and immigration attitudes.

Data Description and Empirical Strategy

We test our hypotheses using cross-sectional and cross-national data from the European Social Survey (Rounds 1 to 7). There are three main strengths of the European Social Survey. Firstly, it maintains a consistent battery of questions measuring respondents' attitudes toward immigration, which allows the operationalization of our dependent variable. Secondly, these questions are phrased similarly across questionnaires for each country. Thirdly, it classifies respondents according to their occupational categories using the International Standard Classification of Occupation (ISCO) 1988 and 2008 systems across all ESS rounds. The ISCO classification structure aggregates occupational groups according to their similarity in terms of job and skill. Job here is defined as "a set of tasks and duties performed, or meant to be performed, by one person, including for an employer or in self-employment" while skill refers to "the ability to carry out tasks and duties of a given job" (ILO 2012, 11). The availability of detailed occupational categories at the 4 digit levelacross ESS rounds allows us to construct the two explanatory variables used in this study – (a) the potential of occupational offshorability, (b) the level of task routineness of occupations. To synchronize the two ISCO classification systems, we used the crosswalk provided by Gazenboom et al. (2010) to downgrade the occupations coded in ISCO-08 to ISCO-88.

To operationalize potential offshorability, we referred to the index provided by Blinder (2007) which assigned a value to each of the 817 occupational categories listed in the Standard Occupation Classification

(SOC) 2000. As a crosswalk to ISCO 08 only exists for the newer SOC 2010, we first crosswalked SOC 2000 to its newer classification index SOC 2010. Most of the ISCO 08 categories had a one-to-one fit with the SOC 2010 categories. Some ISCO 08 categories were however composed of multiple SOC 2010 categories. To get around this, we use the weighted mean value of potential offshorability of the component SOC 2010 categories. The weights are obtained in proportion to the number of workers in each SOC 2010 category obtained from Labour Force Statistics from the Current Population Survey conducted by the Bureau of Census for the Bureau of Labour Statistics in the USA.[6]

The Blinder index assigns values of potential offshorability on two criteria: (1) does the worker in this occupation need to be physically close to a specific work location, and (b) does the worker in this occupation need to be physically close to the work unit? (Blinder 2009, 18). Higher values on the Blinder index indicate a greater potential of offshorability. Blinder however cautioned against treating the scale as cardinal. Instead he recommended it to be used as a categorical classification system in which values ranging from: (1) 76-100 indicate that an occupation is potentially highly offshorable, (b) 51-75 indicate that an occupation is potentially offshorable, (c) 26-50 indicate that an occupation is potentially non-offshorable, and (d) 0-25 indicate that an occupation is potentially highly non-offshorable. For the purposes of this study, we collapsed the index into two categories similarly to Owen and Johnston (2017). Our variable measuring potential offshorability is thus a dummy with 0 indicating that an occupation is potentially non-offshorable, and 1 indicating that an occupation is potentially offshorable.

To measure task routineness, we used the routine task index (RTI) created by Acemoglu & Autor (2011). The routine task index assigns occupations scores according to the level of routineness in their constituent tasks. It is constructed by subtracting the sum of log of abstract and the log of manual tasks from the log of routine tasks from the O*NET database. Higher values on the RTI indicate higher levels of occupational task routineness. We assigned RTI values to each of the ISCO categories at the 4 digit level using data from Owen and Johnston (2017). The centered values range from -2.12 (religious professionals) to 2.49 (metal moulders and coremakers).

Our theory suggests that the effect of task routineness and offshorability should be conditional on the country's comparative advantage on supplying these tasks. Thus, the difference between routine and non-

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[6] When ISCO categories are composed of multiple SOC codes, those SOC components are weighted using US employment by detailed occupation (SOC) numbers. Weights are averaged over 4 annual figures - 2011, 2012, 2013, 2014. Weight source: Labour Force Statistics from the Current Population Survey, Household data, Annual Averages (USA). As far as possible, we use weighted means (by size of SOC component categories of a single ISCO category). If data does not allow us to distinguish between SOC categories, a simple mean is assigned to the ISCO category instead. Simple mean assigned especially when ISCO category composed of two SOC codes without one direct SOC-Census match. Simple mean also assigned when more than 1 SOC code (when number of component SOC codes > 3) is missing from census data. In the event that a specific component SOC code (number of component SOC component codes > 2) for a single ISCO category is missing from the Census data, we treat it as 0 (number too small to feature in the census dataset). In some cases, when CENSUS category is composed of multiple SOC component codes which are themselves component codes of same ISCO category, we assign the Census value weight across those multiple SOC component codes.

routine workers should be more pronounce the richer the country is. We therefore use the 16 richest countries in the ESS data based on their GDP per capita.[7] Another reason to focus on the richest countries in the sample is that because they are relatively advanced, they should be similarly affected by overriding transnational forces.

