NOVEMBER 2018

Working Paper 156

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Wiener Institut für Internationale Wirtschaftsvergleiche

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Research for this paper was financed by the Anniversary Fund of the Oesterreichische Nationalbank (Project No. 16732). Support provided by Oesterreichische Nationalbank for this research is gratefully acknowledged.

Abstract

This paper investigates with a joint approach the impact of immigration and different measures of 'offshoring' on the labour demand and demand elasticities of native workers in four different occupational groups: managers/professionals, clerks, craft workers and manual workers. It shows that of all measures of globalisation considered immigration has the most consistent and strongest negative effect on the employment of native workers, particularly on managers/professionals, clerks and manual workers. The employment effects of offshoring differ by the measure used and are positive for craft workers but, in contrast to what is typically found in the literature, negative for the high-skilled group of managers/professionals. Furthermore, immigration and offshoring both impact on natives' labour demand elasticities but the effect differs by occupational group. Thus, while the immigration of craft workers reduces labour demand elasticities for native craft workers, the immigration of managers/professionals and clerks has the opposite effect on native workers in the same occupations. Furthermore, we test for cross effects of migration and outsourcing between the different occupational groups.

Keywords: offshoring, immigration, labour demand, labour demand elasticity, occupations

JEL classification: F16, F22, F66

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1. Introduction

This paper sheds light on the effects of different measures of offshoring and immigration on labour demand and labour demand elasticities of native workers in a sample of Western European countries between 2005 and 2014. In the context of the current discussion on the impact of international integration on advanced countries labour markets both international of-shoring (see e.g. Autor et al., 2013) and migration (for an overview of the vast literature in this area, see e.g. Docqier et al., 2014) have played major roles.

The paper contributes to the existing literature on several accounts. First, it simultaneously looks at the effects of immigration and offshoring (as an important factor of 'globalisation') on the labour demand and demand elasticities of native workers. Traditionally, offshoring and immigration are analysed separately which renders a comparison of the impact of these two factors impossible. The joint analysis of both forces of globalisation therefore allows us to determine their *relative* importance for changes in native employment and identify the underlying globalisation force with the strongest effects. Second, it focuses on the labour demand of native workers in four different occupational groups: managers/professionals, clerks, craft workers and manual workers. Our occupation-based analysis therefore allows us to identify those professional groups that are either favoured or detrimentally affected by the two factors of international integration (i.e. migration and offshoring). Similar to native workers, we also differentiate migrant workers by type of occupation. This allows us to determine any immigration-induced employment (and employment-elasticity) effects when migrants and natives actually compete for the same jobs. The use of occupational categories rather than distinguishing workers by their educational attainment levels (as done in almost all research so far) avoids the potential bias inherent in educational attainment-based analyses which arises from the non-negligible job-skill mismatch that is typical among migrant workers and the underutilisation of their skills in jobs that require little qualifications. Third, in addition to own-effects of immigration and of offshoring our analysis also sheds light on the more complex cross effects of immigration and offshoring. In particular, we not only determine how immigrants of a particular occupation affect employment prospects of native workers in the same occupation, but also show how immigrants of each of the other of the four types of occupations affect employment (and employment elasticities) of native workers of a particular occupation. Similarly we check on the cross effects of offshoring. Our analysis also investigates whether there are differences in the impact of offshoring in manufacturing as compared to services activities and also whether offshoring takes place towards other developed economies (EU and non-EU) or towards developing economies. Furthermore, we distinguish between 'narrow' (intra-industry imports of intermediate inputs) and 'broad' (imports of intermediates from other industries) offshoring (see also Hijzen and Swaim, 2010, and Foster-McGregor et al., 2016) with the first referring to imports of intermediate inputs within the same industry while the latter includes imports of intermediate inputs in all other backwardly linked industries.

Summarising the principal results, we show that of all the three globalisation measures considered immigration has the most consistent and strongest negative effect on the employment of native workers. This has in parts to do with our industry classification which is rather broad (e.g. we could not differentiate amongst different branches of manufacturing) and includes many sectors that are traditionally classified as 'non-tradable'. Thus while the impact of 'off-shoring' is in the first instance felt by tradable activities, migration flows are present in both tradable and non-tradable sectors. With respect to the different occupational groupings, the analysis shows a negative employment impact of immigrant workers on native workers in three of the occupational groupings (managers/professionals, manual workers and clerks) but a positive impact and thus a complementarity between native and immigrant craft workers.

As regards employment effects of offshoring, our results show the expected negative results for narrow offshoring but positive results of broad offshoring which reveals the cost-reducing (variety enhancing) effect of broad offshoring on output and employment. Furthermore, in contrast to what is typically found in the literature[1], the negative employment effect of 'narrow offshoring' is significant only for the high-skilled group of managers/professionals. This result suggests that, on the one hand, as a result of improvements in ICT, tasks of managers/professionals become increasingly offshorable and that, on the other hand, managers/professionals are also the most internationally mobile, following the offshoring activities of their firms. In contrast, the positive impact of broad offshoring is strongest for craft workers, which supports the hypothesis of differentiated international task specialisation which benefits the group of (skilled) crafts workers in particular.

Our analysis of the impact of immigration and offshoring on employment elasticities reveals interesting differences across occupations. As concerns the employment elasticity effects of immigration, we find that immigration of craft workers reduces both labour demand and labour demand elasticities for native craft workers. This finding indicates that foreign labour substitutes for native workers but that the remaining native craft workers gain bargaining power which lowers their demand elasticities. The opposite is observable for native clerks and managers/professionals where both labour demand and labour demand elasticities tend to increase as a result of the inflow of migrants into the respective occupations. Thus, for these occupations there is evidence that immigrant and native workers are complements but that the expansion of employment goes along with a loss of bargaining power and higher demand elasticities.

Furthermore, narrow offshoring tends to reduce both labour demand and labour demand elasticities for manual workers. Hence, for manual workers whose jobs are offshored the most, the jobs that continue to be performed by native workers become less sensitive to wages due to a gain in bargaining power of workers in 'less offshorable jobs'. In contrast, for managers/professionals both labour demand and labour demand elasticities tend to increase as a result of narrow offshoring. This suggests that offshoring which might generate further coordination activities in the home country and thus has a positive direct employment effect for managers/professionals also widens the scope for the international allocation of managerial activities and thus makes employment possibilities more sensitive to managerial/professional salary changes.

The study also reveals complex cross effects across occupational groupings (i.e. how immigration in one occupational group affects labour demand and labour demand elasticities in other occupational groupings; and the same with respect to the impact of how offshoring activities of a particular type of occupation affects other occupational groups) as well as the differentiated impact of offshoring in manufacturing or in services.

The rest of the paper is structured as follows. Section 2 gives a brief overview of theoretical arguments and international empirical evidence in the related literature. Section 3 discusses the methodological approach and the various data sources used in the analysis. General patterns of offshoring and migration intensity differentiated by country and industry are discussed in section 4. Results of our econometric analysis are presented and discussed in section 5. Finally, section 6 summarises and concludes.

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1 See, e.g., Hijzen et al. (2005); Foster-McGregor et al. (2013); Bramucci (2016).

2. Related literature

2.1. THEORETICAL CONSIDERATIONS

The theoretical set-up underlying the analysis conducted in this paper follows quite closely the framework suggested by Hijzen and Swaim (2010) who, in turn, rely on Hamermesh (1993). However, while Hijzen and Swaim apply the basic framework of Hamermesh to studying the impact of offshoring, we further extend it to analyse the impact of both offshoring and migration and also include cross effects of how labour demand and labour-demand elasticities of different occupational groups interact.

The basic idea of analysing the impact of the different factors of international integration on labour markets is the following: there might be a direct effect of 'competition for jobs': certain jobs get transferred abroad through 'offshoring' and hence employment levels of workers in the 'home country' declines. Similarly, migrants might directly compete for jobs formerly taken by native workers and these suffer an employment decline. These are direct *'substitution effects'*. However, there are also – what the literature calls – *'scale effects'*, which result from the positive output or productivity effects which the cost advantages of importing intermediate inputs or the hiring of migrant workers might imply and that show up in a better competitive position on product markets. These cost advantages might simply be a price effect (i.e. sourcing more cheaply the same type of inputs) or a 'variety' effect as imports of intermediate inputs widen the range of intermediates that can be used in production and this provides a productivity boost. The same can be said about migrants: they might be either 'perfect substitutes' for native workers but willing to work at a lower wage – in which case it would be simply a price effect – or they might supply somewhat differentiated 'skills' that allows the exploitation of increased task specialisation (see also Ottaviano and Peri, 2008) and this adds some complementarity benefit to native workers even in the same occupational category.

The analysis of 'scale effects', furthermore, has to distinguish between the impact on output or on productivity. In the econometric specification, we shall control for output variation and thus try to isolate the productivity effect which would – at a constant level of output and in the simple case – lead to a negative employment effect of both outsourcing as well as migration. However, such a negative productivity effect on factor demand – at constant level of output – would only be the uniquely determined outcome in a situation in which imported intermediate inputs are homogenous with respect to domestically produced inputs; similarly with respect to the use of immigrant workers in relation to native workers. In a setting in which, however, there is an 'increase in variety' through the use of intermediate inputs or of immigrant labour as is customarily assumed in most 'new growth' and 'new trade' models that rely on a monopolistic competition framework (see e.g. Romer, 1991; Grossman and Helpman, 1991) such productivity-enhancing effect of offshoring and of employing migrant labour do not have to lead to employment reductions – at constant levels of output – of the native labour force, or – at least – can modify the negative impact on employment of native workers.

Let us move on to the impact of offshoring and migration on the elasticity of labour demand (i.e. to which extent labour demand reacts to wage changes). This point has initially been made by Dani Rodrik (1997) in his book '*Has Globalisation Gone Too Far*'. He conjectured, without a strong theoretical treatment of this issue, that ‘globalisation’ weakens the bargaining power of native workers, as the shift of jobs abroad or even the threat that jobs might be shifted abroad, would reduce the bargaining power of workers. This would imply an increase in the elasticity of labour demand which amounts to a flattening of the labour demand schedule (i.e. stronger quantity reaction to a price change). The same can be argued with respect to the inflow or the possibility of an inflow of an immigrant work force. In our analysis, we shall give this argument a new twist: outsourcing is a process that also implies a complex readjustment of a country in terms of ‘intra-industry’ or ‘task’ specialisation (see Grossman and Rossi-Hansberg, 2008; Costinot and Vogel, 2010; Ottaviano et al., 2013) and also of occupational structures within an industry as well as across industries within a country. Such readjustment opens up the possibility that international integration might not necessarily lead to an increase, but also to a decrease in the elasticity of labour demand, at least in the longer-run. The reason is that a new intra-industry or inter-industry specialisation of tasks might strengthen the position of those workers whose jobs remained in the country (or of native workers who retained their jobs) as they gain from a ‘specialisation advantage’ with regard to the jobs or tasks they carry out within an international division of labour. We shall see that in our empirical analysis, we do indeed find instances of both negative as well as positive effects on labour demand elasticities of different occupational groups with regard to offshoring and migration.

We should add one more dimension to the analysis: the role of price elasticity on the output markets and its link to the demand elasticity on factor markets. The ‘scale effect’ that we mentioned above depends also very much on the impact of international integration on the ‘price elasticity’ on output markets. The standard assumption here is that more international competition increases the price elasticity on output markets (see e.g. Levinsohn, 1993) and such increased price elasticity gives employers less room for manoeuvre and this then affects employer-employee relationships and thus increases the elasticity of labour demand[2]. The relationship between price elasticity on product markets and factor demand elasticities has been analysed already by J.R. Hicks in his book *Theory of Wages* (Hicks, 1963) and later established in a number of contributions (such as Slaughter, 2001; Krishna et al., 2001; Panagariya, 2000; Fajnzylber and Maloney, 2005). But here again, there might be a modifying factor, in that international product market integration might provide an incentive to producers towards more product differentiation. This might even allow an increase in mark-ups in the different product market segments (that is if product differentiation reduces the number of suppliers in their product market segment; it furthermore depends on cross-product substitution elasticities). This in turn could increase the scope for employees to bargain over ‘rents’ i.e. a share of such mark-ups. Thus again, while the simple model of increased product market competition would indicate increased price elasticities when an economy ‘opens up’ (which increases intra-industry trade flows) and this would lead to an increase in employment elasticities, increased product differentiation could also counter-act or modify this impact.

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2 Hijzen and Swaim (2010) and Senses (2010) show, furthermore, that the impact of off-shoring (and we can argue the same with respect to immigration) is theoretically ambiguous. Making use of the decomposition of the determinants of the labour demand elasticity into a substitution (between factors of production) and a scale effect, the impact of an increase in the (constant output) substitution elasticity and a reduction in the cost share of a particular factor will have opposite effects on the total elasticity of labour demand: the latter dampens the scale effect. If the price elasticity of product demand is large relative to the elasticity of substitution in production, then offshoring can reduce the labour demand elasticity, rather than increase it. In our case, offshoring combined with international changes in task specialisation can affect the cost shares of different types of labour in many ways and this is particularly relevant in the context of our analysis differentiating between different types of occupations. The analysis also applies with respect to changes in work allocations between migrants and natives as a result of immigration flows that show particular occupational compositions.

2.2. RELATED EMPIRICAL LITERATURE

We can distinguish in the first instance two types of studies: those that look at the impact of various forces of 'globalisation' on employment taking the slope of the labour demand schedule (i.e. the employment elasticity) as given and those that also consider a change in the slope, i.e. an impact of globalisation on employment elasticities. The latter has been first raised by Rodrik (1997) and then explored in many studies dealing with trade integration more generally and off-shoring specifically. With regard to the impact of migration on employment, we could not find any studies that also considered the impact on employment elasticities, although many studies cover the impact on employment in great detail.

Let us review some of the studies and also mention in which way our study might add to the available literature.

The first study picking up Rodrik's interest in the impact of 'globalisation' on employment elasticities was that of Slaughter (2001). Slaughter's study used industry data for US manufacturing and estimates separate effects on employment elasticities for production and non-production workers. He finds significant time trends in employment elasticities for both types of labour: nonetheless, employment elasticities became markedly more elastic for production workers from the late 1970s to the early 1990s, while this was not the case for non-production workers. However, his study could not attribute these trends directly to trade variables. Krishna et al. (2001) studied the impact of trade liberalisation in Turkey over the years 1983 to 1986 when strong tariff reductions took place, Their study included data on 10 3-digit industries and confirmed the impact of trade liberalisation on mark-ups which points to increased competitive pressures on product markets (see also Levinson, 1993). However they did not find evidence for an impact on labour demand elasticities. Bruno et al. (2004) analyse an industry panel for a number of industrialised countries including major European countries, Japan and the US for the period 1970-1996. They find a significant effect of import penetration on labour demand elasticities only for the United Kingdom. For Italy and France the evidence is mixed and for the remaining countries they found no evidence that trade integration has significantly affected labour demand elasticities. Similarly, Bruno et al. (2005), using a 31 sector industry breakdown for Italy, find that Rodrik's conjecture could not be corroborated. Hasan et al (2006), in a study on India, used industry level data disaggregated by states. It is one of the first studies that include also variation in the extent of labour market regulation (across states) when examining the impact of trade reforms on labour markets. They found that trade liberalisation increased labour demand elasticities. Furthermore, the absolute level of these elasticities were lower in states and industries with higher levels of protection. They were higher in Indian states that had more flexible labour regulations and these were also more impacted by trade reforms.

