

# Displacement and income effects of Central and Eastern European labour migrants in the Netherlands

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## Abstract

*Labour migration from the Central and Eastern European countries of Estonia, Latvia, Lithuania, Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Bulgaria and Romania, together referred to as the New European Member States (NMS), has a modest impact on the Dutch labour market. In this paper we analyse displacement and wage effects of these labour migrants using a combination of the area and skill-cell approach on administrative data of all employees in the Netherlands between 1999 and 2005. Despite the substantial growth since 2000 in the number of Polish labour migrants in particular, displacement of Dutch employees hardly takes place. Also, effects on wages are barely noticeable. Since we use a complete set of data on employees, the estimated effects can be interpreted as general equilibrium effects.*

## 1. Introduction

As in many Western European countries, the inflow of labour migrants from Central and Eastern Europe has increased in the Netherlands after these countries joined the European Union. This has raised concerns about the labour market position of the native Dutch population. One view is that the new generation of labour migrants has such a low reservation wage that this will displace native employees in the labour market or at least causes a reduction in wage levels and thus income levels of the native Dutch population. The opposite view is that these labour migrants solve local labour market shortages at relatively low costs, increasing the level of production and income in the Netherlands and therefore increasing labour market opportunities of the native Dutch population. In this paper we analyse displacement and income effects of labour migration from the Central and Eastern European countries of Estonia, Latvia, Lithuania, Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Bulgaria and Romania, together referred to as the New EU Member States (NMS). We find that despite the substantial growth in NMS immigrants since 2000, and the number of Polish labour migrants in particular, on average displacement of native Dutch employees hardly takes place. Also, a reduction in wage levels is barely noticeable. However, income differences in the Netherlands increase as a result of labour migration from the NMS countries, since the small wage reductions that do occur only concern low-wage employees.

Economic theory predicts that an increase in labour supply reduces wages. If wages are difficult to reduce, increased labour supply increases unemployment, especially if labour is already redundant. If

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wages are elastic, the reduced labour costs may increase production levels and may even increase the demand for labour in the long run. An increase in labour supply may also improve the allocation of labour, reducing production costs and increasing production, especially when labour shortages exist. Therefore, the effect of increased labour supply through labour migration is ambiguous. Much depends on whether increased labour supply is complementary to existing labour supply and whether existing labour supply is redundant or short of labour demand. Also, labour migration may be interpreted as a labour supply shock, or as an answer to an increase in labour demand. The latter is more or less the case with temporary labour migration to perform seasonal jobs in for example agriculture or construction.