Our main dependent variable is the ESS question *"Is immigration bad or good for country's economy"*, which is a scale from zero to ten. While this variable may reflect all kinds of economic concerns over immigration, it is more likely to be associated with concerns over fiscal burden than labour market competition (Dustmann & Preston 2006).

We use ordinary least squares models, include country and year dummies and cluster the standard errors by country. The data is weighted by the design weights and the population size weights. We include standard controls used in the literature of policy preferences in our models. These include age, gender, whether the respondent belongs to a minority group, income[8] and labour market status. We include only people aged 18 to 65, because our hypotheses concern only working age population.[9] While our purpose is not to test sectoral and factor-endowment trade models empirically, we take these competing explanations into account by adding controls for the worker's industry and the years of education.[10]

Formally, we estimate the following regression:

$$Y_{i,c,t} = \beta_0 + \beta_1 RTI_{i,c,t} + \beta_2 OFF_{i,c,t} + \beta_3 RTI_{i,c,t} * OFF_{i,c,t} + \beta_4 Z_{i,c,t} + \varepsilon_{i,c,t} \quad (1)$$

Here, $Y_{i,c,t}$ measures the attitudes toward immigration of individual *i* in country *c* in the year *t*, $RTI_{i,c,t}$ is the occupational task routineness, $OFF_{i,c,t}$ is a dummy for offshorability, $RTI_{i,c,t} * OFF_{i,c,t}$ is the interaction term of task routineness and offshorability and $Z_{i,c,t}$ is a vector of control variables.

[7] These include Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom. GDP/CPT rankings from IMF 2016.

[8] Income is a measurement of self-reported income. Unfortunately, the income scales vary somewhat between ESS waves, so we have recoded the incomes from 2002-2008 from 12 categories to 10 categories. Including incomes in the regressions is essential, because our measures of task routineness and offshorability are static and thus do not capture the changes in task-intensity and offshorability over time. Assuming that incomes are elastic and to some degree reflect the wage-level, productivity and comparative advantage of an occupation, including incomes to the regression models might offset some of the pitfalls of the crude measurements of our main covariates. Tasks that have declining market value should see a reduction in occupational wages. See e.g. Firpo, Fortin and Lemieux 2011.

[9] Our results are robust and more evident when we limit the sample to (1) those who have a job and (2) those who are in the workforce.

[10] Education is the number of years a person has received education. The results are robust to using different measures of education such as capping the education years at a maximum of 20 or using education as a categorical variable (primary, upper secondary, post-secondary and tertiary). We use education as a control instead of an explanatory variable, because even though education is one the strongest and most consistent determinants of immigration attitudes, it is a very coarse measure of skill-level of workers (Oesch 2008; Ortega & Polavieja 2012; Malhotra, Margalit et al. 2013; Hainmueller & Hopkins 2014; Polavieja 2016). According to Hainmueller and Hopkins (2014) education is more likely to capture differences in tolerance, ethnocentrism, cultural capital, sociotropic concerns and political correctness than signs of labour market competition. Furthermore, education is likely to suffer from substantial selection bias. This is illustrated well in Lancee & Sarrasin (2015), who use longitudinal data from Swiss Household Panel to prove that differences between educational groups are mostly due selection bias. They also show that higher educated individuals are more likely to oppose immigrants after entering the labour market.

Results

We start by illustrating the links between occupational characteristics and income. Figure 3 shows that the aggregate income increases linearly when we move from the most routine-heavy occupations toward occupations that involve many cognitive and abstract tasks. The direction is opposite when we look at the occupational offshorability. The most offshorable occupations are in the richest decile. The results imply that these occupational characteristics proxy the labour market outcomes in terms of wage rather well.

[Figure 3 about here]

We present our main results in Table 1. All our models include country and year controls. Models 3-5 also include controls for the main activity, which refers to whether the individual has been in paid work, education, unemployed, sick or disabled, retired, military service or housework in the last 7 days before the interview. Model 1 contains only the offshorability dummy and the measure of task routineness. Model 2 adds the interaction term for the two. Model 3 and 4 include individual level controls suggested in the literature with and without control for income (we expect that income is to a large part a result of occupational characteristics). Model 5 adds further controls for subjective views that might be correlated with attitudes toward immigration.

[Table 1 about here]

Our five models show remarkable consistency. Older people, male, minorities, highly educated and wealthy seem to have more positive view on the economic effects of immigration. These findings are generally similar to previous literature.[11] However, the main interest of this paper lies in the effect of task routineness, offshorability and their interaction. These occupational characteristics seem to have opposite impact on immigration attitudes. Occupational offshorability increases positive attitudes towards immigration whereas the increase in negative attitudes is associated with increases in task routineness.