Görg and Hanley (2005) is the first study that used plant level data to examine the impact of the fragmentation of production on labour demand using data on outsourcing within the Irish electronics industry. This covered a number of sub-industries within electronics comprising both manufacturing and service activities. Their analysis estimates only short-run effects of outsourcing on employment and these are negative at the plant level. Furthermore, they find stronger effects from outsourcing materials than from services outsourcing. Fajnzylber and Maloney (2005) study the impact of trade liberalisation in Mexico (1984-1990), Chile (1979-1985) and Columbia (1977-91), also using plant-level data. For Mexico, where trade liberalisation was accompanied by a strong depreciation of the real exchange rate, they do find a significant effect on labour demand elasticities, while the same was not the case for Chile and Columbia. Senses (2010) used detailed plant-level data for US manufacturing to analyse the relationship between offshoring and labour demand elasticities over the period 1972-2001. He finds that conditional demand elasticities for production workers are positively related to increased exposure to offshoring both in the short-run and in the long-run. Controlling for skill-biased technical change does not affect the magnitude or significance of this relationship. Senses concludes that the advantage of plant-level (compared to industry level) analysis is that it allows 'identification of within industry movements in relative employment and relative wages due to offshoring, as well as [capturing] plant-level characteristics that affect the ease with which foreign labour can be substituted for domestic labour' (Ibid, p. 98).

Finally we come to Hijzen and Swaim (2010) and Foster-McGregor et al. (2016), both studies most closely related methodologically to our own (see section 3). Both these studies use industry-level data, Hijzen and Swaim relying on the OECD's STAN database, Foster-McGregor et al. on the more recently released WIOD database. Hijzen and Swaim find a significant cross-sectional association between higher average offshoring intensity and higher labour demand elasticity, but no such positive association over time between the increases in offshoring and demand elasticity experienced during the second half of the 1990s. Hijzen and Swaim also examine the impact of employment protection and find that strict employment protection legislation weakens the cross-sectional association between offshoring and higher labour demand elasticity. Foster-MacGregor et al. (2016) examine the impact of offshoring (using the same indicators that we use in the present paper) on labour demand elasticities over the period 1995-2009 for a sample of 40 economies. They differentiate the labour force by educational attainment levels (low, medium and high) based on ISCED – as compared to our analysis that is based on occupational (ISCO) categories. The econometric specification is similar to ours except that we examine jointly the impact of migration and offshoring on labour demand and labour demand elasticities. They find that offshoring impacts negatively on labour demand, in particular the demand for low- and medium-educated workers, and obtain some evidence that offshoring has also increased labour demand elasticities. Differentiating between sub-samples of developed and developing economies, they find that the negative effects of offshoring in developed countries are the strongest for high-educated employees which they trace back to the impact of offshoring by developed economies to other developed economies.

The literature of the impact of immigration on labour markets is vast and it makes no sense to review it here (for a recent assessment of this literature see Dustmann et al., 2016; see also an earlier meta-study by Longhi et al., 2010). As mentioned earlier, we found no studies directly estimating the impact of immigration on changing employment elasticities, while this topic was analysed in the trade and offshoring literature, although there are studies analysing the determinants of differentiated employment elasticities (such as the study by Monte et al., 2017, that analyses patterns of within country mobility across local Spanish labour markets).

As our focus was the joint estimation of the impact of both 'forces of globalisation' i.e. international migration and offshoring, on labour markets we shall here refer only to the very interesting papers Ottaviano et al. (2013 and 2016). In both papers, Ottaviano et al. look at complementarity and substitutability effects between offshoring and migration and locate their analytical framework within the context of task allocation (amongst workers), task specialisation and 'trade in tasks' (see Grossman and Rossi-Hansberg, 2008). In the first of these papers (Ottaviano et al., 2013), the authors are, like in our paper, interested in the employment effects of immigration and offshoring on native workers. They explore the impact of falling offshoring and immigration costs: this brings out, first of all, the impact of offshoring on domestic jobs, involving both productivity/scale and substitution effects. It also brings out the trade-off between off-shoring and migrants jobs, and what such fall in immigration and offshoring costs does to the task specialisation between migrants, natives and off-shore workers. In this paper, the authors use US data on immigrants and natives employment and information on offshore workers by US multinational affiliates for the period 2000-2007; furthermore they attempt to capture task specialisation by using information regarding the 'complexity' of tasks to be performed in particular jobs. In the second paper (Ottaviano et al., 2016), the analysis is further extended to explore the relationship between trade in services (imports and exports) and immigration on the basis of UK firm-level data and other data sources. The paper focuses on services producing firms, concentrating on services in which local knowledge (about legal norms, institutional settings and language) might be particularly important. This brings out the trade-stimulating role that immigrants from a particular country can have for trade with that country. Immigration can have a number of impacts in this context: an 'import substitution' effect and various 'export promotion' effects (through productivity improvements and the saving of trade costs).

The short literature review shows the importance of empirical work, as offshoring and migration can interact in various ways in terms of their impact on employment. Our study attempts to follow up these differentiated impacts and adds to the literature by analysing effects on both employment and employment elasticities and differentiating by occupational categories of employees.

3. Methodological approach and data

3.1. THE MODEL

In order to shed light on industry-level labour demand, we employ the log-linear model of labour demand (Hamermesh, 1993). More specifically, closely following Hijzen and Swaim (2010), we focus on the conditional labour demand model, where the profit-maximising level of labour demand is determined by minimising production costs conditional on output. In this sense, we therefore determine the technology-effect of offshoring and migration, by keeping output constant. Hence, if offshoring or migration has productivity-enhancing effects, we will observe a negative effect on native employment since the same amount of output can be produced with fewer inputs. Furthermore, as is common in the literature, capital is treated as quasi-fixed to avoid measurement problems of the user cost of capital. The conditional labour demand equation can be written as follows:

$$lnL_{ict}^{N} = \alpha_0 + \sum_{j=1}^{J} \alpha_j lnw_{ijct} + \beta_k lnk_{ict} + \beta_y lny_{ict} + \sum_{i=l}^{L} \gamma_l lnz_{ilct} + \varepsilon_{ict} \quad (1)$$

Given our interest in the effects on native employment, L_{ict}^{N} refers to labour demand of native workers of industry i in country c at time t. Furthermore, w_{ijct} is the nominal price of the j different variable factors, that is, the average gross annual wage of native workers and the price of materials. Given the log-linear specification of labour demand, the parameters α_j refer to the own-price and cross-price (constant output, constant capital) labour demand elasticities at time t. Furthermore, k_{ict} is the capital stock while y_{ict} is real gross output. z_{ilct} refers to a set of l different demand shifters for native workers. In this respect, we include different offshoring indicators and the share of migrants (as discussed in detail in section 3.2 below). Furthermore, following Hijzen and Swaim (2010) we also include a measure of import penetration (IP) as a measure of general trade openness, defined as $Imports/(GDP + Imports - Exports)$. Finally, we also include a measure of technological change to capture that either an increase in trade or Skill-Biased Technological Change (SBTC) are the key underlying causes of recent changes in relative labour demand. However, in the absence of suitable and reliable information to capture SBTC in our data, we include a set of country-sector linear time trends, which control for unobserved changes across time in labour demand for each industry in each country. Finally, ε_{ict} refers to a random normally distributed disturbance term with zero mean and constant variance.

Furthermore, data are differenced to account for any time-invariant industry fixed effects that affect the level of labour demand. Typically, in this literature, longer differences are used to not only account for any lags in the adjustment of native labour demand to shocks but also to reduce measurement errors. However, given the rather short time horizon of our data (10 years), we take shorter differences to increase degrees of freedom and the variation in our data. Furthermore, in view of the particular time horizon – 2005-2014 – shorter differences also allow us to more explicitly account for the crisis years and related effects, which longer differences would have blurred. In particular, we use three different differencing periods – 1-year, 2-year and 3-year differences – which allows us to also determine the robustness of our results to the chosen differencing period. The final estimation equation is therefore:

$$\Delta lnL_{ijt} = \alpha_0 + \sum_{j=1}^{J} \alpha_j \Delta lnw_{ijct} + \beta_k \Delta lnk_{ict} + \beta_y \Delta lny_{ict} + \sum_{i=l}^{L} \gamma_l \Delta lnz_{ilct} + \varepsilon_{ict} \qquad (2)$$

where Δ refers to the difference of a variable.

This approach, however, only allows us to determine the (technology-related) effects of offshoring and immigration on labour demand of native workers but not its *impact on labour demand elasticities*. For this purpose, we follow Hijzen and Swaim (2010) and include an interaction term of our offshoring and immigration measures with the wage variables for natives. To make the interpretation of coefficients easier and more meaningful, all measures used in the interaction terms are centred[3].

We also estimate the model for four different types of occupations, namely (i) managers/professionals (ISCO-88: 1-3), (ii) clerks (ISCO-88: 4-5), (iii) craft workers (ISCO-88: 6-7), and (iv) manual workers (ISCO-88: 8-9) (see Table 1 below for an overview). In this case, the dependent variable is industry-level labour demand for native workers of a particular occupation type and the wage variable is the average annual gross wage of native workers of that particular occupation type. There is a rich and continuously growing strand of literature that analyses the effects of offshoring and immigration on domestic employment. This literature either looks at the overall employment effects or, increasingly also, at the employment effects differentiated by skill groups (in terms of low-, medium- and high-educated workers) to also shed light on the potential skill-bias of offshoring and the degree of substitutability (complementarity) of native workers for foreign workers with similar (dissimilar) skills. In contrast, however, comparable evidence by occupation is scarce but generally of great importance. As concerns offshoring, the differentiation by occupation allows us to determine which jobs are particularly prone to offshoring and, consequently, which professional groups are affected the most. As concerns immigration, the analysis of employment effects based on skills may produce a distorted picture due to the partly substantial job-skill mismatch[4] among migrant workers – particularly in terms of their pronounced over-education – which reflects that natives and migrants of comparable skills do not compete for the same jobs. In contrast, our occupation-based analysis allows us to determine the effects when migrants and natives compete for the same jobs. In this context, we expect even stronger substitution effects which, however, not necessarily have to translate into higher unemployment among native workers but can also result in larger occupational mobility among native workers up their career ladder (for empirical evidence on Europe see, e.g., Cattaneo et al., 2015). Methodologically, we estimate the four occupation-specific labour demand equations by Seemingly Unrelated Regression (SUR) which allows for the contemporaneous correlation of error terms across all four regression equations and is then more efficient than separate estimation by ordinary least squares (OLS). To account for any potential heteroscedasticity issues and guarantee unbiased estimates, we report heteroscedasticity-robust t-values.

[3] The interaction term in general can be interpreted as how a percentage increase of the migrant share (of offshoring) affects employment of natives at a given wage rate. Centring refers to setting the variables always in relation to the average values (of wage rates, of migrant shares, of offshoring).

[4] See, e.g., Landesmann et al. (2015) for an overview.

Table 1 / Occupational groups according to 1-digit ISCO-88 classification

Group	ISCO-88 classification
Managers/professionals	Legislators, senior officials and managers (ISCO-88: 1), professionals (ISCO-88: 2) and technicians and associate professionals (ISCO-88: 3)
Clerks	Clerks (ISCO-88: 4) and service workers and shop and market sales workers (ISCO-88: 5)
Craft workers	Skilled agricultural and fishery workers (ISCO-88: 6) and craft and related trades workers (ISCO-88: 7)
Manual workers	Plant and machine operators and assemblers (ISCO-88: 8) and elementary occupations (ISCO-88: 9)

As is standard in the literature, we estimate industry labour demand elasticities on the identification assumption that industry labour supply is perfectly elastic. Consequently, any shifts in labour supply – as measured by changes in wages – trace out the labour demand curve so that estimated parameters can be interpreted as labour demand elasticities (Slaughter, 2001). The appropriateness of this assumption however depends on the level of aggregation of the data. This assumption is plausible for firms but is less plausible for industries – as in our case – and entirely implausible for entire economies, which face perfectly inelastic labour supply curves. A violation of this assumption results in upward-biased labour demand elasticities due to the positive correlation between wages and labour supply. Following Hijzen and Swaim (2010), we therefore use an Instrumental Variable (IV) approach to control for this potential endogeneity. In this context, we use the female labour force participation rate of natives as instrument and conduct Durbin-Wu-Hausmann tests to test for the exogeneity of the wage variables. However, since this instrument is only available at the country level and therefore lacks any industry dimension, we interact it with industry dummies to deal with this limitation. Results from the Durbin and Wu-Hausmann tests however suggest that endogeneity is not an issue in our data. Hence, the reported (heteroscedasticity-robust) coefficients from our OLS/SUR estimations are unbiased.

3.2. OFFSHORING, MIGRATION AND LABOUR DEMAND/ELASTICITIES

Offshoring is measured using imported intermediate inputs obtained from international input-output tables. In our analysis, we distinguish various different offshoring measures. Following Feenstra and Hanson (1999), we differentiate between narrow (N) (or intra-industry) and broad (B) (or inter-industry) offshoring, with narrow offshoring only considering imports of intermediates in a given industry from the same industry and broad offshoring considering imports of intermediates from all industries but its own. In this respect, narrow offshoring better captures the essence of international production fragmentation which, by definition, takes place within the industry. Hence, we expect stronger negative employment effects from narrow offshoring as it more strongly reflects substitution opportunities from international production fragmentation. Narrow and broad offshoring are defined as follows:

$$IIM_{i,c}^{N} = \frac{O_{j=i,c}}{V_{i,c}} \quad \text{and} \quad IIM_{i,c}^{B} = \frac{\sum_{j=1,j\neq i}^{J} O_{j,c}}{V_{i,c}}, \tag{3}$$

where $O_{j=i,c}$ refers to imported intermediate purchases by industry i from industry j in country c. j either refers to the same industry or to all industries but the importing industry. V refers to value-added of industry i in country c.

Furthermore, we also differentiate between manufacturing (M) and services (S) offshoring to account for the growing importance of services offshoring over the past two decades. While global production networks predominantly referred to the offshoring of manufactured intermediate inputs, as a result of recent advances in information and communication technologies (ICTs), many services – particularly business services – that were previously seen as non-tradable have become tradeable. Manufacturing and services offshoring are defined as follows:

$$IIM_{i,c}^{M} = \frac{\sum_{m=1}^{M} o_{m,c}}{v_{i,c}} \quad \text{and} \quad IIM_{i,c}^{S} = \frac{\sum_{s=1}^{S} o_{s,c}}{v_{i,c}} \qquad (4)$$

where M and S are the subset of manufacturing and services industries, respectively.