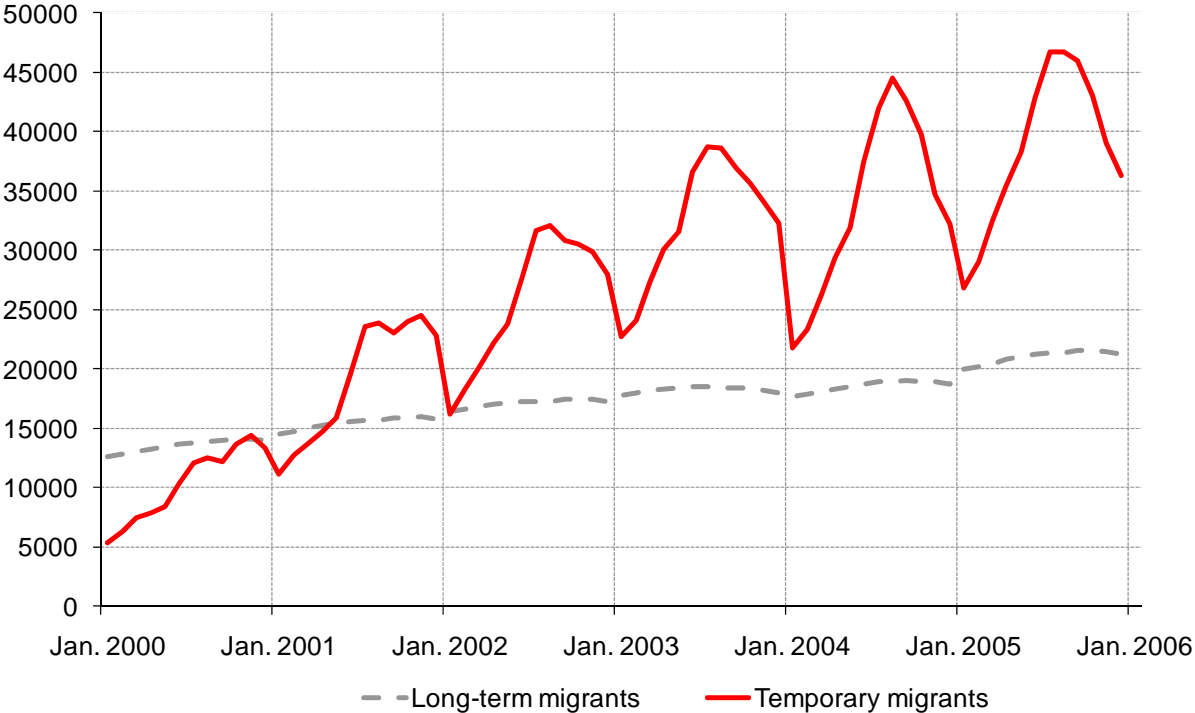
Most empirical studies on the impact of labour migration show small or negligible average displacement and wage effects. However, when distributional effects are taken into account, these are often found to be significant. Using an area approach in which labour market outcomes in areas with high and low immigration flows are compared, Card (1990), Pischke and Velling (1997) and others find no significant effects of labour migration in the long run. To avoid problems with self-selection and correlation between area observations due to interregional migration, Borjas (2003) introduces skill-cell correlation to identify effects of labour migration on native employment and wages. It is one of the few studies that yields significant and sizable effects of migration. In a similar study for Germany however, Bonin (2005) finds no effects. More recently Drinkwater et al (2009) and Wadensjö (2007) find no evidence for displacement, nor for social welfare tourism. Dustmann, Frattini and Preston (2007) even find small positive effects of labour migration on wages, with the best effects for the higher wage brackets and negative effects for the lowest wage brackets. In general, small negative effects of labour migration are only found for low-wage, low-skilled native employees, leading to increased wage differences (Guiletti, 2009). Pohl (2009) finds that for Germany skilled immigration is positively associated with income increases of native employees in skilled jobs, whereas the opposite effect is found for natives in occupations that only require little education. Similar results have not been available for the Netherlands.

## **2. Data**

Data on the number and type of labour migrants in the Netherlands are not readily available. A number of studies have tried to estimate these amounts for recent years and have all come up with different numbers (Van den Berg et al, 2008; De Boom et al, 2008; De Bondt et al, 2008; Timmermans et al, 2008). The main reason for this is the variety in definitions of labour migrants. Labour migrants can either be employees or self-employed, registered in the country of origin or in the country of destination, and either be legal or illegal. In our study we focus on the group of labour migrants for whom we have reliable administrative data available, namely legal employees from the NMS countries (including temp agency workers). This excludes self-employed migrants as well as temp agency workers who work for a foreign temp work agency. This does not yet completely define our research population, as there is a difference between migrants by country of birth ('foreign-born') and migrants by nationality ('foreigners'). For example, in 2005 half of the labour migrants from the NMS countries that resided in the Netherlands for longer than 4 months had a Dutch passport and about 9 thousand labour migrants with a Polish address had the German nationality. We identify labour migrants primarily as foreign-born, but have to distinguish between long-term migrants and

temporary migrants. The first group is registered in the Dutch municipal personal records database as they intend to stay in the Netherlands for more than 4 months, while the second is not. Temporary labour migrants are only registered at the Dutch social security administration (UWV), as they are officially still residing in their home country. As a consequence, long-term migrants can be identified by country of birth but temporary migrants can only be identified by their country of residence.<sup>2</sup> But even then our research population is not completely defined. Labour migrants may become unemployed or non-active, and we may look at the number at a certain moment in time (e.g. the first of July) or during a certain period (e.g. a month or a year). Our research population is therefore further restricted to all employees working for a company registered in the Netherlands at any moment during the years 1999-2005.