The interactions in models 2-5 show that the effect of task routineness is conditioned by the degree of occupational offshorability. As offshorability increases, the difference in attitudes between people in routine and non-routine occupations grows as well. To facilitate interpretation, the conditional effect of offshorability is illustrated in Figures 4a and 4b. The Figures show that the degree of offshorability is associated with the changes in attitudes when task routineness is low, but not so much when the task routineness is high. People in offshorable and low-routine occupations are most supportive for economic immigration, but contrary to our expectations, the people in offshorable routine occupations are not more anti-immigration than their reference group.

[Figure 3 about here]

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[11] Even though male and older individuals are often found to be more anti-immigrant in general, they are also on aggregate level more liberal in economic issues.

Figure 4a shows how the effect of task routineness varies based on offshorability. One unit change in task routineness leads to -.19 change in immigration attitudes when the occupation is not offshorable and to -.37 change when the occupation is offshorable. On the immigration attitude scale, which ranges from 0 to 10 (mean 5.17), the difference between most routine and most non-routine occupation is 0.88 in non-offshorable occupations and 1.70 in offshorable occupations. This is a substantial difference given the fact that we control for number of factors that are either determinants (education) or outcomes (income and income insecurity) of occupational characteristics.

Based on Table 1 and Figure 4, we can reject the null hypothesis of our hypothesis 1 and conclude that people in routine occupations are noticeably more aversive of the economic impact of immigration. The hypothesis 2, where we expected offshorability to have a conditional effect on the immigration attitudes, is a bit more complicated. While the conditional effect of offshorability seems clear, Figure 4b shows that differences between the most routine workers in offshorable and non-offshorable occupations are not statistically significant. Thus, we can reject the null hypothesis of hypothesis 2 only partly. Offshorability increases the pro-immigration attitudes among the workers in low-routine occupations, but there seems to be no increase in anti-immigration attitudes associated with offshorability among the high-routine workers.

Our results suggest that task routineness of an occupation is strongly correlated with how people see the economic effects immigration. They also suggest that task routineness is conditioned by offshorability, but people in occupations that are more exposed to global economy are in general more – not less – confident of the positive economic effects of immigration.

However, another side of the story is that globalization might indeed increase polarization in attitudes between occupational groups. The subgroup of people we identified as "globalization winners" has clearly the most positive view of the economic effects of immigration. The differences in attitudes between workers who supply high routine and low routine tasks are much lower in the non-offshorable occupations.

Robustness checks

We run a number of sensitivity checks to test our results. We describe the results in Table 2. To save space, we present only the coefficients for offshorability, task routineness and their interaction. All the models include the same controls as the Model 5 in Table 1 if not stated otherwise.

[Table 2 about here.]

We start by adding controls for the worker's industry using the 2 digit NACE classification that our data provides (Model 1). Adding industry controls hardly effects the coefficients, which suggests that occupational characteristics are to a large degree independent from the sector of employment. Unfortunately, the NACE classification changes twice during our time period, which means we have slightly different industry controls for different waves. However, limiting our scope only to the last three waves

(2010, 2012, 2014), which use the same NACE classification confirms that our results are not dependent on industrial level factors.

Even if in Table 1 we show that the occupational characteristics matter, it is possible that our approach captures some other confounding characteristics that are not related to the threat of automation and offshoring. We try to mitigate these concerns by adding controls for the two most obvious competing theories: labour market competition from immigrants and deindustrialization. In Model 2, we include the percentage of foreign workers in each occupation in each country to test whether the ones facing more competition from foreign workforce are most sceptical about immigration. The data is far from perfect as it comes from the OECD DIOC database, which is based on censuses from year 2000 and provides information on ISCO 3 digit level. However, we believe it is reasonable to assume that the changes in the type of employment of foreign workforce have not changed radically. All the coefficients of interest stay highly significant after including the control in the model and the control itself is positive and almost significant at the 95 percent confidence level. If anything, the high percentage of foreign workers in one's occupation is more likely to increase positive feelings toward immigration and not the other way around. In model 3, we add a dummy for production workers based on (Oesch 2006) classification. The dummy is highly significant and negative, which means that production workers are on aggregate level more sceptical about immigration. The coefficients on offshorability and task routineness stay fairly unaffected, but the interaction term loses its statistical significance. We are not too concerned about this, as production workers are exactly the ones that could be described as "globalization losers" in our framework (the task routineness and offshorability of the production related occupations are substantially higher than the average in our sample). Therefore, the control is most likely a redundant variable, whose information is already contained.

Next, we use different measures of offshorability and task routineness. Model 4 employs the (Blinder 2009) offshorability scale as a continuous variable and Model 5 takes both scales from (Goos et al 2014), which uses ISCO 2 digit classification. Because of different scaling, the size of the effect is not comparable to our original model, but most importantly both models are statistically significant and the direction stays the same.