Finally, we also differentiate by sourcing country and classify them by region as either EU or non-EU countries as well as by income level as either developed or developing countries according to the 2005 World Development Report (see Table A9 in the Annex). The underlying hypothesis here is that offshoring to developing countries is more likely to exploit differences in factor endowments and thus lead to stronger vertical task specialisation (e.g. offshoring of the lower skill tasks) than would offshoring to other more advanced economies which exploits the advantages of horizontal task differentiation. Here, offshoring to developed EU and non-EU countries (DevdEU and DevdExEU respectively) and developing EU and non-EU countries (DevgEU and DevgExEU respectively) is defined as follows:

$$IIM_{i,c}^{DevdEU} = \frac{\sum_{w=1}^{W} o_{w,c}}{v_{i,c}}, \; IIM_{i,c}^{DevdExEU} = \frac{\sum_{x=1}^{X} o_{x,c}}{v_{i,c}}$$

$$IIM_{i,c}^{DevgEU} = \frac{\sum_{y=1}^{Y} o_{y,c}}{v_{i,c}}, \; IIM_{i,c}^{DevgExEU} = \frac{\sum_{z=1}^{Z} o_{z,c}}{v_{i,c}} \qquad (5)$$

where W, X, Y and Z refer to the subset of developed (EU and non-EU) and developing (EU and non-EU) countries, respectively. This differentiation of offshoring by sourcing country produced econometric results with little statistical significance which, for the sake of brevity, are not reported in what follows.[5] Instead, our descriptive analysis in section 4 provides a more thorough analysis of offshoring patterns by sourcing country.

In addition to offshoring, we also analyse the effect of migration on the labour demand of native workers. In particular, migrant workers may complement or substitute native workers, depending on the relative skill-endowment of native and foreign workers. In particular, migrants of a particular skill group tend to complement natives with different skills but substitute natives with similar skills. The migrant share, defined as the total number of migrants (as determined by country of birth) employed in industry i of country c at time t as a share of the total number of employees in industry i of country c at time t, is specified as follows:

$$MS_{ict} = \frac{\#\,of\ migrant\ workers_{ict}}{total\ \#\,of\ workers_{ict}}. \qquad (6)$$

Similar to native workers, we also differentiate migrant workers by type of occupation (managers/professionals, clerks, craft workers and manual workers) to capture occupation-specific substitution and complementarity effects of migration on native employment. In this respect, we shed

5 The full set of results is available from the authors upon request.

light on both own and cross effects of migration by determining (i) the effects of migration of a particular type of occupation on the demand for natives of the same occupation only, and (ii) the effects of migration of all four types of occupation jointly on the demand for natives of a particular occupation. Due to the high substitutability between native and migrant workers of the same occupation, we generally expect negative own effects but more complex and mixed cross effects.

3.3. DATA SOURCES

We construct our database from different data sources. Labour-market related information such as native, migrant and total employment as well as annual gross wages are taken from the EU-SILC (EU Statistics on Income and Living Conditions), which is an annual survey on income, poverty, social exclusion and living conditions in the EU. The EU-SILC generally covers all EU-28 Member States plus Macedonia, Iceland, Turkey, Norway and Switzerland, for different time periods. We use anonymised cross-sectional micro-data from 2005 onwards, aggregated to the one-digit industry-level as specified by the EU-SILC industry classification scheme. Both, the NACE-break (between 2007 and 2008) and the ISCO-break (between 2010 and 2011) are accounted for by means of double-coded NACE and ISCO information in the break-years and suitable correction of preceding and succeeding years. Hence, all labour-market data correspond to the NACE Rev. 2 industry classification and the ISCO-88 occupational classification. Information on input prices, the capital stock and real gross output is taken from the EU-KLEMS Growth and Productivity Accounts 2017 release, which is available for the period from 1995 to 2015 for 34 industries and 8 aggregates according to the ISIC Rev. 4 (NACE Rev. 2) industry classification. Finally, all trade-related data are taken from the WIOD (World Input-Output) database 2016 release, which combines detailed information on national production activities and international trade, taken from official statistics. It provides information on international linkages of production processes and structures of final goods trade across 56 industries (classified according to the ISIC Rev. 4 industry classification) and 43 countries (comprising all 28 EU Member States and 15 other major countries in the world, plus an estimate for the rest of the world (RoW)) over the period 1995 to 2014. As such, it contains information on purchases by each industry of intermediate inputs from each industry, domestic or foreign. From the WIOD dataset we calculate import penetration and all relevant measures of offshoring.

Generally, as determined by the EU-SILC industry classification and aggregation scheme (see Table A10 in the Annex for the list of industries), our database refers to the 1-digit industry level and covers the time horizon between 2005 and 2014. In the analysis, we focus on the economically more advanced group of ‘Northern’ EU Member States which are not only strongly integrated into international production networks but are also major immigration countries – particularly for immigrants from other parts of Europe, especially from new EU Member States (NMS). The group of Northern EU Member States comprises Austria (AT), Belgium (BE), Denmark (DK), Finland (FI), France (FR), Germany (DE), Ireland (IE), Italy (IT), the Netherlands (NL), Sweden (SE) and the United Kingdom (UK). Furthermore, we concentrate on industries A, B-E, F, G, H, I, J, K and L-N (NACE Rev. 2) and exclude all public sector industries, such as O, P, Q and R-U.

4. Descriptive analysis

We start with Figures 1a and 1b which show the shares of migrants in the employed labour force by country (1a) and in different NACE industries (1b). Just like in the case of offshoring or trade, where it matters whether offshoring occurs in countries with different factor endowments or in countries with similar factor endowments with regard to its impact on labour markets, so the composition of migrants by source country might also matter with respect to their impact on labour markets. Different source countries might have different access to segments of the labour market, such as stricter rules for non-EU migrants compared to EU migrants. Information regarding the source country might also reflect differences in degree recognition, skill levels etc. such as whether migrants come from countries with more developed educational systems as compared to less advanced economies. Figure 1a therefore distinguishes whether migrants come from other European economies, from advanced non-European or from developing non-European economies. We shall check whether the labour market impact of migrants on native workers differs by region of origin of these migrants.

What Figure 1a shows is, firstly, that the overall migrant shares in the employed labour force is particularly high in Austria, Spain, Ireland, Sweden and the United Kingdom and still very low in the new Member States (NMS), the Czech Republic, Hungary and Slovakia. The latter will be excluded from the following econometric analysis, as will the Southern European economies Greece, Portugal and Spain that play a different role both with respect to 'offshoring' and migration compared to the Western/Northern EU economies. Secondly, when we compare the two different periods (2005-2008 and 2009-2014) we see that the share of migrants in the employed labour force has generally declined following the onset of the recent financial and economic crisis (the data span goes up to 2014 i.e. before the major recent refugee inflow[6]). This indicates that the migrant inflow has either declined over the crisis years (i.e. inflows being demand-determined), or that the incidence of losing jobs was higher amongst the migrants as compared to the native labour force during the crisis years. Thirdly, the composition of migrants with respect to regions of origin differs quite substantially across EU Member States: countries like Austria, Germany, Greece and Ireland (and so do the NMS) mainly attract migrants from Europe, while countries which had colonial histories such as Spain, Portugal, France, the Netherlands and the UK have a high share of migrants from developing non-European countries in their labour forces; Sweden joins this group but mainly because it has a long history of being open to refugees and asylum seekers.

Figure 1b tells us in which industries we find the highest shares of migrants in the labour force (we show an average over all countries in the sample, i.e. including those countries left out in the econometric analysis; see previous paragraph). Restaurants and hotels (NACE industry I) stick out, followed by an industry group which is dominated by household services (R-U)[7]. In these industries, on average about

[6] Furthermore, even though there was a major inflow of asylum seekers in some of the EU countries (Austria, Germany and Sweden in particular) in the years 2015 and 2016, their integration into the labour market is expected to be a protracted process (see e.g. Brücker et al., 2016) and it is thus likely that even the inclusion of these years would not have made much difference.

[7] We use in the text short-hand description for the industries. For more precise information regarding the industry classification used, see Annex Table A2.

15-20% of the work forces are migrants and a substantial share from developing non-Europe. Other industries that have, on average, a migrant share of around 10% of the labour force include manufacturing (within group B-E), construction (F), wholesale and retail trade (G), transport (H), information and communications (J), professional services (L-N) and health workers (Q). We shall see that the occupational structure and the migrants positions in these occupations differ quite a lot across these industries, some of them having significantly higher 'skill content'[8] than others.

Figure 1a / Share of migrants by country

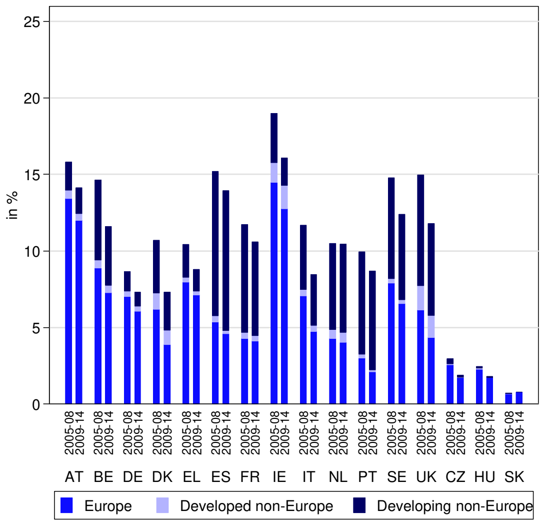
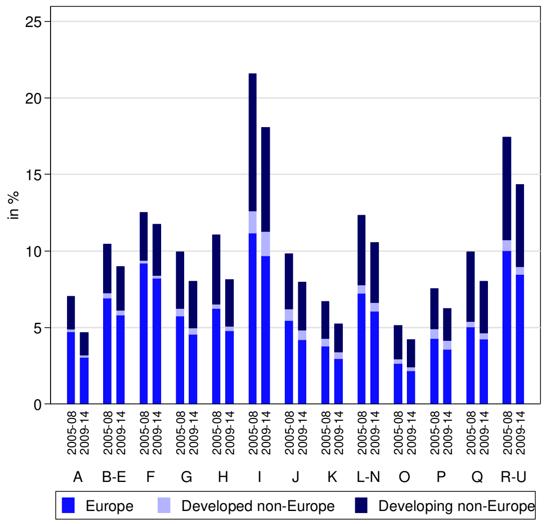


Figure 1b / Share of migrants by industry



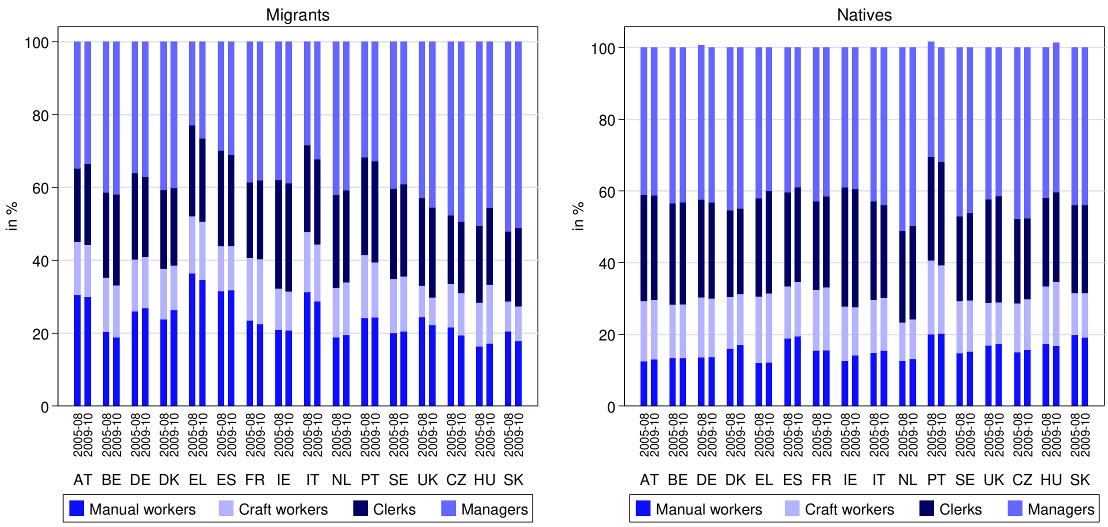
Source: EU LFS, own calculations.

Figures 2a and 2b compare the compositions of migrants and of the native labour force by occupational categories. As shown previously in Table 1, we distinguish 4 occupational groupings: managers and professionals[9], clerks and sales staff, skilled craft workers, and manual workers. Roughly these four groups correspond (in the same sequence) to skilled and unskilled white collar workers, and skilled and unskilled manual workers. When we compare the occupational composition of migrant and native workers in the different EU countries in Figure 2a, we see a remarkable similarity in occupational structures amongst the native working population (in the aggregate) across all European economies. There are only slight differences, such as the Netherlands having a relatively high share of managerial and professional staff and Portugal a rather low share. However, the picture is much more differentiated for the migrant working populations in the different EU economies: here we see Greece, Spain, Italy and – to a lesser extent – Austria with much higher shares of migrants working in manual worker jobs than in the other economies, and some of the advanced European countries (Belgium, Denmark, Netherlands, Sweden, United Kingdom) having a high share of migrants working as managers and professionals. Interestingly, also all the three NMS (Czech Republic, Hungary and Slovakia) have a high share of foreign employees in managerial and professional jobs which most likely is linked to their roles in foreign enterprises as these countries attracted a lot of FDI. We shall return to this point later on.

8 'Skill content' in this analysis will be represented by shares of more qualification demanding occupational categories; see further below.

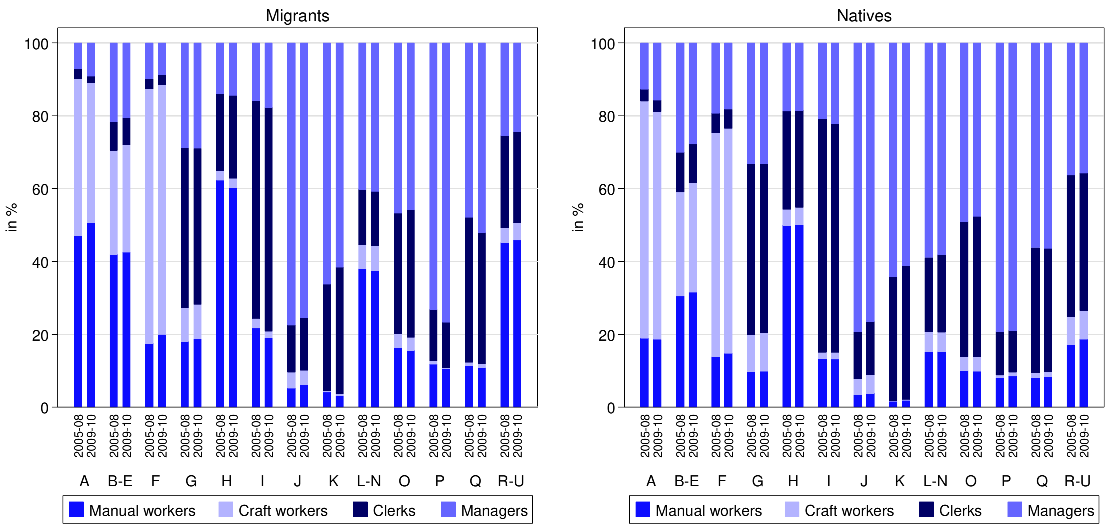
9 Again, we use short descriptions in the text and the full description of occupations in these 4 groupings can be referred to in Table 1.

Figure 2a / Occupational composition of migrant and native workforce by country



Source: EU LFS, own calculations.