Figure 1 Total migrants from the NMS countries working in the Netherlands each month



Between 1999 and 2005 the number of labour migrants from the NMS countries who were employed in the Netherlands during a certain year grew from over 23 thousand to more than 96 thousand. However, due to seasonal labour, the number of labour migrants in any month fluctuates strongly during the year, as shown in Figure 1. An increasing number of labour migrants come to the Netherlands for only a few months: the number of temporary labour migrants has risen from 9 thousand in 1999 to 71 thousand in 2005. The vast majority of them comes from Poland. Among the long-term labour migrants, (former) Polish citizens make up ‘only’ about half of the total group, which has increased from more than 14 thousand in 1999 to over 25 thousand in 2005. Apart from Polish employees, the group of long-term labour migrants mainly consists of employees from

<sup>2</sup> Long-term migrants with incomplete information on country of birth (for example Baltic citizens born in the USSR) are identified by nationality.

Hungary, Slovakia and the Czech Republic, and since 2007 from Bulgaria and Romania as well.<sup>3</sup> Since 2005, the number of labour migrants from the NMS countries has further increased to an estimated 158 thousand employees in 2008 (Heyma, Berkhout, van der Werff and Hof, 2008). The vast majority of this number, about 107 thousand, have been temporary labour migrants.

A large part of the long-term labour migrants are female (64 percent), whereas the majority of temporary labour migrants are male (62 percent). The dominance of females in the group of long-term labour migrants may be related to marriages to Dutch citizens. With regard to age the rule is that the younger employees are, the more temporary the nature of their stay. The dominant group of long-term labour migrants is between 25 and 35 years old. When it comes to temporary labour migrants, it is mostly workers between 19 and 25 years old who come to the Netherlands. Temporary labour migrants from the NMS countries are typically employed through temporary work agencies (48 percent) or through direct employment with an employer in agriculture (23 percent) or business services (18 percent, mostly outsourcing). Long-term labour migrants from the NMS countries are much more similar to Dutch employees when it comes to the industry they work in. The average salary they earn is in most cases close to the minimum wage or slightly above.

### 3. Empirical strategy

There have basically been three approaches in the literature to identify the effects of immigration on local labour market outcomes. The seminal work by Card (1990) can be seen as the start of the '*area approach*'. In this work Card exploits a natural experiment, an immigration shock from Cuba to Miami in 1980, which he used to identify changes in local wages and unemployment. Other examples of natural experiments are Hunt (1992) and Carrington and DeLima (1996). None of these studies found significant effects of immigration on local labour market outcomes. Other studies using this approach focused on spatial correlations, exploiting geographic variation in immigration flows and changes in local labour market outcomes. Examples are Altonji and Card (1991), LaLonde and Topel (1991) and Pischke and Velling (1997). Again, hardly any significant effects of immigration were found, but it was recognized that this could be due to intra-national migration and self-selection of employees over regions. Immigration can cause native employees to move to areas with lower immigration numbers. In that case, the net increase of total labour supply in high immigration areas would be lower than the increase in the number of labour migrants. In low immigration areas the opposite would take place. This would reduce the decline in wages in areas with high immigration and induce a decline in wages in areas with low immigration. Comparison of both areas would result in an underestimation of the true effect of immigration on wages. This underestimation is aggravated when immigrants endogenously cluster in areas with high wages. Self-selection would then produce a spurious positive correlation between wages and immigration.