In models 6 to 14, we add new controls from ESS and use different set of countries, waves and observations. Using all 32 countries in the survey (Model 6) reduces the size of coefficients as expected (remember that in our model rich countries should enjoy higher comparative advantage in routine tasks), but does not change the big picture. Adding controls for self-placement on the left-right scale (Model 7), work contract type (Model 8), which can be used as a proxy for labour market outsiderness (Thewissen and Rueda 2017) and the type of organization one works for (Model 9) do not make a difference. Dividing the sample into two periods – roughly pre and post-financial crisis – (Models 10 and 11) reveals that explanatory power of the occupational characteristics might have grown slightly over time. Running the regressions separately for young workers and old workers (Models 12 and 13) shows that occupational characteristics seem to be associated with immigration attitudes especially among the former. This might be due to a number of factors. Firstly, the difference between routine and non-routine workers might be more pronounced among the generations that are in general more international and more prone to adapt new technologies. Secondly, as Kitschelt and Rehm (2014) argue, occupations shape individuals' preferences. Old workers are more likely to be affected by this occupational socialization process, whereas younger workers are not. When we restrict our sample to those workers who find it difficult or very difficult to live comfortably on current income, an interesting pattern emerges. The other coefficients lose significance and power, but the size of the interaction term coefficient increases. This implies that our model really proxies economic concerns associated with labour market risks and opportunities, and not some other occupational characteristics.

In models 15 to 20, we test how our results survive different methodological approaches.[12] Multilevel models take into account the hierarchical nature of the data – for example, individual level observations are nested within countries. One could also claim that individuals are nested within occupations, which are nested within industries, which in turn are nested within countries (even though this line of reasoning ignores the global value chains, which should affect the occupations in spite of the country and industry level characteristics). In model 15, we estimate a multilevel model with random intercepts, for countries. In model 16, we fit two-level mixed model with random intercepts both at country and industry-within-country levels (years 2010-2014, because of the NACE restrictions). In model 17, we run the same model, but replace industries with occupations. In model 18, we fit three-level mixed model with random intercepts for countries, industries and occupations. All multilevel specifications show very similar results to our main model. In models 19 and 20, we account for the fact that standard errors could be correlated on industry or occupation level instead of country level. In both specifications the results stay rather unchanged except for the fact that in model 20 the statistical significance of the interaction term drops just below the 95 percent confidence level ($p = 0.054$).

Finally, we test our model using slightly different independent variables associated with immigration attitudes and attitudes toward redistribution. In models 21 to 25, we use the following questions on the left hand side of the regression: "country's cultural life undermined or enriched by immigrants" (21), "immigrants make country worse or better place to live" (22), "country should allow many/few immigrants from the same race/ethnic group as majority" (23), "country should allow many/few immigrants of different race/ethnic group from majority" (24), "country should allow many/few immigrants from lesser developed economies outside Europe" (25).[13] The coefficients on offshorability and task routineness differ little from our main model, which is what we would expect, given the fact that people who dislike one aspect of immigrants/immigration tend to be aversive of other aspects too. The interaction term is only

[12] We stick to our main model, because Monte Carlo simulations suggest that multilevel models would require at least 25 countries in linear models (Bryan and Jenkins 2016). We cluster the standard errors at the country level, because the country level differences in take up of automation, welfare policy and institutions affect attitudes toward immigration. Clustering is usually done at the bigger and more aggregate level when possible even when it leads to too few clusters (Cameron and Miller 2015).

[13] The first two use the same scale as the variable in our main model. The last three ask whether a country should allow many, some, a few or none immigrants (to come and live here).

statistically significant at the 95 percent confidence level in one of the models (23). While we should not put too much emphasis on models that have little statistical significance, the fact that the interaction term has no correlation with questions that measure racial or ethnical prejudice or cultural anxiety, gives support to the argument that our model really proxies *economic* anxiety. This argument gets further support from model (26) where we use the question "government should reduce differences in income levels" as the independent variable. Once again, the pattern stays the same. People in the offshorable occupations tend to disagree with the statement, while people in routine occupations tend to agree. The interaction terms shows that the differences are more pronounced among the people in offshorable occupations.

Taken together, the sensitivity checks imply that the coefficients on offshorability and task routineness are remarkably robust to different specifications. While the interaction term does not survive all of the robustness tests, it lacks statistical significance only in a few models. We have no reason to assume that these models are enough to obliterate the countering evidence from the other specifications.