Figure 2b / Occupational composition of migrant and native workforce by industry



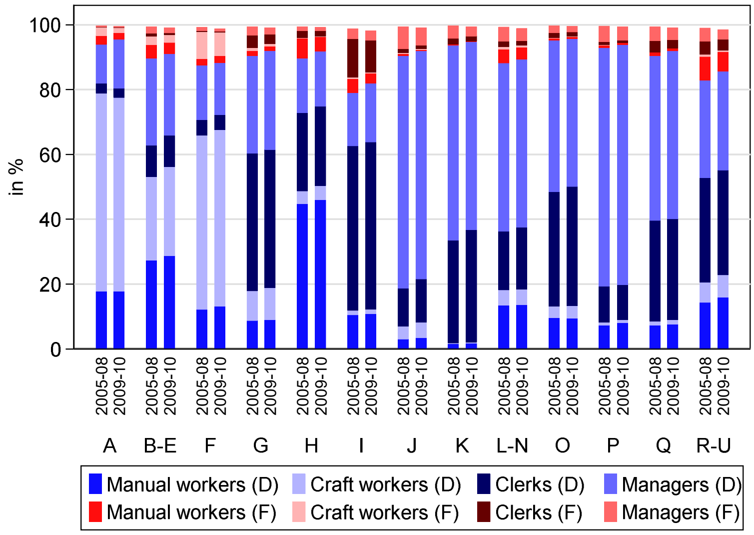
Source: EU LFS, own calculations.

Interesting are also the differences in occupational structures of migrants and native workers in the different industries. This is depicted in Figure 2b[10], again for the aggregate of the European countries in the sample. We see here a much higher share of migrants in manual workers' jobs in agriculture, in industry, in transport and in household services (A, B-E, H and R-U respectively) while native workers are more highly represented in skilled (craft) worker jobs in agriculture and in managerial and

10 Just as we leave out certain groups of countries of the econometric analysis that is to follow, but they are included in the descriptive graphs, we also include certain sectors (i.e. mostly sectors in which public employment is high i.e. O, P, Q and R-U; for sector classification see Annex Table A2) in the graphs that will later on be left out of the econometric analysis.

professional occupations in industry and in transport. On the other hand, we can see a high share of migrants in high-skill managerial and professional occupations in information and communications industries (J) and in financial services (K) on an equal footing with native workers.

Figure 3 / Occupational composition of the workforce



Note: D refers to native and F to foreign workers.
Source: EU LFS, own calculations.

A comprehensive picture of the position of migrants across industries in the European economies as a whole can be obtained in Figure 3. This does not provide new information, but it shows the shares of migrants in the work forces ranging between 5 and 22% across industries and we see here – at one glance – the characteristics of these industries regarding their occupational structures, i.e. whether they offer high or low shares of high- and low-skill blue-collar or white-collar jobs.

Next, we want to show the indicators with regard to '*narrow*' (within the same industry) and '*broad offshoring*' (in other backwardly linked industries) that we introduced earlier. We distinguish in Figures 4 and 5 offshoring by manufacturing and services industries, and also whether offshoring (i.e. imports of intermediate inputs) occurs in 4 different regions: 'developed' and 'developing EU' (the latter comprising the Southern EU economies without Italy, plus the NMS), and 'developed' and 'developing non-EU' economies.

As regards offshoring in manufacturing and services industries – and this refers to 'broad offshoring' in Figure 4a – we see that offshoring of intermediate input supplies is particularly high in *manufacturing* activities in Austria, Germany, France and particularly in the NMS (Czech Republic, Hungary and Slovakia with their strong cross-border production networks specifically in the motor vehicles industry). Ireland sticks out with very strong purchases of intermediate inputs of *services* from abroad, and such purchases are also high in Belgium, Denmark, the Netherlands and in Hungary. Figure 4b presents the differentiated offshoring activities by industries for the European countries as a whole and this shows strong purchases of intermediate inputs from abroad in manufacturing (within the B-E grouping) but also of agriculture and construction. Offshoring the supply of service inputs is high in industries G (which includes motor vehicles repairs and wholesale trade), H (transport services), J (information and communications), K (financial and insurance services), and L-N (professional services).

Figure 4a / Manufacturing and services offshoring by country

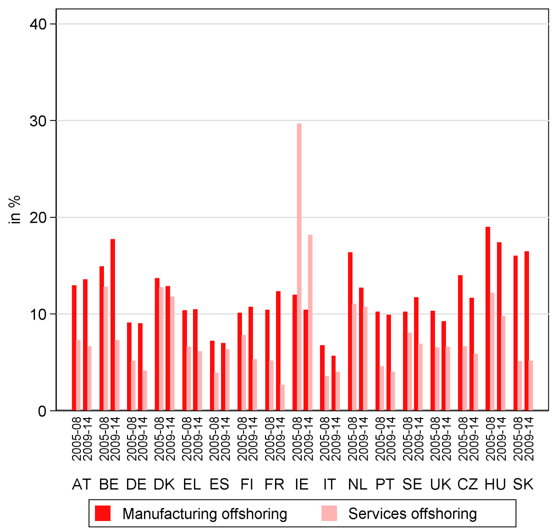
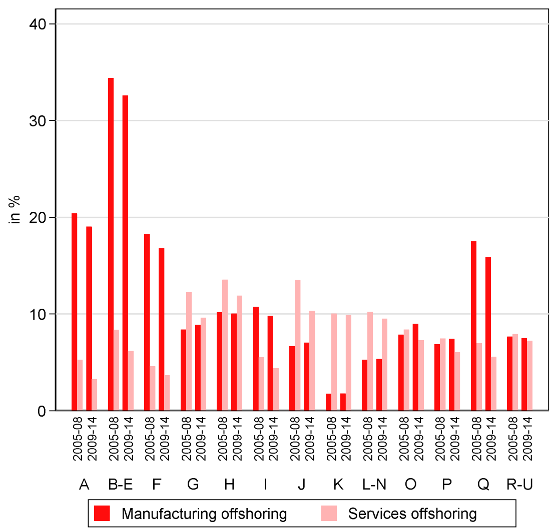


Figure 4b / Manufacturing and services offshoring by industry

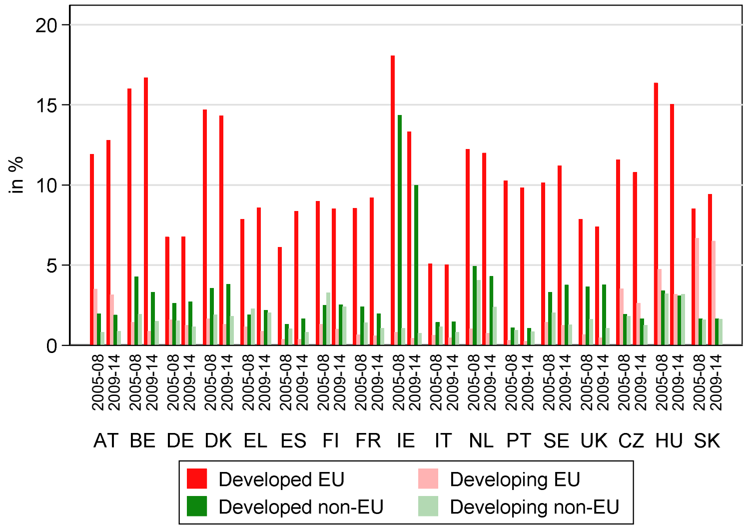


Source: WIOD, own calculations.

As regards countries where such offshoring takes place (see Figure 5a), we can see that with the exception of Ireland, by far the most important shares of imported intermediate inputs come from developed EU countries; only in Ireland the share of intermediate inputs supplied by developed non-EU countries is rather close to that supplied by developed EU. As regards industries, and here we can compare 'narrow' and 'broad offshoring' (see Figures 5b and 5c), the highest shares of imported intermediate inputs supplied within the same industry ('narrow offshoring') is in manufacturing (within the B-E group) – i.e. over 25% – followed by agriculture – with over 10% – and these come predominantly from developed EU economies. This share declines for manufacturing if one compares 'broad offshoring' (Figure 5c) with 'narrow offshoring' (Figure 5b) which means that import shares of intermediate inputs directly supplied within the same industry are higher in manufacturing than if we look at the import shares of inputs from other industries. The opposite is the case when we look at the other industries: intermediate inputs supplied from other industries ('broad offshoring') show higher overall import shares as compared to 'narrow offshoring'. This reveals the very strong intra-industry production networking in manufacturing. In all industry groupings (with the exception of the health sector), supplies from advanced EU countries dominate.

We want to finally point to an interesting difference in the industry distribution of migrants as compared to that of offshoring as this is of interest with regard to the labour market impact of these two forces of 'globalisation': offshoring is much higher in the traditional tradable goods industries (agriculture and manufacturing) than in the services industries (see Figure 5b and focus on 'narrow offshoring' which is the relevant category for this comparison). On the other hand, when we looked at migrants' shares in the employed labour forces of the different industries, we pointed to the rather high shares in the services industries (see Figure 1b). We shall keep this in mind when we interpret the econometric results regarding the impact of offshoring vs. migration on the labour market situation (employment and employment elasticities) of native workers.

Figure 5a / Broad offshoring by sourcing country



Note: For the list of country classifications see Table A10 in the Annex.
Source: WIOD, own calculations.

Figure 5b / NO by sourcing country

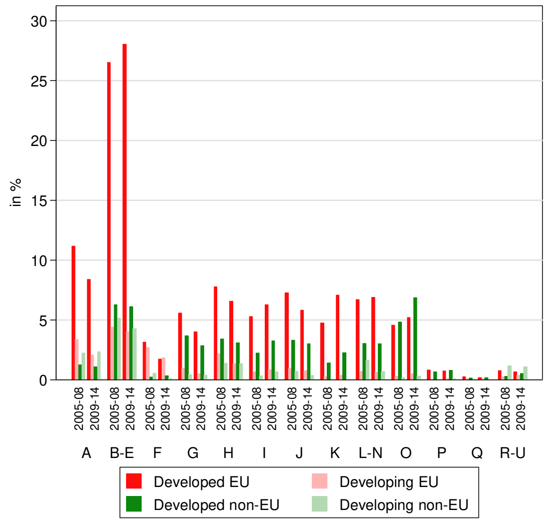
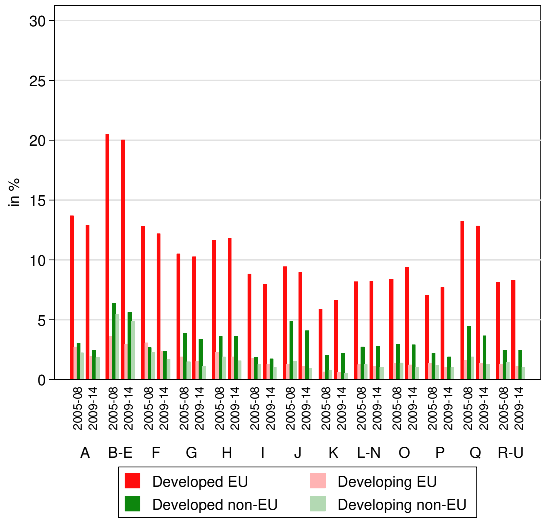


Figure 5c / BO by sourcing country



Note: NO – narrow offshoring; BO – broad offshoring. For the list of country classifications see Table A10 in the Annex.
Source: WIOD, own calculations.

5. Results

In what follows, we discuss the results of our econometric analysis, which uses immigration on the one hand, and different offshoring measures – narrow and broad offshoring, manufacturing and services offshoring – on the other hand, as the key measures of globalisation. While section 5.1 refers to results for the effects on the labour demand of native workers, section 5.2 refers to results for the effects on the labour demand elasticity for native workers. To draw a richer picture, both sections also briefly address the question of cross-occupational effects of immigration on native workers with different occupations.

5.1. LABOUR DEMAND DYNAMICS

5.1.1. Immigration, narrow and broad offshoring and labour demand

Table A1 reports results for the impact of immigration as well as narrow and broad offshoring on total labour demand and on labour demand of the four types of occupations, separately for the three differencing periods (D1, D2 and D3).

Looking at aggregate employment, of all three globalisation measures considered, immigration has the most consistent and strongest negative effect on the employment of native workers. In particular, our estimates suggest that a 1 per cent increase in the share of immigrants is associated with an around 0.1 per cent decrease in total native employment. Furthermore, as expected, immigrants of a particular occupation substitute for native workers of the same occupation. Among the four types of occupations, this substitution effect is most consistent and most pronounced for managers/professionals but also prevalent for manual workers and clerks. In contrast, for craft workers, we observe the opposite, with some evidence that foreign and native craft workers actually complement each other.

Furthermore, as concerns the employment effects of offshoring, the results for *narrow offshoring* show the expected negative signs which indicates that it is associated with a loss in employment. However, the coefficients are only significant for managers/professionals, and are generally rather small. More specifically, the estimated coefficients suggest that the employment of managers/professionals falls by around 0.1 per cent as a result of an increase in narrow offshoring by 1 per cent. On the one hand, this finding indicates that in addition to low and medium-skilled workers, also highly-skilled workers are affected by offshoring. Thus, differently from the focus of most contributions on the effects of outsourcing on low-skilled workers, we find instead that highly skilled workers' (professionals and managers) employment is affected by outsourcing[11]. However, one can argue, on the one hand, that as a result of improvements in ICT, tasks of managers/professionals also require less personal contact and face-to-face communication and therefore become increasingly more offshorable which also puts their jobs at risk (Grossmann and Rossi-Hansberg, 2008). On the other hand, it may also suggest that managers/professionals, whose skills are easily transferable across countries and who are therefore

[11] Related empirical evidence typically finds negative employment effects of narrow offshoring on low- and medium-skilled workers but less so on high-skilled workers (e.g. Hijzen et al., 2005; Foster-McGregor et al., 2013; Bramucci, 2016).

most mobile internationally, follow any offshoring activities of their firms. This is particularly so if offshoring is associated with the acquisition of a foreign affiliate, as part of international outsourcing activities, which often requires more intense on-site presence and control.

In contrast to narrow offshoring, we find positive effects of *broad offshoring* on native employment. However, these employment-enhancing effects are rather sporadic and mainly observable for the more skill-intensive occupations. In general, craft workers profit the most and experience the strongest increases in employment, irrespective of the differencing period considered. Similarly, but less consistently so, the employment of managers/professionals also increases while clerks remain unaffected by broad offshoring. The positive employment effects of broad offshoring are contrary to what is generally found in the literature (see, e.g., Hijzen and Swaim, 2007; Foster-McGregor et al., 2016). This discrepancy in results is mainly due to our underlying industry sample which is dominated by service industries while comparable empirical evidence either refers to all industries or manufacturing industries only. In this context, our results are more reflective of changes in the generally more labour-intensive services industries and suggest that offshoring of activities to industries outside the own industry leads to greater specialisation in production which not only gain in employment but also become more skill-intensive. Associated improvements in the quality of output stimulate the demand for products and services in downstream industries which increases the demand for skilled labour and further reinforces specialisation patterns.

As concerns the remaining control variables, we observe the following: regarding the labour demand elasticity, the coefficients on own wages are consistently negative and significant and, as regards their size, in line with the literature. In particular, for total employment, our results suggest that a 1 per cent increase in average gross wages is associated with a reduction in labour demand of between 0.3 and 0.5 per cent. Labour demand elasticities are more heterogeneous for the different occupations, but generally lowest (in absolute terms) for managers/professionals, whose labour demand falls by between 0.2 and 0.3 per cent in response to a 1 per cent increase in wages. In contrast, labour demand elasticities tend to be highest (in absolute terms) for clerks, whose labour demand falls by between 0.3 and 0.5 per cent as a result of an increase in wages by 1 per cent. With regard to the remaining control variables, results are mixed and less consistent. For instance, intermediate inputs appear to be complementary to craft workers but substitute for managers/professionals. Furthermore, the capital stock and import penetration variables are hardly ever significant while real gross output increases labour demand, most consistently for managers/professionals, but also for craft and manual workers. The coefficients on the trend, which we include to capture SBTC, are negative, in general, and most consistently significant for manual workers. This suggests that SBTC is associated with lower labour demand, and mainly harms manual workers' employment opportunities.