To avoid problems with intra-national migration and self-selection, the *factor proportions* approach calculates changes in the supply of different skill groups caused by immigration, and then applies labour demand elasticities to estimate wage effects. Studies by Borjas, Freeman and Katz (1997) and by Jaeger (2007) yield more sizable wage effects of immigration than the area approach. Since

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<sup>3</sup> From January 1st 2007 on, Bulgaria and Romania have become members of the European Union, allowing their citizens to travel freely across the EU.

migration between skill groups is unlikely, the estimated effect does not suffer from self-selection. As an alternative, Borjas (2003) introduced a *skill-cells approach* claiming that similarly educated workers might still not be perfect substitutes, because their skills may differ as a result of work experience. He again divided the labour market into a large number of cells, not by region but by educational level and work experience. This approach yielded negative (average) wage effects for the U.S. However, a similar approach for Germany by Bonin (2005) did not show any significant effects of migration on local wages.

To identify displacement and income effects in the present study, we follow Borjas (2003) in dividing the labour market into a large number of cells. But with no consistent information on the educational level and work experience of employees, especially for labour migrants, we partly use an area approach by dividing the labour market by regions, and in addition by industries and periods of time. Below we argue that our (partial) area approach is less of a problem for the estimation of displacement effects than for wage effects. In addition, the effects that we find can be interpreted as general equilibrium effects, since we include all jobs of employees in the Dutch labour market in our analysis.

For segmentation into regions, we use a division of the Netherlands into 40 regions. For segmentation into industries, we use 13 standard categories. In addition, we separate temporary agency workers from 'regular' employees, as we find that many NMS migrants enter the Dutch labour market through temporary work agencies. For a segmentation into periods, we use monthly data for the years 1999-2005. Together we have 50,400 potential labour market cells, which can be used for regression analyses. For each of these cells we observe the number of jobs by native Dutch employees, the number of jobs by immigrant employees from the NMS countries, the number of jobs by immigrant employees from other countries, and the average wage levels of native Dutch employees. All immigrant employees from non-NMS countries are excluded from the analysis. We also exclude all cells with less than 100 observations, as these have a relative small impact on the Dutch economy.

### 3.1 Model

To estimate effects of labour migration from the NMS countries on labour market outcomes of native Dutch employees, we explain the growth in native employment and native wages within specific industries and regions by a number of explanatory variables, including the relative size and growth of labour migration from the NMS countries. We control for interdependencies between observed cells of the labour market in a number of ways. Firstly, we take into account that there are *region, industry and time specific patterns* that lead to interdependencies between cells if not controlled for. We therefore include region, industry and time specific dummies, as well as dummies for combinations of region, industry and time. This way, time-constant differences that are not affected by labour migration are controlled for. Secondly, *business cycle variation* in employment patterns are controlled for by including indicators for the business cycle, including the vacancy rate, the total size of the working population and the added value per employee. Thirdly, for *serial correlation*, i.e. interdependencies between cells over time, we correct by using first differences models with clustered standard errors by sector-region combination.

Our basic equation for labour market outcomes for native Dutch employees is:

$$y_{ijt} = a \cdot P_{ijt} + b \cdot X_{ijt} + c_i \cdot s_i + d_j \cdot r_j + e_t \cdot p_t + f_{ij} \cdot (s_i \cdot r_j) + g_{it} \cdot (s_i \cdot p_t) + h_{jt} \cdot (r_j \cdot p_t) + \varepsilon_{ijt} \quad (1)$$

where

- $y_{ijt}$  = labour market outcome for native Dutch employees  
(log of number of Dutch employees in industry i, region j and period t, or log of average wage level of Dutch employees in industry i, region j and period t)
- $P_{ijt}$  = share of NMS migrants in the population of employees
- $X_{ijt}$  = vector of explanatory variables
- $s_i$  = indicator for industry i
- $r_j$  = indicator for region j
- $p_t$  = indicator for time period t
- $\varepsilon_{ijt}$  = error term
- $a, b, c, d, e, f, g, h$  = parameters to be estimated