Conclusions

In this paper, we have studied how occupational characteristics are associated with immigration attitudes in 16 Western European countries. More specifically, we have examined whether the labour market vulnerabilities and prospects – measured in terms of occupational task routineness and offshorability – increase probability of having anti-immigration attitudes. To our knowledge, this is the first paper to examine the association between task routineness, offshorability and immigration attitudes in Europe. Similarly to papers studying trade preferences (Owen & Johnston 2017) and demand for social protection (Walter 2017), our study suggests that the exposure to globalization has conditional effect on immigration attitudes

We find that people whose occupational task content is high have more negative views on immigration regardless of their education and income. While we cannot overrule that this is due to selection bias to these occupations, previous literature (e.g. Geraci et al 2017) suggests that exogenous variation in labour market risks has causal effect on immigration attitudes. These risks are not necessarily associated as much with present income as they are with the likelihood of occupational job replacement and the potential earnings losses and occupational unemployment caused by technological change.

Contrary to our expectations, occupational offshorability is not associated with lower income or more negative immigration attitudes. Workers in offshorable occupations have approximately higher income are more likely to embrace the economic effects of immigration. However, the effect of offshorability is conditional on the routine task content of one's occupation. People in occupations that are both non-routine and offshorable are substantially more welcoming toward immigration than the working age population generally. As the task content of one's occupation increases, the differences between people in offshorable and non-offshorable occupations starts to shrink leading to a state where the differences are no longer statistically significant.

The fact that people in offshorable occupations are generally more welcoming toward immigration signals that the fragmentation of the production chains and the so-called "trade in tasks" does not necessarily lead to more anti-immigrant attitudes at the occupational level. This is generally in line with the long-term development of immigration attitudes in Europe. In spite of the intensification of international trade, offshoring and fragmented production chains, the attitudes toward immigrants have become more positive over time on aggregate level. On the other hand, our results suggest that differences in immigration attitudes between routine and non-routine workers become more polarized as offshorability increases. We argue that this polarization reflects the distributional consequences of globalization at the occupational level. This might be due the fact that offshoring increases the skill premium between workers (e.g. Hummels et al 2014).

Our results are encouraging in a sense that they propose that occupational offshorability is not directly responsible for scapegoating immigrants. Then again, it seems that globalization might increase biases and bubbles between those, who benefit the most from international trade and those, whose relative status declines. From this point of view, our study supports the hypothesis that occupational differentiation may explain the micro-logic of political polarization (Kitschelt and Rehm 2014). This kind of polarization might increase political tensions and segmentation within countries even if majority of the population benefits from economic integration. The most likely beneficiaries are radical right parties, who are the *issue owners of sociocultural issues like immigration* (Roodujin and Burgoon 2018, 1747) and whose support base consists of disproportionally big amount of workers in routine occupations.

Figures and Tables

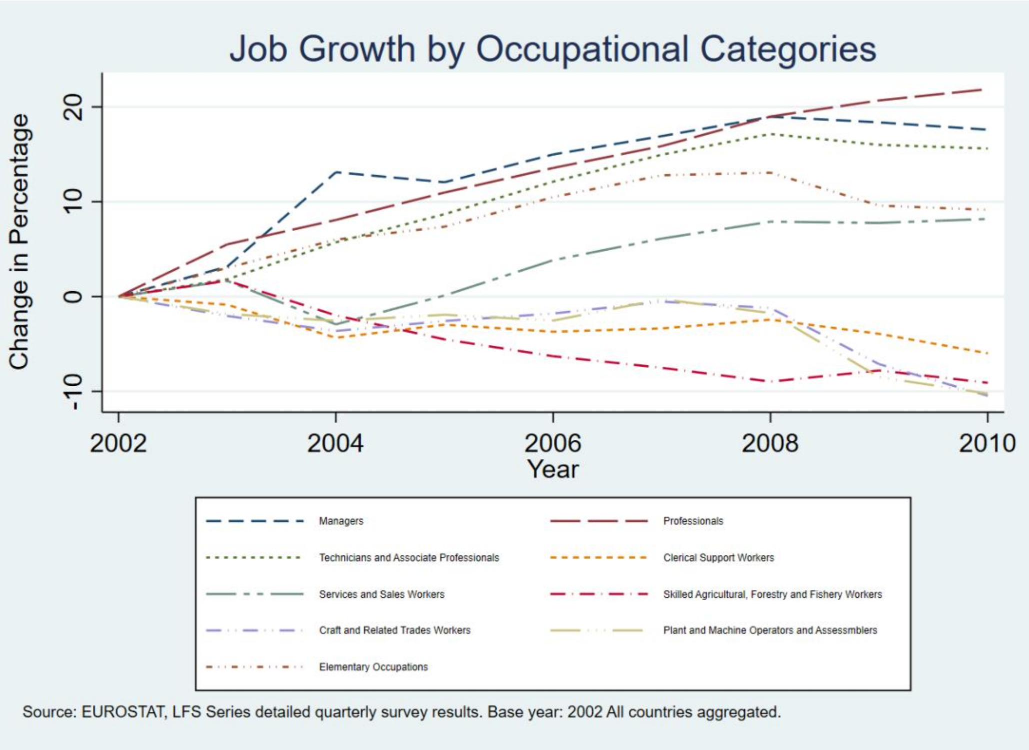

Figure 1. Job growth by occupational categories in 16 European countries between 2002 and 2010.