5.1.2. Manufacturing and services offshoring, immigration and labour demand

Table A2 reports results for the effects of offshoring and immigration on employment, when offshoring is differentiated in terms of manufacturing and services offshoring. Since the effects of the other control variables are similar to what is observed above (see Statistical Annex, Table A1), we concentrate our discussion on the three globalisation measures in what follows.

Similar to Table A1, immigration induces a substitution effect on native employment with immigrants of a particular occupation substituting for native workers of the same occupation, particularly among managers/professionals, manual workers and clerks. In contrast, both manufacturing and services offshoring are associated with an increase in the employment of natives which corresponds to what we observed for broad offshoring above. Generally, manufacturing offshoring favours craft workers the most by improving their employment opportunities and levels, irrespective of differencing period considered. More sporadic and weaker employment-enhancing effects are found for managers/professionals and clerks. Similarly, services offshoring is also associated with higher employment but less consistently so across differencing periods. In general, however, services offshoring tends to initiate a stronger increase in employment, as suggested by the size of the coefficients.

5.1.3. Cross effects of immigration

Results for the effects of immigration across occupations are reported in Tables A3 and A4 below. Consistent with above results (see Statistical Annex, Tables A1 and A2), they generally show the same substitution effects between migrants and natives of the same occupation. However, our results also point to more complex effects of immigration across occupations. Interestingly, the few statistically significant effects tend to be negative which suggests that immigration has an effect that goes beyond the same occupation and also negatively affects native workers in other occupations. These negative cross effects in turn reflect existing complementarities between native workers across occupations which show up and become relevant once a particular occupation is affected.

In particular, we find some evidence that an inflow of foreign managers/professionals not only reduces the employment of native managers/professionals but also of native craft workers. Similarly, foreign clerks are substitutes for native clerks as well as native manual workers while foreign manual workers substitute for native manual workers as well as native clerks. In contrast, foreign craft workers initiate more complex employment effects: while there is some evidence that foreign craft workers actually complement native craft workers, they tend to substitute for both native managers/professionals and native manual workers.

5.2. LABOUR DEMAND ELASTICITY DYNAMICS

5.2.1. Immigration, narrow and broad offshoring and the elasticity of labour demand

Results for the effects of narrow offshoring, broad offshoring and immigration on the elasticity of labour demand for total native employment and native employment by type of occupation are reported in Table A5 (see Statistical Annex). In contrast to results in Table A1, Table A5 reports results from a model with interaction effects. In this new specification, interaction terms of our offshoring and immigration measures with the wage variables for natives capture the indirect effects of globalisation through a change in the elasticity of labour demand for native workers while the offshoring and immigration measures by themselves capture the direct effects of globalisation on the labour demand for native workers. Since the effects of the other control variables are similar to what is observed above (see Statistical Annex, Table A1), we concentrate our discussion on wages, the three globalisation measures and their interaction with wages in what follows.

As concerns the elasticity of labour demand, we only observe negative coefficients on own wages for total native employment which suggests that – at average levels of (narrow and broad) offshoring and immigration – an increase in the wages of natives is associated with a reduction in their employment. In contrast, none of the own-wage coefficients of the four types of occupations is statistically significant.

In terms of direct and indirect effects of (narrow and broad) offshoring and immigration on labour demand for native workers, our results are mixed and vary by type of occupation. For instance, immigration of craft workers reduces both labour demand and labour demand elasticities for native craft workers. This finding indicates that, in view of cost advantages of foreign labour, stronger labour market competition between foreign and native workers reduces the demand for native craft workers. The remaining native craft workers, who enjoy the advantage of better language skills, qualifications and knowledge of local standards and conditions, gain bargaining power which lowers their demand elasticities in turn. In contrast, the opposite is observable for both managers/professionals and clerks, whose labour demand and labour demand elasticities tend to increase as a result of the inflow of migrants with similar occupations. Generally, observable effects are not very robust to the differencing period considered but, if statistically significant, seem to be stronger for clerks than managers/professionals. In general, our results indicate that immigrant and native managers/professionals and clerks are complements and hired alongside each other. However, for native managers/professionals and clerks, this expansion in employment goes together with a loss in bargaining power and higher demand elasticities. The results indicate that native manual workers are unaffected by immigrant manual workers and neither see their jobs threatened nor their bargaining power affected as a consequence.

Furthermore, the coefficients on the broad offshoring variable and its interaction with the wage variable are statistically insignificant, except for a positive significant direct effect for native craft workers. Hence, broad offshoring neither has a direct nor an indirect effect (through a change in labour demand elasticities) on labour demand for native workers. Differences in results on the role of broad offshoring for native labour demand (as reported in Table A1) are the result of differences in our research questions, which in this case is on the effects of globalisation on the elasticity of labour demand, and the model specification.

In contrast, for some occupations, narrow offshoring is of non-negligible importance. For instance, for native manual workers, narrow offshoring tends to reduce both labour demand and labour demand elasticities. Hence, for manual workers, whose jobs are offshored the most, this finding suggests that those manual jobs that are less offshorable remain in the offshoring country which improves the bargaining power and lowers the demand elasticities of these workers. This is in contrast to what is observable for managers/professionals, whose labour demand and labour demand elasticities tend to increase due to narrow offshoring. This result suggests that offshoring, which often necessitates more intensive management coordination activities in the home country, increases the employment of managers/professionals. At the same time, however, as the international task allocation of managerial activities increases, managers' jobs become more sensitive to wage changes.

5.2.2. Manufacturing and services offshoring, immigration and the elasticity of labour demand

Table A6 reports the effects of offshoring and immigration on the elasticities of labour demand for total and occupation-specific native employment, when offshoring is differentiated in terms of manufacturing and services offshoring. In what follows, we again concentrate our discussion on wages, manufacturing and services offshoring and their interaction with wages, since the effects of the other control variables closely mimic what we observed above.

As concerns the wage elasticity of labour demand, we see the same effects as in Table A5, namely consistently negative wage elasticities of labour demand for total native workers but – when estimated at the level of individual occupations – statistically insignificant own-wage effects for all four types of occupations.

Furthermore, (evaluated at average wages) manufacturing offshoring (see Table A6) has little statistically significant effects on both labour demand and labour demand elasticities, except for managers/professionals if three-year differences are used, in which case we observe an increase in demand and the demand elasticity.

In contrast, effects on labour demand and demand elasticities are more differentiated for services offshoring (see again Table A6) but, from the perspective of statistical significance, are equally scarce. Generally, for total employment, both demand and demand elasticities decrease as a result of more intensive services offshoring activities. Since our industry-sample in the empirical analysis predominantly consists of services industries, this result thus mainly reflects effects in the services sector. In particular, for the total native workforce, services offshoring is associated with a loss in employment but also a decrease in demand elasticities which suggests that workers, whose jobs are less offshorable and therefore remain in the offshoring country, gain bargaining power. Furthermore, both clerks and craft workers are also affected by services offshoring, but the effects on their demand and demand elasticities show little robustness across differencing periods. For instance, there is some evidence that clerks see their demand and demand elasticities fall in response to services offshoring while, on the contrary, craft workers experience an increase in both labour demand and demand elasticities.

5.2.3. Cross effects of immigration

Finally, Table A7 and Table A8 report the effects of immigration across occupations on both labour demand and labour demand elasticities. The two tables differ in terms of the offshoring measures that are used (narrow and broad offshoring in Table A7 and manufacturing and services offshoring in Table A8).

In line with above results (see Table A5 and Table A6), we observe similar effects of immigrants of a particular occupation on the labour demand and labour demand elasticities for native workers of the *same* occupation. At the same time, we also find interesting effects *across* occupations which point to important side effects on occupations not directly affected by immigration and reflect existing interdependencies across native occupations. For instance, an increase in migrant clerks is associated with an increase in the demand and the demand elasticity for native manual workers and, less consistently also, for managers/professionals. In contrast, an inflow of migrant managers/professionals tends to lower the demand and the demand elasticity for native craft workers while migrant manual workers are associated with higher demand and demand elasticities for native clerks but lower demand and demand elasticities for native managers/professionals. In contrast, immigrant craft workers only have an effect on native workers of the same occupation, by reducing their demand and demand elasticities.

6. Summary and conclusion

This paper has analysed the impact of two ‘forces of globalisation’ on the labour markets in Western European economies: immigration and offshoring. We focused on employment effects of the native labour forces and the contribution in this paper goes beyond the existing literature in a number of ways: firstly, we introduce immigration and offshoring measures together in our estimates so that the relative importance of these two features of international market integration can be jointly assessed. Secondly, we deviate from existing analyses in that we look at the impact on occupational (rather than educational) categories. We think that this is particularly important in that there is strong available evidence of ‘skill-jobs’ mismatches of migrants – i.e. migrants not necessarily working in the jobs for which their formal educational attainment levels would have trained them. This suggests that a more direct analysis of substitutability or complementarity in production between migrants and natives is possible by analysing occupational categories (i.e. the ‘jobs’ these two groups perform). Thirdly, our analysis follows other contributions that analyse the impact of the two forces of ‘globalisation’ on employment not only directly but also via affecting the employment elasticity (i.e. sensitivity of employment to wage changes). This type of analysis has been undertaken for off-shoring but so far – to our knowledge – not in a comprehensive model that includes offshoring and immigration. Lastly, we analysed also cross effects of how the impact on employment and employment elasticity for one group of employees is related to that of other groups of workers.

The principal results have already been summarised in the introductory section so we shall not repeat this over here. However, our analysis yielded a number of interesting results that are particularly noticeable or unexpected and/or differentiate our results from those obtained in other studies: firstly, the immigration impact on natives’ employment turns out to be stronger than the off-shoring impact. One reason for this is that our data-set contains no differentiation of manufacturing (due to data-constraints) but quite a few service industries. As the latter include activities that are traditionally seen as non-tradable (and thus ‘non-offshorable’) this can account for less impact from offshoring than from migration (as migrants are employed in both non-tradable as well as tradable sectors). Secondly, and somewhat surprisingly we found quite strong employment effects on managers and professionals from offshoring and migration. We attribute this result to the fact that due to improvements in international communications and logistics, managerial/professional functions can also be increasingly ‘internationalised’, partly through offshoring and partly through the mobility of the managers/professionals themselves. The third interesting result is that in quite a few instances, the direct employment effects (from offshoring and/or migration) can be negative, but employment elasticities on the other hand get reduced (reflecting a strengthening of the bargaining position of employees). This is an interesting result in that it might result from a redefinition of job specialisation between native and migrant workers and of tasks performed domestically as compared to those in offshored activities. Both these two processes can lead to an improved bargaining position of native workers that remain employed. Lastly, our results show in quite a few instances a strong position of native craft workers (i.e. workers with higher levels of training) in Western Europe to benefit from migrant flows and even from off-shoring which points to complementarity benefits for well-trained personnel from these two forces of international integration. This has quite strong policy implications with regard to a favourable outcome for native workers with higher levels of skills.

7. References

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8. Statistical Annex

Table A1 / Employment effects: Narrow and broad offshoring

	D1					D2					D3				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	total	**manager**	**clerk**	**craft**	**manual**	**total**	**manager**	**clerk**	**craft**	**manual**	**total**	**manager**	**clerk**	**craft**	**manual**
Δw_{I}	-0.475***	-0.172*	-0.467***	-0.315***	-0.292***	-0.284**	-0.195**	-0.325***	-0.272***	-0.284***	-0.387**	-0.219*	-0.248*	-0.029	-0.256**
	(-4.195)	(-1.861)	(-4.472)	(-4.052)	(-3.434)	(-2.587)	(-1.988)	(-2.937)	(-2.855)	(-3.038)	(-2.499)	(-1.956)	(-1.848)	(-0.224)	(-2.519)
Δw_{II}	-0.283	-0.552*	-0.073	0.758**	-0.735**	-0.196	-1.011***	0.142	1.560***	-0.406	-0.400	-0.555	1.054*	0.417	-0.759
	(-1.479)	(-1.885)	(-0.186)	(2.158)	(-2.501)	(-1.002)	(-3.390)	(0.340)	(3.266)	(-0.792)	(-1.207)	(-1.149)	(1.703)	(0.612)	(-1.206)
ΔK	0.227	0.616	-0.550	0.003	-0.218	0.297	0.768*	0.209	0.885	0.291	0.239	-0.113	-0.857	0.378	1.266*
	(0.936)	(1.567)	(-1.191)	(0.007)	(-0.398)	(1.018)	(1.724)	(0.356)	(1.152)	(0.400)	(0.836)	(-0.219)	(-1.250)	(0.407)	(1.666)
ΔGO	0.189	0.535**	0.326	0.750**	0.676**	0.319**	0.364*	0.067	0.484*	0.551**	0.368**	0.441***	-0.122	0.126	0.369
	(1.265)	(2.259)	(1.100)	(2.439)	(2.144)	(2.173)	(1.959)	(0.301)	(1.755)	(1.972)	(2.034)	(2.605)	(-0.544)	(0.381)	(1.475)
ΔIP	-0.030	0.027	-0.039	0.022	0.005	-0.029	0.004	-0.016	-0.020	0.045	-0.005	0.095*	-0.026	-0.040	-0.066
	(-0.925)	(0.377)	(-0.694)	(0.306)	(0.050)	(-0.909)	(0.073)	(-0.204)	(-0.332)	(0.746)	(-0.138)	(1.947)	(-0.498)	(-0.627)	(-0.702)
ΔIIM^{N}	-0.031	-0.098***	0.009	-0.033	-0.031	-0.033	-0.110**	-0.034	-0.002	-0.026	-0.030	-0.060	-0.054	-0.110	0.009
	(-0.976)	(-2.744)	(0.130)	(-0.720)	(-0.619)	(-0.844)	(-2.229)	(-0.323)	(-0.023)	(-0.395)	(-0.638)	(-1.010)	(-0.807)	(-1.344)	(0.091)
ΔIIM^{B}	0.274**	0.481***	0.202	0.787***	0.465*	0.204	0.305**	0.275	0.578***	0.231	0.111	-0.118	0.214	1.006***	-0.008
	(2.208)	(3.034)	(1.187)	(3.278)	(1.959)	(1.507)	(2.136)	(1.266)	(2.586)	(1.094)	(0.877)	(-0.749)	(1.077)	(3.551)	(-0.029)
ΔMS_{i}	-0.089***	-0.067***	-0.034	-0.064*	-0.031	-0.111**	-0.095***	-0.087***	0.013	-0.099**	-0.098*	-0.095***	-0.063**	0.084*	-0.089**
	(-2.981)	(-3.063)	(-1.302)	(-1.916)	(-0.903)	(-2.462)	(-4.304)	(-3.473)	(0.348)	(-2.508)	(-1.977)	(-4.048)	(-2.265)	(1.940)	(-2.337)
Trend	-0.003	-0.001	-0.011**	-0.006	-0.018***	-0.007**	-0.006	-0.008	0.011	-0.016*	-0.003	-0.019**	-0.018*	0.001	-0.035***
	(-1.369)	(-0.230)	(-2.271)	(-1.077)	(-2.859)	(-2.046)	(-1.044)	(-0.998)	(1.089)	(-1.884)	(-0.420)	(-2.472)	(-1.921)	(0.069)	(-3.033)
Constant	0.024	0.027	0.079	0.033	0.132*	0.033	0.085	0.034	0.046	0.191*	0.071	0.211	0.135	-0.063	0.408***
	(0.848)	(0.356)	(0.961)	(0.236)	(1.945)	(0.826)	(0.863)	(0.437)	(0.176)	(1.935)	(1.126)	(1.610)	(1.130)	(-0.340)	(2.696)
Observations	613	653	653	653	653	533	570	570	570	570	463	485	485	485	485
R^2	0.121	0.092	0.110	0.116	0.116	0.162	0.169	0.114	0.134	0.157	0.224	0.196	0.169	0.133	0.241

Note: Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Regressions for the four types of occupation are estimated using SUR.