The share of NMS migrants in the population of employees is calculated as

$$P_{ijt} = \frac{M_{ijt}}{N_{ijt} + M_{ijt}} \quad (2)$$

where

- $N_{ijt}$  = number of Dutch employees in industry i, region j and period t
- $M_{ijt}$  = number of NMS migrant employees in industry i, region j and period t

By taking first differences, the model reduces to

$$(y_{ijt} - y_{ij,t-1}) = a \cdot (P_{ijt} - P_{ij,t-1}) + b \cdot (X_{ijt} - X_{ij,t-1}) + e_t^* + g_{it}^* \cdot s_i + h_{jt}^* \cdot r_j + \varepsilon_{ijt}^* \quad (3)$$

To ensure that we do not estimate any reverse causalities, the variable  $P_{ijt}$  for the share of NMS migrants is lagged by 3 months, and the increase in this share is added to the model in two ways: reflecting a one month growth (between 4 and 3 months ago) and a three months growth (between 6 and 3 months ago). This way, we disentangle effects of an instant increase in the share of labour migrants from the effects of a more structural increase in labour migration. The empirical specification in equation (3), including (the instant and more structural growth in) the share of labour migrants, is estimated by OLS. Since we use a dataset that includes *all* employees that have a Dutch labour contract at any moment in time during the period 1999-2005, we have a complete picture of the labour market for employees in this time period. Mobility from one cell of the labour market to another cell of the labour market is thus completely observed in our dataset and included in the estimated effects. The estimated effects can therefore be interpreted as general equilibrium effects.

### 3.1 *Displacement effects*

Displacement effects are identified by measuring the effect of (the growth in) the share of migrant employees on the number of native Dutch employees. Displacement actually takes place if the estimated effect is significantly negative. A significant positive effect would mean that labour migrants from the NMS countries are not competing with native Dutch employees but are rather complementary. In that case they solve labour shortages and effectively raise production possibilities to a level that more labour demand (for native Dutch employees) is generated. Taking a 12-months lag in wages as one of the explanatory variables for the growth in the number of native Dutch employees, the effect is identified on 40,397 labour market cells that vary by region, industry and time period.

As noted earlier, a basic problem of our geographical approach is that developments in each of the labour market cells are not completely independent from developments in all of the other cells. The same holds for the division by industry. Excess labour supply in one segment of the labour market may lead to mobility to other segments of the labour market. Employees may change regions and industries as a result of differences in the labour market situation per region and industry. Stated differently, if immigration causes displacement of native employees, these native employees may move to other cells of the labour market with lower levels of immigration. It not only means that the number of native Dutch employees reduces in high immigration areas (displacement), but also that this number may increase in low immigration areas (interregional migration). Simply comparing both areas would result in an overestimation of the direct displacement effect of immigration. Also, a growth in the number of employees at any period of time may result in a lack of growth in the next period (serial correlation). The interdependency of observations makes the standard OLS technique an invalid instrument for estimation. As stated before, we control for interdependencies between observed cells of the labour market with region, industry and time specific dummies, as well as dummies for combinations of region, industry and time, and by including indicators for the business cycle. Also, by using monthly observations instead of yearly observations, we reduce the potential bias from inter-regional migration within observed periods. For serial correlation we correct by using first differences models with clustered standard errors by sector-region combination.

### 3.1 *Wage effects*

Wage effects are identified by measuring the effect of (the growth in) the share of migrant employees on the average wage level of native Dutch employees. If migrant workers are competing with natives, a negative wage effect is expected. If a positive effect occurs, the increase of labour through migration is complementary to the native workforce, actually 'filling the gaps'. The effect is identified on 45,502 labour market cells that vary by region, industry and period. Following Dustmann, Frattini and Preston (2007), we expect wage effects to differ between skill groups. As labour migrants are often working in low-wage jobs, they will be competing with the lower educated native workforce while being complementary to the higher educated native workforce. We test for such distributional effects by running similar analyses for separate groups, depending on the wage level.