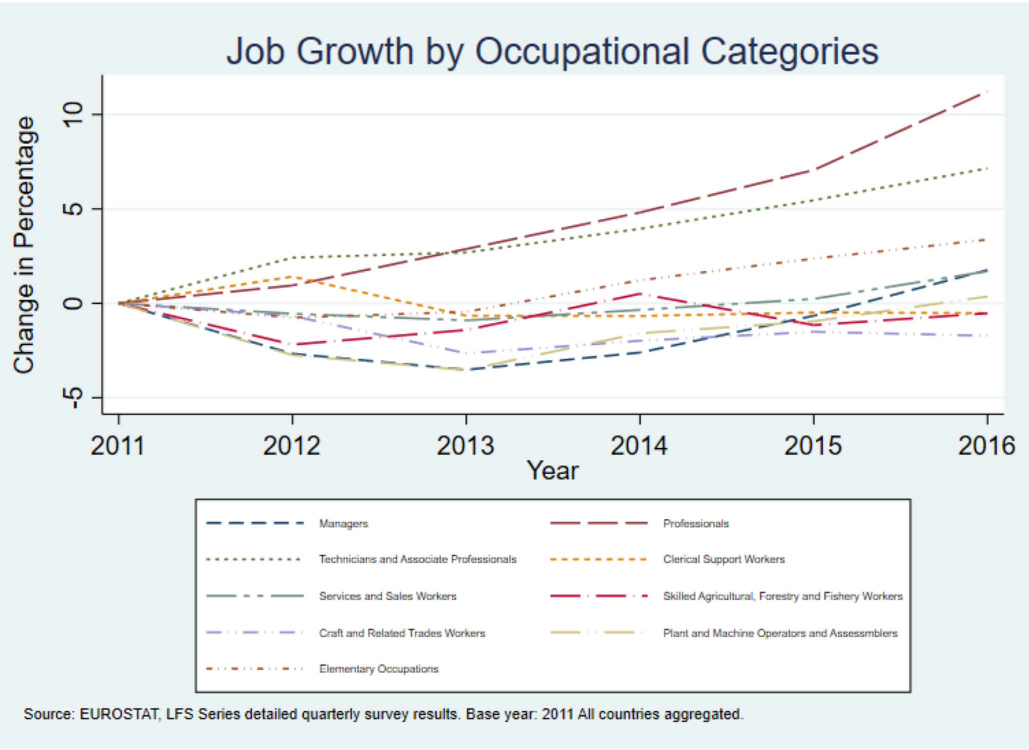

Figure 2. Job growth by occupational categories in 16 European countries between 2011 and 2016.

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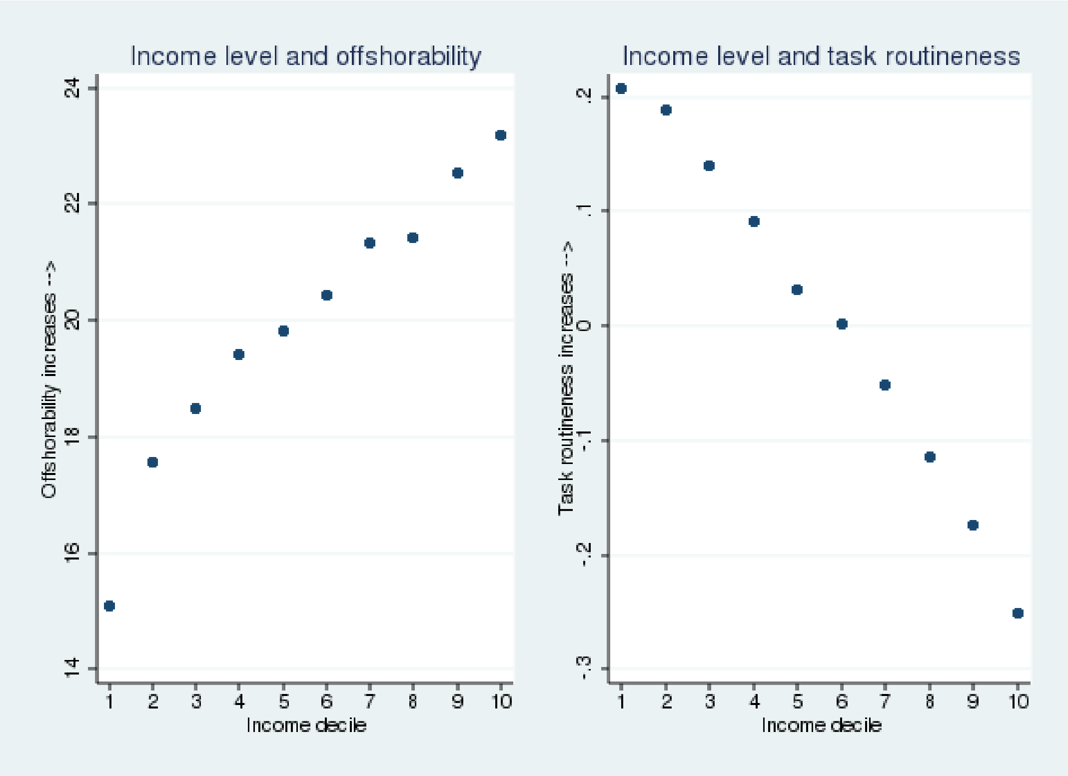