Table A2 / Employment effects: Manufacturing and services offshoring

	D1					D2					D3				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	total	manager	clerk	craft	manual	total	manager	clerk	craft	manual	total	manager	clerk	craft	manual
Δw_i	-0.475***	-0.148	-0.468***	-0.312***	-0.300***	-0.285**	-0.173*	-0.324***	-0.276***	-0.285***	-0.392***	-0.219**	-0.271**	-0.027	-0.257**
	(-4.178)	(-1.602)	(-4.484)	(-4.005)	(-3.537)	(-2.629)	(-1.750)	(-2.915)	(-2.892)	(-3.063)	(-2.884)	(-1.977)	(-2.035)	(-0.212)	(-2.561)
Δw_{II}	-0.262	-0.480	-0.028	0.861**	-0.649**	-0.185	-0.995***	0.230	1.733***	-0.373	-0.374	-0.605	1.088*	0.748	-0.757
	(-1.348)	(-1.562)	(-0.071)	(2.343)	(-2.235)	(-0.999)	(-3.396)	(0.536)	(3.630)	(-0.740)	(-1.164)	(-1.256)	(1.774)	(1.144)	(-1.217)
ΔK	0.230	0.564	-0.533	0.103	-0.219	0.286	0.755*	0.240	1.046	0.330	0.013	-0.155	-0.873	0.506	1.268*
	(0.984)	(1.493)	(-1.173)	(0.221)	(-0.404)	(1.002)	(1.727)	(0.411)	(1.401)	(0.457)	(0.044)	(-0.299)	(-1.272)	(0.539)	(1.658)
ΔGO	0.243	0.712***	0.382	0.774**	0.765**	0.305**	0.462**	0.074	0.519*	0.592**	0.251	0.442**	-0.142	0.076	0.367
	(1.547)	(2.958)	(1.231)	(2.478)	(2.469)	(2.011)	(2.426)	(0.321)	(1.810)	(2.080)	(1.328)	(2.514)	(-0.609)	(0.222)	(1.420)
ΔIP	-0.041	-0.045	-0.037	0.024	-0.019	-0.035	-0.071*	-0.028	-0.007	0.035	-0.008	0.052	-0.042	-0.063	-0.061
	(-1.403)	(-0.603)	(-0.949)	(0.320)	(-0.207)	(-1.469)	(-1.926)	(-0.681)	(-0.128)	(0.652)	(-0.274)	(1.356)	(-1.088)	(-1.188)	(-0.807)
ΔIIM^M	0.129**	0.152**	0.148*	0.424***	0.232*	0.142**	0.113*	0.050	0.220*	0.113	0.120*	0.009	0.167*	0.313**	-0.004
	(2.185)	(2.190)	(1.739)	(3.029)	(1.923)	(2.251)	(1.929)	(0.510)	(1.837)	(1.042)	(1.911)	(0.147)	(1.670)	(2.359)	(-0.037)
ΔIIM^S	0.166	0.446***	0.269*	0.286*	0.401**	0.007	0.250**	0.136	0.324**	0.144	-0.296***	-0.107	-0.058	0.181	0.002
	(1.620)	(3.462)	(1.863)	(1.678)	(2.520)	(0.090)	(2.420)	(0.880)	(1.979)	(0.913)	(-2.926)	(-0.924)	(-0.397)	(1.058)	(0.015)
ΔMS_i	-0.089***	-0.064***	-0.036	-0.066**	-0.035	-0.109**	-0.094***	-0.087***	0.011	-0.098**	-0.082*	-0.096***	-0.063**	0.085*	-0.090**
	(-2.876)	(-2.958)	(-1.348)	(-2.005)	(-1.016)	(-2.463)	(-4.273)	(-3.506)	(0.306)	(-2.452)	(-1.789)	(-4.091)	(-2.292)	(1.914)	(-2.365)
Trend	-0.003	-0.003	-0.011**	-0.006	-0.019***	-0.006*	-0.008	-0.009	0.010	-0.016*	-0.002	-0.018**	-0.015	0.002	-0.035***
	(-1.323)	(-0.857)	(-2.336)	(-0.952)	(-3.020)	(-1.949)	(-1.318)	(-1.108)	(0.951)	(-1.892)	(-0.414)	(-2.274)	(-1.543)	(0.160)	(-3.014)
Constant	0.024	0.028	0.072	0.035	0.156**	0.030	0.067	0.043	0.047	0.206**	0.079	0.214	0.133	-0.050	0.409***
	(0.860)	(0.383)	(0.915)	(0.249)	(2.327)	(0.783)	(0.687)	(0.571)	(0.184)	(2.088)	(1.224)	(1.577)	(1.112)	(-0.267)	(2.653)
Observations	613	653	653	653	653	533	570	570	570	570	463	485	485	485	485
R^2	0.125	0.105	0.117	0.119	0.125	0.168	0.172	0.111	0.134	0.158	0.262	0.193	0.177	0.115	0.241

Note: Robust t-statistics in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$; Regressions for the four types of occupation are estimated using SUR.

Table A3 / Employment effects – cross effects: Narrow and broad offshoring

	D1				D2				D3			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	manager	clerk	craft	manual	manager	clerk	craft	manual	manager	clerk	craft	manual
Δw_{I}	-0.172*	-0.409***	-0.238***	-0.345***	-0.218**	-0.234**	-0.212**	-0.295***	-0.210*	-0.181	-0.011	-0.224**
	(-1.653)	(-3.479)	(-2.701)	(-3.584)	(-1.970)	(-1.984)	(-2.110)	(-3.058)	(-1.667)	(-1.297)	(-0.072)	(-2.204)
Δw_{II}	-0.666	-0.302	0.746	-0.847*	-0.684	0.085	2.285***	-1.047**	-0.422	1.014	0.389	-1.298*
	(-1.519)	(-0.727)	(1.442)	(-1.893)	(-1.517)	(0.204)	(3.620)	(-2.001)	(-0.760)	(1.600)	(0.448)	(-1.915)
ΔK	0.344	-0.041	0.192	0.354	0.966**	0.025	1.854**	0.789	0.076	-0.778	1.108	1.718**
	(0.894)	(-0.075)	(0.306)	(0.639)	(2.008)	(0.040)	(2.094)	(1.090)	(0.134)	(-1.093)	(1.050)	(2.065)
ΔGO	0.509**	0.439	0.946***	0.709**	0.450**	-0.021	0.764***	0.745***	0.609***	-0.282	0.362	0.454*
	(1.999)	(1.293)	(2.784)	(2.293)	(2.218)	(-0.087)	(2.730)	(2.598)	(3.079)	(-1.097)	(1.047)	(1.754)
ΔIP	0.026	-0.026	-0.044	-0.001	-0.004	0.006	-0.050	0.080	0.099**	-0.022	-0.070	-0.167*
	(0.305)	(-0.301)	(-0.630)	(-0.013)	(-0.082)	(0.091)	(-0.846)	(1.427)	(2.132)	(-0.405)	(-1.065)	(-1.950)
ΔIIM^{N}	-0.094**	-0.018	-0.045	-0.049	-0.107**	-0.095	0.027	-0.072	-0.100	-0.134*	-0.098	0.062
	(-2.534)	(-0.247)	(-0.967)	(-0.818)	(-2.204)	(-0.922)	(0.426)	(-1.018)	(-1.573)	(-1.809)	(-1.181)	(0.686)
ΔIIM^{B}	0.367**	0.357*	0.787***	0.343	0.203	0.283	0.522**	0.178	-0.127	0.384*	1.004***	0.049
	(2.115)	(1.891)	(3.429)	(1.396)	(1.320)	(1.162)	(2.326)	(0.837)	(-0.654)	(1.675)	(3.165)	(0.179)
$\Delta MS_{manager}$	-0.062**	-0.044	-0.020	-0.007	-0.107***	0.007	-0.093**	0.005	-0.077***	-0.007	-0.006	0.053
	(-2.331)	(-1.347)	(-0.516)	(-0.229)	(-3.891)	(0.221)	(-2.232)	(0.144)	(-2.846)	(-0.193)	(-0.135)	(1.488)
ΔMS_{clerk}	0.010	-0.031	-0.028	-0.026	0.016	-0.104***	-0.040	-0.062*	0.001	-0.063**	-0.015	-0.033
	(0.529)	(-1.096)	(-0.982)	(-0.887)	(0.695)	(-3.631)	(-1.118)	(-1.866)	(0.038)	(-2.171)	(-0.370)	(-0.985)
ΔMS_{craft}	-0.055**	-0.015	-0.039	-0.069**	0.008	0.028	0.035	-0.039	0.002	0.011	0.110**	-0.014
	(-2.339)	(-0.581)	(-1.060)	(-2.115)	(0.352)	(0.985)	(0.845)	(-1.131)	(0.071)	(0.314)	(2.208)	(-0.367)
ΔMS_{manual}	0.012	-0.004	-0.003	-0.060	0.007	0.021	0.069	-0.106**	-0.032	-0.083**	0.052	-0.095**
	(0.500)	(-0.119)	(-0.090)	(-1.642)	(0.253)	(0.580)	(1.591)	(-2.554)	(-1.095)	(-2.285)	(1.059)	(-2.134)
Trend	-0.004	-0.013**	-0.005	-0.014*	-0.004	-0.017**	0.015	-0.014	-0.017*	-0.009	0.009	-0.033***
	(-1.070)	(-2.365)	(-0.689)	(-1.898)	(-0.582)	(-2.155)	(1.417)	(-1.586)	(-1.959)	(-0.860)	(0.595)	(-2.737)
Constant	0.095	0.160	-0.099	0.119	0.066	0.124	-0.118	0.054	0.168	0.169	-0.163	0.389**
	(1.589)	(1.251)	(-0.771)	(0.578)	(0.665)	(1.600)	(-0.437)	(0.233)	(1.326)	(1.061)	(-0.868)	(2.056)
Observations	465	465	465	465	427	427	427	427	364	364	364	364
R^2	0.120	0.112	0.106	0.133	0.177	0.162	0.165	0.122	0.209	0.211	0.167	0.273

Note: Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Regressions for the four types of occupation are estimated using SUR.

Table A4 / Employment effects – cross effects: Manufacturing and services offshoring

	D1				D2				D3			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
	manager	**clerk**	**craft**	**manual**	**manager**	**clerk**	**craft**	**manual**	**manager**	**clerk**	**craft**	**manual**
Δw_i	-0.152	-0.415***	-0.236***	-0.357***	-0.194*	-0.242**	-0.214**	-0.291***	-0.216*	-0.195	-0.009	-0.235**
	(-1.446)	(-3.517)	(-2.681)	(-3.765)	(-1.722)	(-2.053)	(-2.161)	(-3.068)	(-1.746)	(-1.393)	(-0.062)	(-2.384)
Δw_{ii}	-0.620	-0.242	0.893*	-0.770*	-0.714	0.128	2.401***	-1.050**	-0.491	1.064*	0.797	-1.340**
	(-1.368)	(-0.574)	(1.718)	(-1.807)	(-1.586)	(0.296)	(3.919)	(-2.036)	(-0.885)	(1.686)	(0.957)	(-2.044)
ΔK	0.308	-0.059	0.233	0.364	0.940**	0.035	2.089**	0.755	0.052	-0.804	1.274	1.775**
	(0.796)	(-0.108)	(0.377)	(0.661)	(1.966)	(0.056)	(2.406)	(1.043)	(0.090)	(-1.114)	(1.178)	(2.130)
ΔGO	0.629**	0.502	1.082***	0.879***	0.563***	0.020	0.928***	0.774**	0.623***	-0.257	0.272	0.500*
	(2.371)	(1.362)	(3.092)	(2.812)	(2.615)	(0.075)	(3.116)	(2.566)	(3.038)	(-0.975)	(0.746)	(1.884)
ΔIP	-0.024	-0.032	-0.062	-0.039	-0.073*	-0.041	-0.027	0.043	0.044	-0.081*	-0.091*	-0.132*
	(-0.266)	(-0.438)	(-0.890)	(-0.380)	(-1.717)	(-0.965)	(-0.520)	(0.945)	(1.053)	(-1.874)	(-1.764)	(-1.955)
ΔIIM^M	0.144	0.192**	0.357**	0.063	0.055	0.068	0.097	0.089	0.000	0.174	0.252*	0.019
	(1.643)	(2.088)	(2.388)	(0.430)	(0.837)	(0.596)	(0.742)	(0.774)	(0.004)	(1.531)	(1.675)	(0.157)
ΔIIM^S	0.233	0.226	0.459***	0.448**	0.225*	0.140	0.523***	0.058	-0.133	0.021	0.207	0.190
	(1.548)	(1.231)	(2.589)	(2.465)	(1.836)	(0.736)	(3.036)	(0.360)	(-0.972)	(0.129)	(1.073)	(1.154)
$\Delta MS_{manager}$	-0.063**	-0.044	-0.018	-0.007	-0.115***	0.004	-0.091**	0.005	-0.083***	-0.004	0.008	0.055
	(-2.399)	(-1.329)	(-0.469)	(-0.227)	(-4.121)	(0.125)	(-2.142)	(0.122)	(-3.083)	(-0.102)	(0.170)	(1.523)
ΔMS_{clerk}	0.008	-0.032	-0.030	-0.031	0.011	-0.108***	-0.036	-0.064*	-0.003	-0.069**	-0.017	-0.032
	(0.416)	(-1.121)	(-1.054)	(-1.079)	(0.488)	(-3.799)	(-1.035)	(-1.956)	(-0.128)	(-2.369)	(-0.412)	(-0.951)
ΔMS_{craft}	-0.056**	-0.017	-0.042	-0.070**	0.007	0.028	0.033	-0.041	-0.002	0.007	0.116**	-0.014
	(-2.410)	(-0.652)	(-1.159)	(-2.157)	(0.307)	(0.987)	(0.806)	(-1.176)	(-0.086)	(0.204)	(2.284)	(-0.370)
ΔMS_{manual}	0.012	-0.005	-0.005	-0.062*	0.011	0.021	0.058	-0.104**	-0.024	-0.079**	0.049	-0.098**
	(0.487)	(-0.147)	(-0.180)	(-1.729)	(0.398)	(0.578)	(1.347)	(-2.429)	(-0.823)	(-2.222)	(0.999)	(-2.230)
Trend	-0.005	-0.013**	-0.005	-0.016**	-0.006	-0.018**	0.012	-0.015	-0.016*	-0.007	0.010	-0.034***
	(-1.359)	(-2.373)	(-0.757)	(-2.232)	(-0.899)	(-2.208)	(1.126)	(-1.586)	(-1.801)	(-0.670)	(0.674)	(-2.847)
Constant	0.116*	0.172	-0.096	0.126	0.122	0.159*	-0.013	0.069	0.217**	0.220	-0.194	0.363*
	(1.919)	(1.407)	(-0.790)	(0.622)	(1.222)	(1.834)	(-0.048)	(0.300)	(2.140)	(1.443)	(-1.034)	(1.911)
Observations	465	465	465	465	427	427	427	427	364	364	364	364
R^2	0.119	0.117	0.114	0.143	0.178	0.158	0.172	0.197	0.202	0.209	0.146	0.275

Note: Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Regressions for the four types of occupation are estimated using SUR.