Contrary to the displacement effect, our geographical approach leads to an underestimation of the true direct wage effect. Since excess labour supply in one segment of the labour market may lead to mobility to other segments of the labour market, the exit of native employees in high immigration cells relieves the downward pressure on wages in these cells, while the growth of native employees in low immigration cells sets a downward pressure on local wages. Not correcting for this interdependency thus leads to an underestimation of the direct wage effect. In addition, self-selection of immigrants into areas with relatively high wages would result in a spurious positive correlation between immigration and wages, leading to a further underestimation of the direct wage effect. Again we control for interdependencies between observed cells of the labour market with region, industry and time specific dummies, as well as dummies for combinations of region, industry and time, and by including indicators for the business cycle. For serial correlation we correct by using first differences models with clustered standard errors by sector-region combination.

#### **4. Estimation results: displacement effects**

Displacement of native Dutch employees is considered to have taken place when a relative decrease in the number of jobs for native Dutch employees is the direct consequence of a relative increase in the supply of labour migrants. For the period 1999-2005 we do not find displacement of native Dutch employees as a result of the influx of long-term labour migrants from the NMS countries. The estimation results in Table 1 show that there are no significant effects of the share of long-term NMS migrants or the growth in that share on the number of jobs held by native Dutch employees. With regard to temporary labour migration from the NMS countries, displacement of native Dutch employees is in fact observed. The size of this effect is however small. If the share of labour migrants is doubled in any segment of the labour market, the number of jobs for native Dutch employees in that segment declines by 0.07 percent. In that case, one out of any 1400 native Dutch employees is displaced. This effect is estimated in the period between 1999 and 2005, in which a number of industries increased their share of NMS migrants significantly. So even displacement by NMS migrants is generally speaking a limited phenomenon, it may be a serious issue in certain segments of the labour market. At the same time, we find a small but significant positive effect of the growth in the share of labour migrants on the number of jobs by native Dutch employees. It means that a growth in the share of NMS migrants may increase production levels in a way that more jobs become available for native Dutch employees as well.

The effects of most other variables have the expected sign. The number of jobs becomes higher when more women participate in the labour market (higher labour supply), when the potential workforce is higher (higher labour supply), and when the vacancy rate is higher (higher labour demand, weakly significant). The number of jobs decreases when the average tenure and age of employees is higher or when the average wage is higher. Higher tenure, age and wage point at higher labour costs, which reduce the demand for labour.

In case of displacement, it takes Dutch employees who lose their job more time to find another job, because there are more candidates for the available jobs due to labour migration. But displacement of native Dutch employees is not necessarily the same as labour migrants taking up or over jobs of native Dutch employees, as long as displacement mainly takes place in industries with a growing



labour demand. To test this, we have divided the labour market cells between industries with a growing number of jobs and industries with a declining number of jobs. In situations where the number of jobs grows, increased labour supply may help to solve shortages. In situations of a declining number of jobs, labour migration may induce excess labour supply and therefore more time for native Dutch job-searchers to find a job. For both the growing and declining industries, we have estimated the same equation as reported in Table 1. The results are reported in Table 2.