Figure 3. The average measure of offshorability and task routineness in different income deciles

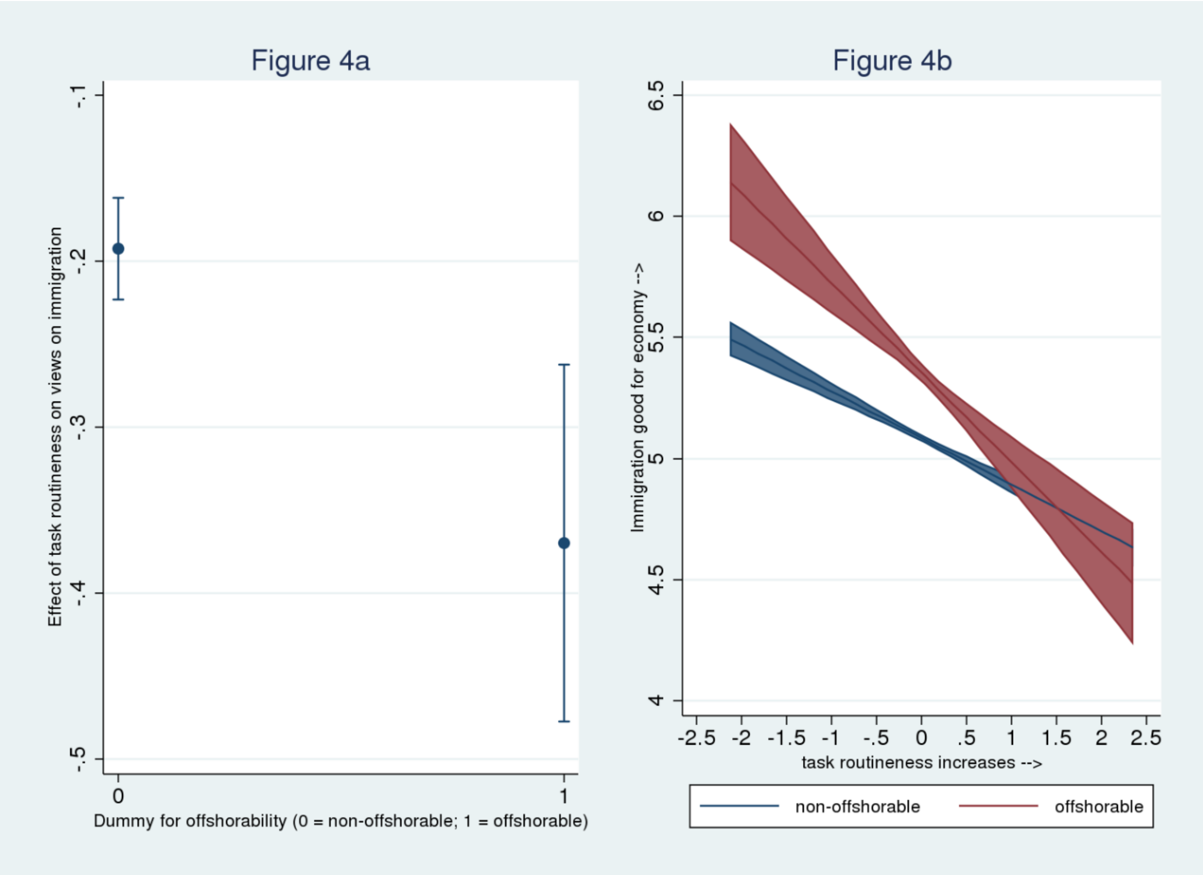

Figure 4. Predicted probabilities of task routineness on attitudes toward immigration in non-offshorable and offshorable occupations. 95 percent confidence intervals. Figures based on the Model 5 in Table1.