Table A5 / Employment elasticity effects: Narrow and broad offshoring

	D1					D2					D3				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**
	total	**manager**	**clerk**	**craft**	**manual**	**total**	**manager**	**clerk**	**craft**	**manual**	**total**	**manager**	**clerk**	**craft**	**manual**
Δw_i	-1.227**	-0.021	-0.168	0.112	0.102	-1.570***	0.227	-0.203	0.406	0.167	-1.772***	0.467	0.607	-0.172	0.185
	(-2.280)	(-0.055)	(-0.270)	(0.245)	(0.207)	(-2.970)	(0.574)	(-0.297)	(0.706)	(0.285)	(-2.885)	(0.945)	(0.872)	(-0.249)	(0.249)
Δw_{ii}	-0.255	-0.532*	-0.046	0.744**	-0.746**	-0.114	-1.043***	0.138	1.620***	-0.442	-0.349	-0.633	1.001	0.678	-0.845
	(-1.339)	(-1.822)	(-0.116)	(2.263)	(-2.491)	(-0.585)	(-3.420)	(0.333)	(3.415)	(-0.834)	(-0.991)	(-1.311)	(1.602)	(1.064)	(-1.368)
ΔK	0.188	0.641	-0.501	-0.104	-0.202	0.285	0.806*	0.257	0.623	0.283	0.200	-0.075	-0.718	-0.066	1.212
	(0.772)	(1.633)	(-1.093)	(-0.219)	(-0.372)	(0.948)	(1.799)	(0.433)	(0.825)	(0.387)	(0.681)	(-0.146)	(-1.034)	(-0.075)	(1.563)
ΔGO	0.198	0.541**	0.340	0.813***	0.703**	0.301**	0.356*	0.066	0.515*	0.567**	0.367**	0.401**	-0.093	0.186	0.401
	(1.327)	(2.263)	(1.143)	(2.738)	(2.258)	(2.085)	(1.894)	(0.290)	(1.894)	(2.019)	(2.121)	(2.418)	(-0.422)	(0.569)	(1.627)
ΔIP	-0.022	0.022	-0.050	0.002	0.020	-0.047	-0.003	-0.023	-0.007	0.044	-0.001	0.049	-0.033	-0.065	-0.049
	(-0.550)	(0.309)	(-0.861)	(0.032)	(0.226)	(-1.317)	(-0.068)	(-0.330)	(-0.098)	(0.741)	(-0.020)	(0.991)	(-0.543)	(-0.956)	(-0.570)
ΔIIM^N	-0.792	-0.116	0.767	0.254	-1.304*	0.312	0.196	0.643	-0.500	-0.185	-0.468	1.144*	-0.350	0.089	-1.487**
	(-0.853)	(-0.162)	(0.917)	(0.380)	(-1.654)	(0.460)	(0.332)	(0.774)	(-0.466)	(-0.240)	(-0.546)	(1.689)	(-0.335)	(0.084)	(-2.159)
ΔIIM^B	-1.622	1.471	0.343	3.053*	2.792	-3.462**	1.520	0.135	4.044*	1.501	-2.924	0.426	1.980	2.087	1.852
	(-0.809)	(0.982)	(0.154)	(1.876)	(1.590)	(-2.010)	(1.000)	(0.055)	(1.787)	(0.746)	(-1.338)	(0.216)	(0.803)	(0.801)	(0.780)
ΔMS_i	-0.339	-0.729*	0.348	-1.356***	0.055	-1.664**	-0.042	-0.052	-0.711	0.408	-2.018**	1.180**	1.869**	-2.058***	0.743
	(-0.755)	(-1.803)	(0.426)	(-2.837)	(0.072)	(-2.557)	(-0.091)	(-0.067)	(-1.585)	(0.587)	(-2.268)	(2.125)	(2.148)	(-3.800)	(0.835)
$\Delta(w_i \times IIM^N)$	0.073	0.002	-0.074	-0.028	0.124*	-0.034	-0.029	-0.067	0.049	0.016	0.043	-0.114*	0.030	-0.018	0.147**
	(0.823)	(0.033)	(-0.900)	(-0.422)	(1.645)	(-0.507)	(-0.511)	(-0.779)	(0.467)	(0.210)	(0.528)	(-1.762)	(0.300)	(-0.172)	(2.200)
$\Delta(w_i \times IIM^B)$	0.186	-0.095	-0.015	-0.229	-0.232	0.360**	-0.117	0.015	-0.347	-0.125	0.296	-0.050	-0.174	-0.110	-0.185
	(0.946)	(-0.659)	(-0.066)	(-1.394)	(-1.355)	(2.066)	(-0.800)	(0.062)	(-1.547)	(-0.629)	(1.382)	(-0.267)	(-0.712)	(-0.424)	(-0.774)
$\Delta(w_i \times MS_i)$	0.024	0.063	-0.038	0.130***	-0.009	0.152**	-0.005	-0.004	0.074	-0.051	0.187**	-0.122**	-0.190**	0.218***	-0.082
	(0.562)	(1.644)	(-0.472)	(2.720)	(-0.113)	(2.424)	(-0.115)	(-0.046)	(1.617)	(-0.736)	(2.205)	(-2.320)	(-2.222)	(3.905)	(-0.935)
Trend	-0.003	-0.001	-0.011**	-0.008	-0.018***	-0.008**	-0.006	-0.008	0.011	-0.016*	-0.007	-0.016**	-0.017*	0.002	-0.034***
	(-1.563)	(-0.193)	(-2.272)	(-1.254)	(-2.804)	(-2.366)	(-0.990)	(-1.024)	(1.077)	(-1.922)	(-1.162)	(-2.027)	(-1.812)	(0.151)	(-2.986)
Constant	0.048	0.038	0.072	0.034	0.123*	0.131**	0.056	0.029	0.102	0.183*	0.249***	0.093	0.043	0.015	0.378**
	(1.280)	(0.498)	(0.878)	(0.262)	(1.783)	(2.226)	(0.537)	(0.357)	(0.426)	(1.807)	(2.794)	(0.635)	(0.348)	(0.085)	(2.426)
Observations	613	653	653	653	653	533	570	570	570	570	463	485	485	485	485
R^2	0.129	0.097	0.113	0.143	0.123	0.178	0.172	0.116	0.151	0.159	0.248	0.224	0.181	0.172	0.251

Note: Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Regressions for the four types of occupation are estimated using SUR.

Table A6 / Employment elasticity effects: Manufacturing & Services

			D1					D2					D3		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	total	manager	clerk	craft	manual	total	manager	clerk	craft	manual	total	manager	clerk	craft	manual
Δw_i	-0.883**	-0.035	-0.009	-0.071	-0.019	-1.040**	0.206	-0.414	0.248	0.129	-1.519***	0.595*	-0.128	-0.352	0.168
	(-2.360)	(-0.126)	(-0.019)	(-0.220)	(-0.049)	(-2.590)	(0.662)	(-0.898)	(0.581)	(0.313)	(-3.954)	(1.650)	(-0.257)	(-0.748)	(0.326)
Δw_{II}	-0.244	-0.461	-0.007	0.902***	-0.671**	-0.179	-1.031***	0.210	1.842***	-0.406	-0.412	-0.663	0.941	1.071*	-0.834
	(-1.294)	(-1.507)	(-0.017)	(2.596)	(-2.289)	(-0.981)	(-3.471)	(0.494)	(3.907)	(-0.785)	(-1.267)	(-1.371)	(1.552)	(1.781)	(-1.358)
ΔK	0.189	0.599	-0.462	-0.058	-0.184	0.280	0.806*	0.239	0.710	0.317	-0.013	-0.064	-0.479	0.044	1.297*
	(0.820)	(1.590)	(-1.031)	(-0.122)	(-0.338)	(0.969)	(1.824)	(0.411)	(0.978)	(0.439)	(-0.044)	(-0.124)	(-0.714)	(0.049)	(1.757)
ΔGO	0.264	0.711***	0.406	0.782**	0.738**	0.303*	0.447**	0.061	0.513*	0.611**	0.256	0.383**	-0.177	0.108	0.367
	(1.648)	(2.964)	(1.320)	(2.560)	(2.358)	(1.967)	(2.325)	(0.259)	(1.788)	(2.128)	(1.392)	(2.284)	(-0.806)	(0.323)	(1.405)
ΔIP	-0.048	-0.048	-0.032	0.013	-0.012	-0.046*	-0.071**	-0.032	0.000	0.032	-0.028	0.025	-0.057	-0.071	-0.066
	(-1.579)	(-0.651)	(-0.800)	(0.168)	(-0.132)	(-1.883)	(-1.967)	(-0.765)	(0.008)	(0.643)	(-1.001)	(0.628)	(-1.485)	(-1.399)	(-0.920)
ΔIIM^M	-0.037	0.861	-0.185	1.352	1.019	-0.480	1.160	0.916	1.884	1.032	-0.530	1.984*	1.661	0.599	1.274
	(-0.035)	(0.988)	(-0.185)	(1.488)	(1.326)	(-0.473)	(1.087)	(0.732)	(1.420)	(1.157)	(-0.502)	(1.874)	(1.419)	(0.429)	(1.135)
ΔIIM^S	-1.815*	0.918	2.458*	2.148**	1.529	-1.940*	1.124	-1.543	2.283*	0.694	-3.971***	0.680	-3.012*	0.860	-0.308
	(-1.733)	(0.968)	(1.682)	(2.024)	(1.155)	(-1.853)	(1.111)	(-1.054)	(1.824)	(0.504)	(-3.856)	(0.636)	(-1.898)	(0.640)	(-0.225)
ΔMS_i	-0.276	-0.745*	0.584	-1.371***	-0.250	-1.467**	-0.092	0.002	-0.743	0.449	-1.601**	1.125*	1.528*	-2.120***	0.707
	(-0.588)	(-1.809)	(0.706)	(-2.937)	(-0.349)	(-2.350)	(-0.185)	(0.002)	(-1.637)	(0.644)	(-2.281)	(1.914)	(1.742)	(-3.895)	(0.800)
$\Delta(w_i \times IIM^M)$	0.017	-0.067	0.034	-0.094	-0.078	0.061	-0.101	-0.086	-0.165	-0.091	0.064	-0.188*	-0.147	-0.029	-0.123
	(0.165)	(-0.812)	(0.342)	(-1.045)	(-1.057)	(0.618)	(-0.990)	(-0.699)	(-1.269)	(-1.052)	(0.630)	(-1.882)	(-1.269)	(-0.210)	(-1.128)
$\Delta(w_i \times IIM^S)$	0.195*	-0.046	-0.216	-0.187*	-0.112	0.193*	-0.085	0.168	-0.201	-0.052	0.368***	-0.076	0.298*	-0.073	0.034
	(1.871)	(-0.506)	(-1.486)	(-1.784)	(-0.852)	(1.868)	(-0.880)	(1.144)	(-1.627)	(-0.380)	(3.607)	(-0.743)	(1.894)	(-0.530)	(0.246)
$\Delta(w_i \times MS_i)$	0.018	0.065*	-0.061	0.131***	0.022	0.133**	-0.000	-0.009	0.077*	-0.055	0.149**	-0.117**	-0.156*	0.224***	-0.079
	(0.409)	(1.660)	(-0.756)	(2.806)	(0.308)	(2.213)	(-0.000)	(-0.110)	(1.671)	(-0.796)	(2.211)	(-2.099)	(-1.816)	(3.984)	(-0.908)
Trend	-0.003	-0.003	-0.011**	-0.007	-0.018***	-0.007**	-0.007	-0.010	0.009	-0.017**	-0.007	-0.013*	-0.017*	0.004	-0.035***
	(-1.466)	(-0.776)	(-2.338)	(-1.160)	(-2.944)	(-2.350)	(-1.220)	(-1.308)	(0.920)	(-2.018)	(-1.142)	(-1.725)	(-1.772)	(0.266)	(-3.045)
Constant	0.045	0.038	0.115**	0.039	0.144**	0.114**	0.035	0.005	0.121	0.199**	0.305***	0.065	0.096	0.028	0.363**
	(1.277)	(0.520)	(2.224)	(0.298)	(2.118)	(2.122)	(0.332)	(0.042)	(0.531)	(2.007)	(3.606)	(0.454)	(0.839)	(0.157)	(2.284)
Observations	613	653	653	653	653	533	570	570	570	570	463	485	485	485	485
R^2	0.131	0.111	0.124	0.148	0.128	0.182	0.175	0.117	0.152	0.162	0.296	0.217	0.204	0.154	0.248

Note: Robust t-statistics in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$; Regressions for the four types of occupation are estimated using SUR.