Table 1: Estimation results for the number of jobs by native Dutch employees

Explanatory variables	Lag in months	Growth period in months	Estimate	t-value
Proportion of long-term NMS migrants	3		-0.4749	0.33
Growth in proportion of long-term NMS migrants	3	1	0.7960	0.74
Growth in proportion of long-term NMS migrants	3	3	0.1219	0.26
Proportion of temporary NMS migrants	3		-0.2330	2.44
Growth in proportion of temporary NMS migrants	3	1	0.0147	0.33
Growth in proportion of temporary NMS migrants	3	3	0.0852	2.40
Proportion of women			0.8343	4.05
Average tenure			-0.0066	6.08
Average age			-0.0119	2.34
Log of average wage (in Euro's)	12		-0.3327	5.93
Log of added value per employee (in Euro's)	12		-0.1190	1.67
Growth in log of added value per employee		12	-0.0665	1.23
Vacancy rate	3		0.0041	1.41
Growth in vacancy rate		3	0.0034	1.64
Workforce / 1,000,000			0.1488	9.21
Time period dummies			Included	
Industry × year dummies			Included	
Industry × month dummies			Included	
Region × year dummies			Included	
Constant			-0.0296	5.30
Number of observations				40,397
R <sup>2</sup>				0.50

We only find displacement effects of labour migration from the NMS countries in growth sectors, i.e. in situations where there is an increase in jobs and an explicit need for new employees. In these situations, native candidates less often fill new job vacancies due to the – possibly cheaper – supply of foreign workers. If the proportion of temporary labour migrants from the NMS countries would double in any segment of the labour market, one out of any 1200 native Dutch employees in that segment is displaced. Again, this modest effect only takes place in growth sectors, where the need for Dutch employees is likely to increase as well.

At the same time we find significant positive effects on the number of jobs held by native Dutch employees in growing industries from a growth in the share of labour migrants, both long-term and temporary. Again, this points at an increase in production levels as a result of labour migration in a way that more jobs become available for native Dutch employees as well. Again, this phenomenon is only found in growing industries. It means that most NMS migrants find jobs in growing industries, where they compete with native Dutch employees for jobs, but also solve labour market shortages in

a way that benefits production levels and thereby labour demand for native Dutch employees. The difference in the effects of labour migration between growing and declining industries is convincing, since all other explanatory variables in these two regressions have very similar effects.

Table 2: Estimation results for the number of jobs by native Dutch employees, distinction between industries in which the number of jobs grows and declines

Explanatory variables	Growing industries		Declining industries	
	Estimate	t-value	Estimate	t-value
Proportion of long-term NMS migrants	-1.5996	0.91	0.8082	0.67
Growth in proportion of long-term NMS migrants	2.8572	1.98	-1.0301	1.44
Growth in proportion of long-term NMS migrants	-0.2266	0.40	-0.0044	0.01
Proportion of temporary NMS migrants	-0.3885	4.54	-0.1263	0.97
Growth in proportion of temporary NMS migrants	0.0306	0.68	0.0279	0.38
Growth in proportion of temporary NMS migrants	0.1475	2.98	0.0426	1.12
Proportion of women	0.7596	3.76	0.8821	4.11
Average tenure	-0.0064	7.55	-0.0058	4.50
Average age	-0.0084	1.67	-0.0135	2.66
Log of average wage (in Euro's)	-0.3559	6.18	-0.4205	6.56
Log of added value per employee (in Euro's)	0.0302	0.27	-0.1307	1.63
Growth in log of added value per employee	0.0565	0.73	-0.0965	1.83
Vacancy rate	0.0032	0.89	0.0022	0.69
Growth in vacancy rate	0.0030	1.24	0.0012	0.53
Workforce / 1,000,000	0.0420	2.34	0.1046	5.08
Time period dummies	Included		Included	
Industry × year dummies	Included		Included	
Industry × month dummies	Included		Included	
Region × year dummies	Included		Included	
Constant	-0.0285	2.15	-0.0394	5.73
Number of observations		21,416		18,981
R <sup>2</sup>		0.60		0.62

In sum, we only find displacement effects of labour migration in growth sectors, i.e. in situations where there is an increase in jobs and an explicit need for new workers. In these situations, native candidates less often fill new job vacancies due to the – possibly cheaper – supply of foreign workers. This modest effect only takes place in growth sectors, where the need for Dutch employees is likely to increase as well.