Table 1. Regression results. Immigration is bad or good for country's economy.

	Model 1	Model 2	Model 3	Model 4	Model 5
Offshorable	0.359***	0.419***	0.243***	0.221***	0.173***
	(0.042)	(0.036)	(0.028)	(0.019)	(0.017)
Routine task index	-0.641***	-0.602***	-0.292***	-0.267***	-0.192***
	(0.042)	(0.042)	(0.031)	(0.024)	(0.014)
Offshorable X Routine task index		-0.271***	-0.148***	-0.163***	-0.178***
		(0.040)	(0.036)	(0.049)	(0.050)
Age			0.008***	0.008)***	0.007***
			(0.002)	(0.002)	(0.002)
Gender			-0.354***	-0.354***	-0.286***
			(0.034)	(0.040)	(0.034)
Not minority group			-0.875***	-0.847***	-0.849***
			(0.087)	(0.101)	(0.134)
Education			0.135***	0.132***	0.113***
			(0.017)	(0.018)	(0.014)
Income				0.059)***	0.018***
				(0.008)	(0.005)
Satisfied with the economy					0.195***
					(0.013)
Trust in people					0.200***
					(0.009)
Income insecurity					-0.073***
					(0.016)
Constant	5.166***	5.180***	4.270***	3.884***	2.528***
	(0.068)	(0.068)	(0.241)	(0.301)	(0.183)
Country and year controls	Yes	Yes	Yes	Yes	Yes
Controls for the main activity	No	No	Yes	Yes	Yes
R^2	0.05	0.05	0.11	0.12	0.20
N	109 836	109 836	108 265	91 182	89 353

Data: European Social Survey waves 2002-2014. Pooled ordinary least squares (OLS).

* p<0.1; ** p<0.05; *** p<0.01

Table 2. Robustness tests.

Model		Offshorable	Routine Task Index	Offshorable X Routine Task Index
(0)	Main model from Table 1	.173***	-.192***	-.178***
(1)	Industry controls	.153***	-.182***	-.158***
(2)	Foreign-born in occupation (ISCO 3)	.153***	-.199***	-.118***
(3)	Production workers	.159***	-.170***	-.097
(4)	Offshorability continuous	.003***	-.190***	-.003***
(5)	Offshorability + RTI (ISCO 2)	.141***	-.070***	-.152***
(6)	All 32 countries	.116**	-.118***	-.147***
(7)	Left-right scale	.163***	-.183***	-.184***
(8)	Work contract type	.153***	-.197***	-.153***
(9)	Type of organization (2010-2014)	.199***	-.171***	-.212***
(10)	First 4 waves	.166***	-.204***	-.148**
(11)	Last 3 waves	.186***	-.184***	-.219***
(12)	Young workers (40 or under)	.222***	-.144***	-.342***
(13)	Old workers (over 40)	.134***	-.213***	-.068
(14)	Worried about household income	.037	-.115**	-.282**
(15)	Multilevel: country	.173***	-.192***	-.178***
(16)	Multilevel: country + industry (2010-2014)	.158***	-.168***	-.180***
(17)	Multilevel: country + occupation	.220***	-.294***	-.166***
(18)	Multilevel: country + industry + occupation (2010-2014)	.171***	-.258***	-.221***
(19)	Standard errors clustered by industry (2010-2014)	.185***	-.185***	-.220***
(20)	Standard errors clustered by occupation	.173***	-.192***	-.178*
(21)	Immigration: culture	.112***	-.258***	-.106
(22)	Immigration: better place	.101***	-.196***	-.086
(23)	Immigrants: same race	.037**	-.076***	-.037***
(24)	Immigrants: different race	.045***	-.097***	-.022*
(25)	Immigrants: poorer countries	.022***	-.087***	-.019
(26)	Attitudes toward redistribution	.083***	-.056***	-.132***

Data: European Social Survey waves 2002-2014. Pooled ordinary least squares (OLS).

* p<0.1; ** p<0.05; *** p<0.01

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Appendix

Table A1. Descriptive statistics for key variables

Variables	Observations	Mean or %	Std. Dev.	Min	Max
Immigration good or bad for economy	140 725	5.24	2.34	0	10
Routine task index	130 847	.01	.60	-2.12	2.49
Offshorable	112 563	.22	.42	0	1
Age	144 014	40.85	13.7	15	64
Gender	143 974	1.51	.50	1	2
Not a minority group	143 036	1.95	.21	1	2
Education	142 895	13.28	3.81	0	56
Income (decile)	116 719	5.81	2.81	1	10
Satisfied with the economy	141 774	5.06	2.44	0	10
Trust in people	143 745	5.56	2.23	0	10
Income insecurity	140 048	1.79	.79	1	4