Table A7 / Employment elasticity effects – cross effects: NO & BO

	D1				D2				D3			
	(1) manager	(2) clerk	(3) craft	(4) manual	(5) manager	(6) clerk	(7) craft	(8) manual	(9) manager	(10) clerk	(11) craft	(12) manual
Δw_i	-0.253	-0.013	0.192	-0.491	0.624	-0.481	0.317	-0.172	0.487	-0.460	0.061	-0.275
	(-0.525)	(-0.017)	(0.422)	(-0.711)	(1.444)	(-0.542)	(0.571)	(-0.331)	(0.842)	(-0.521)	(0.082)	(-0.311)
Δw_{II}	-0.828*	-0.379	0.676	-0.809*	-0.654	-0.001	2.338***	-0.775	-0.249	1.165*	1.064	-1.242*
	(-1.920)	(-0.873)	(1.339)	(-1.863)	(-1.322)	(-0.003)	(3.756)	(-1.503)	(-0.425)	(1.678)	(1.439)	(-1.800)
ΔK	0.278	-0.266	-0.180	0.512	1.136**	0.185	1.310	1.462*	0.258	-0.649	0.329	1.568*
	(0.670)	(-0.437)	(-0.296)	(0.922)	(2.180)	(0.266)	(1.567)	(1.957)	(0.430)	(-0.834)	(0.332)	(1.946)
ΔGO	0.592**	0.427	1.011***	0.804***	0.383*	0.064	0.756***	0.820***	0.347*	-0.269	0.580*	0.470*
	(2.261)	(1.205)	(3.129)	(2.659)	(1.811)	(0.237)	(2.702)	(2.778)	(1.694)	(-0.985)	(1.780)	(1.887)
ΔIP	0.012	-0.024	-0.082	0.018	-0.015	0.010	-0.050	0.030	0.027	-0.027	-0.088	-0.216**
	(0.131)	(-0.286)	(-1.254)	(0.180)	(-0.290)	(0.147)	(-0.794)	(0.503)	(0.509)	(-0.399)	(-1.244)	(-2.419)
ΔIIM^N	0.358	0.216	0.027	-0.635	0.496	0.866	-0.817	0.338	1.819**	-0.046	-0.440	-0.462
	(0.395)	(0.225)	(0.040)	(-0.673)	(0.683)	(0.909)	(-0.740)	(0.415)	(2.217)	(-0.039)	(-0.371)	(-0.499)
ΔIIM^B	0.596	0.792	3.961**	1.294	2.527	-1.709	3.722	0.766	-0.180	-0.259	4.358	0.460
	(0.309)	(0.300)	(2.376)	(0.556)	(1.432)	(-0.545)	(1.619)	(0.392)	(-0.075)	(-0.083)	(1.541)	(0.171)
$\Delta MS_{manager}$	-1.130***	0.190	-0.509	-0.097	-0.084	0.147	-0.770**	-0.269	1.009*	0.196	-0.061	-0.395
	(-2.621)	(0.710)	(-1.190)	(-0.299)	(-0.161)	(0.558)	(-2.387)	(-0.878)	(1.660)	(0.563)	(-0.123)	(-1.112)
ΔMS_{clerk}	0.375*	0.975	-0.170	0.122	0.252	0.577	0.386	1.378***	0.772**	-0.225	0.108	1.034**
	(1.919)	(1.081)	(-0.494)	(0.347)	(0.811)	(0.581)	(1.229)	(3.243)	(1.985)	(-0.232)	(0.268)	(2.548)
ΔMS_{craft}	-0.149	-0.054	-1.852***	0.025	0.085	0.051	-0.374	-0.123	0.204	0.125	-3.151***	-0.429
	(-1.427)	(-0.528)	(-3.169)	(0.179)	(0.822)	(0.463)	(-0.672)	(-0.991)	(1.297)	(0.710)	(-4.048)	(-1.574)
ΔMS_{manual}	-0.003	0.407**	0.238	-0.949	-0.242**	-0.365	0.360	-0.313	-0.125	-0.206	-0.009	-0.102
	(-0.022)	(2.278)	(1.096)	(-1.136)	(-1.991)	(-1.559)	(1.276)	(-0.478)	(-0.823)	(-0.861)	(-0.029)	(-0.092)
$\Delta(w_i \times IIM^N)$	-0.045	-0.024	-0.006	0.055	-0.057	-0.098	0.085	-0.039	-0.186**	-0.009	0.039	0.057
	(-0.520)	(-0.254)	(-0.093)	(0.612)	(-0.813)	(-1.013)	(0.775)	(-0.492)	(-2.376)	(-0.080)	(0.337)	(0.641)
$\Delta(w_i \times IIM^B)$	0.005	-0.040	-0.314*	-0.076	-0.227	0.218	-0.321	-0.069	0.001	0.076	-0.358	-0.044
	(0.028)	(-0.156)	(-1.877)	(-0.333)	(-1.319)	(0.696)	(-1.413)	(-0.361)	(0.006)	(0.246)	(-1.283)	(-0.166)
$\Delta(w_i \times MS_{manager})$	0.105**	-0.022	0.046	0.008	-0.001	-0.014	0.065**	0.024	-0.102*	-0.019	0.005	0.042
	(2.519)	(-0.889)	(1.139)	(0.273)	(-0.013)	(-0.557)	(2.122)	(0.805)	(-1.753)	(-0.566)	(0.112)	(1.231)
$\Delta(w_i \times MS_{clerk})$	-0.037*	-0.098	0.016	-0.014	-0.023	-0.067	-0.041	-0.140***	-0.074*	0.017	-0.011	-0.105***
	(-1.914)	(-1.110)	(0.470)	(-0.412)	(-0.754)	(-0.681)	(-1.362)	(-3.343)	(-1.956)	(0.174)	(-0.280)	(-2.629)
$\Delta(w_i \times MS_{craft})$	0.010	0.004	0.180***	-0.010	-0.008	-0.002	0.043	0.008	-0.020	-0.010	0.325***	0.041
	(0.975)	(0.423)	(3.115)	(-0.701)	(-0.886)	(-0.180)	(0.774)	(0.690)	(-1.328)	(-0.599)	(4.136)	(1.509)
$\Delta(w_i \times MS_{manual})$	0.002	-0.040**	-0.024	0.088	0.024**	0.040*	-0.029	0.020	0.009	0.014	0.003	0.003
	(0.147)	(-2.323)	(-1.137)	(1.072)	(2.100)	(1.708)	(-1.065)	(0.310)	(0.581)	(0.607)	(0.100)	(0.030)
trend	-0.005	-0.016***	-0.007	-0.010	-0.006	-0.020***	0.015	-0.009	-0.012	-0.010	0.013	-0.033***
	(-1.297)	(-2.657)	(-1.054)	(-1.413)	(-0.844)	(-2.581)	(1.443)	(-1.059)	(-1.231)	(-0.857)	(0.916)	(-2.689)
Constant	0.042	0.185	0.034	-0.063	-0.061	0.108	-0.147	-0.251	0.015	0.058	0.106	0.406**
	(0.318)	(1.345)	(0.432)	(-0.458)	(-0.307)	(0.929)	(-0.418)	(-0.981)	(0.118)	(0.348)	(0.563)	(2.165)
Observations	436	436	436	436	393	393	393	393	331	331	331	331
R^2	0.145	0.139	0.157	0.151	0.195	0.178	0.192	0.270	0.254	0.214	0.236	0.326

Note: Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Regressions for the four types of occupation are estimated using SUR.

Table A8 / Employment elasticity effects – cross effects: Manufacturing & Services

	D1				D2				D3			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
	manager	**clerk**	**craft**	**manual**	**manager**	**clerk**	**craft**	**manual**	**manager**	**clerk**	**craft**	**manual**
Δw_i	-0.124	0.411	-0.000	-0.396	0.494	-0.203	0.115	-0.102	0.727*	-0.525	-0.442	0.036
	(-0.327)	(0.741)	(-0.001)	(-0.733)	(1.405)	(-0.310)	(0.293)	(-0.273)	(1.660)	(-0.806)	(-0.808)	(0.060)
Δw_{II}	-0.724	-0.276	0.768	-0.749*	-0.708	-0.004	2.419***	-0.879*	-0.321	1.044	1.461**	-1.327**
	(-1.611)	(-0.624)	(1.515)	(-1.816)	(-1.451)	(-0.010)	(4.001)	(-1.748)	(-0.534)	(1.557)	(2.095)	(-1.984)
ΔK	0.250	-0.185	-0.163	0.535	1.091**	0.092	1.470*	1.443*	0.206	-0.438	0.523	1.630**
	(0.593)	(-0.310)	(-0.266)	(0.963)	(2.099)	(0.136)	(1.785)	(1.922)	(0.337)	(-0.572)	(0.532)	(2.009)
ΔGO	0.709***	0.486	1.118***	0.973***	0.493**	0.092	0.922***	0.894***	0.409**	-0.253	0.483	0.535**
	(2.652)	(1.282)	(3.299)	(3.137)	(2.173)	(0.317)	(3.056)	(2.871)	(1.981)	(-0.947)	(1.412)	(2.052)
ΔIP	-0.030	-0.023	-0.090	-0.021	-0.061	-0.042	-0.044	0.001	0.011	-0.094**	-0.086*	-0.166**
	(-0.322)	(-0.301)	(-1.382)	(-0.209)	(-1.618)	(-0.836)	(-0.801)	(0.011)	(0.253)	(-1.973)	(-1.668)	(-2.537)
ΔIIM^M	1.004	-0.034	1.833**	0.817	2.038	0.919	0.907	1.386	2.458*	1.146	0.357	0.740
	(0.772)	(-0.025)	(2.204)	(0.610)	(1.641)	(0.478)	(0.735)	(1.632)	(1.724)	(0.663)	(0.201)	(0.527)
ΔIIM^S	0.551	3.760**	2.399**	1.340	1.341	-1.863	2.492*	0.507	0.576	-2.936*	2.118	0.952
	(0.436)	(2.475)	(2.033)	(0.837)	(1.141)	(-1.236)	(1.951)	(0.348)	(0.471)	(-1.719)	(1.293)	(0.667)
$\Delta MS_{manager}$	-1.159***	0.186	-0.517	-0.084	-0.071	0.080	-0.772**	-0.347	0.969	0.169	0.202	-0.491
	(-2.584)	(0.704)	(-1.249)	(-0.261)	(-0.135)	(0.310)	(-2.351)	(-1.150)	(1.537)	(0.485)	(0.385)	(-1.396)
ΔMS_{clerk}	0.396*	1.154	-0.143	0.140	0.267	0.779	0.478	1.381***	0.766*	-0.067	0.223	1.086***
	(1.953)	(1.254)	(-0.414)	(0.408)	(0.854)	(0.770)	(1.539)	(3.227)	(1.896)	(-0.071)	(0.534)	(2.641)
ΔMS_{craft}	-0.136	-0.060	-1.705***	0.056	0.091	0.042	-0.513	-0.121	0.122	0.070	-3.028***	-0.387
	(-1.338)	(-0.596)	(-2.924)	(0.413)	(0.855)	(0.408)	(-0.986)	(-0.990)	(0.701)	(0.387)	(-4.100)	(-1.397)
ΔMS_{manual}	-0.023	0.427**	0.182	-1.277	-0.240**	-0.336	0.394	-0.217	-0.149	-0.181	-0.006	-0.035
	(-0.162)	(2.393)	(0.864)	(-1.557)	(-1.973)	(-1.412)	(1.386)	(-0.339)	(-0.958)	(-0.756)	(-0.018)	(-0.034)
$\Delta(w_i \times IIM^M)$	-0.072	0.027	-0.141*	-0.067	-0.190	-0.080	-0.082	-0.123	-0.236*	-0.094	-0.019	-0.065
	(-0.581)	(0.196)	(-1.732)	(-0.524)	(-1.606)	(-0.414)	(-0.677)	(-1.518)	(-1.743)	(-0.538)	(-0.108)	(-0.479)
$\Delta(w_i \times IIM^S)$	-0.022	-0.352**	-0.199*	-0.083	-0.111	0.206	-0.198	-0.040	-0.073	0.307*	-0.202	-0.078
	(-0.182)	(-2.307)	(-1.723)	(-0.527)	(-0.968)	(1.380)	(-1.575)	(-0.280)	(-0.617)	(1.823)	(-1.241)	(-0.550)
$\Delta(w_i \times MS_{manager})$	0.107**	-0.022	0.047	0.007	-0.003	-0.008	0.066**	0.031	-0.100*	-0.017	-0.018	0.052
	(2.483)	(-0.883)	(1.201)	(0.229)	(-0.055)	(-0.316)	(2.100)	(1.065)	(-1.651)	(-0.500)	(-0.362)	(1.526)
$\Delta(w_i \times MS_{clerk})$	-0.039*	-0.117	0.013	-0.017	-0.025	-0.087	-0.050*	-0.140***	-0.074*	0.001	-0.022	-0.110***
	(-1.956)	(-1.292)	(0.391)	(-0.494)	(-0.809)	(-0.867)	(-1.653)	(-3.332)	(-1.884)	(0.011)	(-0.554)	(-2.722)
$\Delta(w_i \times MS_{craft})$	0.008	0.005	0.165***	-0.013	-0.009	-0.002	0.057	0.008	-0.012	-0.006	0.314***	0.036
	(0.866)	(0.526)	(2.862)	(-0.992)	(-0.922)	(-0.185)	(1.090)	(0.669)	(-0.711)	(-0.358)	(4.203)	(1.322)
$\Delta(w_i \times MS_{manual})$	0.004	-0.041**	-0.019	0.121	0.025**	0.037	-0.034	0.011	0.012	0.012	0.002	-0.004
	(0.274)	(-2.386)	(-0.924)	(1.500)	(2.167)	(1.563)	(-1.218)	(0.175)	(0.779)	(0.502)	(0.068)	(-0.034)
Trend	-0.006	-0.015**	-0.007	-0.012*	-0.008	-0.024***	0.011	-0.011	-0.010	-0.014	0.016	-0.034***
	(-1.548)	(-2.552)	(-1.047)	(-1.768)	(-1.183)	(-2.925)	(1.064)	(-1.175)	(-1.021)	(-1.181)	(1.162)	(-2.758)
Constant	0.049	0.161	-0.056	-0.073	-0.063	0.292**	-0.143	-0.260	0.189	0.172	0.107	0.366*
	(0.391)	(1.230)	(-0.466)	(-0.561)	(-0.336)	(2.532)	(-0.419)	(-1.078)	(1.118)	(1.061)	(0.614)	(1.930)
Observations	436	436	436	436	393	393	393	393	331	331	331	331
R^2	0.145	0.159	0.164	0.163	0.195	0.175	0.200	0.276	0.227	0.224	0.223	0.325

Note: Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Regressions for the four types of occupation are estimated using SUR.

Table A9 / Countries and country classifications by region and income level

Country	Code	Classification
Australia	AU	Developed-extraEU
Austria	AT	Developed-EU
Belgium	BE	Developed-EU
Brazil	BR	Developing-extraEU
Bulgaria	BG	Developing-EU
Canada	CA	Developed-extraEU
China	CN	Developing-extraEU
Croatia	HR	Developing-EU
Cyprus	CY	Developed-EU
Czech Republic	CZ	Developing-EU
Denmark	DK	Developed-EU
Estonia	EE	Developing-EU
Finland	FI	Developed-EU
France	FR	Developed-EU
Germany	DE	Developed-EU
Greece	EL	Developed-EU
Hungary	HU	Developing-EU
India	IN	Developing-extraEU
Indonesia	ID	Developing-extraEU
Ireland	IE	Developed-EU
Italy	IT	Developed-EU
Japan	JP	Developed-extraEU
Republic of Korea	KR	Developed-extraEU
Latvia	LV	Developing-EU
Lithuania	LT	Developing-EU
Luxembourg	LU	Developed-EU
Malta	MT	Developed-EU
Mexico	MX	Developing-extraEU
Netherlands	NL	Developed-EU
Norway	NO	Developed-extraEU
Poland	PL	Developing-EU
Portugal	PT	Developed-EU
Romania	RO	Developing-EU
Russia	RU	Developing-extraEU
Slovakia	SK	Developing-EU
Slovenia	SI	Developed-EU
Spain	ES	Developed-EU
Sweden	SE	Developed-EU
Switzerland	CH	Developed-extraEU
Taiwan	TW	Developed-extraEU
Turkey	TR	Developing-extraEU
UK	GB	Developed-EU
USA	US	Developed-extraEU

Table A10 / Overview of industries (NACE Rev. 2 classification)

	NACE Rev. 2	
EU-SILC	**Section**	**Description**
A	A	Agriculture, forestry and fishing
B-E	B	Mining and quarrying
	C	Manufacturing
	D	Electricity, gas, steam and air conditioning supply
	E	Water supply, sewerage, waste management and remediation activities
F	F	Construction
G	G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	H	Transportation
I	I	Accommodation and food service activities
J	J	Information and communication
K	K	Financial and insurance activities
L-N	L	Real estate activities
	M	Professional, scientific and technical activities
	N	Administrative and support service activities
O	O	Public administration and defence; compulsory social security
P	P	Education
Q	Q	Human health and social work activities
R-U	R	Arts, entertainment and recreation
	S	Other service activities
	T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
	U	Activities of extraterritorial organisations and bodies

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Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche“ (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

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Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

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