## 5. Estimation results: income effects

With constant labour demand, the increased supply of labour through labour migration would theoretically reduce the price of labour. The expected effect of labour migration on wages is therefore negative. At the same time, labour migration could be a solution for specific labour shortages, increasing production possibilities and subsequent the demand for complementary types of labour, increasing wages for other employees. Labour migration could therefore have both negative and positive effects on different segments of the labour market. To see what the general effect of labour migration from the NMS countries is on wage levels of native Dutch employees, the average wages per region-industry-period-cell are regressed on a number of explanatory variables in

the same way as the number of jobs by native Dutch employees in the previous section. Among these explanatory variables, we again include indicators for (the growth in) the share of long-term and temporary NMS migrants in the labour force in each cell of the labour market. The estimation results are reported in Table 3.

We find a weakly significant negative effect of the share of long-term migrants from the NMS countries on the wage level of native Dutch employees, as well as a significant negative effect of the growth in the number of temporary migrants. Both effects are however small. If the proportion of long-term labour migrants is doubled in any segment of the labour market, the average wage of native Dutch employees in that segment declines by 0.2 percent. It has to be kept in mind that this value is a lower bound for the true direct wage effect of migration, due to possible consequent interregional migration. At the same time, the estimated effect can be interpreted as a general equilibrium effect, since we observe average wage developments in all segments of the labour market, concerning all employees in the Netherlands between 1999 and 2005.

Table 3: Estimation results for log wages of native Dutch employees

Explanatory variables	Lag in months	Growth period in months	Estimate	t-value
Proportion of long-term NMS migrants			-1.0161	1.82
Growth in proportion of long-term NMS migrants		1	0.1165	0.68
Growth in proportion of long-term NMS migrants		3	-0.1046	0.54
Proportion of temporary NMS migrants			-0.0247	0.43
Growth in proportion of temporary NMS migrants		1	0.0324	1.62
Growth in proportion of temporary NMS migrants		3	-0.0694	2.89
Proportion of women			-0.8177	11.11
Average tenure			0.0020	4.62
Average age			0.0197	8.64
Log of added value per employee (in Euro's)	12		0.0336	2.88
Growth in log of added value per employee		12	0.0046	0.60
Vacancy rate	3		0.0015	4.43
Workforce / 1,000	3		0.0122	9.36
Time period dummies			Included	
Industry × year dummies			Included	
Industry × month dummies			Included	
Region × year dummies			Included	
Constant			-0.0373	15.53
Number of observations				45,502
R <sup>2</sup>				0.84

The effects of most other variables in the wage equation have the expected sign. Tenure and age are good predictors of wage levels, while women still experience lower wage levels than men. A higher added value controls for the average skill level of employees and leads to higher wages. Stronger labour demand, as expressed by a higher vacancy rate, also induces higher average wages. Only the positive effect of the size of the potential workforce, which indicates potential labour supply, seems puzzling. But in an area approach this variable may be an indicator for urbanization, which could explain the positive effect.

To test whether the average wage effects of labour migration are the same for the whole wage distribution, we run the wage equation again on three different segments, where we divide the labour market cells equally between low wages, medium wages and high wages. The results of these estimations are reported in Table 4. It turns out that the effects of labour migration from the NMS countries on the average wage level in the Netherlands have been very different for different wage groups between 1999 and 2005. The effects are the largest in the low-wage group and nonexistent in the higher wage group. The wage of the low-wage group is negatively influenced by the share of long-term labour migrants within the same sector and region. Because of this negative effect for the low-wage group only, there is a slight overall increase in the wage gap due to labour migration from the NMS countries. The extent of the effect, however, is modest: if the share of long-term labour migrants from the NMS countries would double, the average salary in the low-wage group would decrease by 0.3 percent.

Table 4: Estimation results for log wages of native Dutch employees, distinction between low, medium and high wages

Explanatory variables	Low wages		Medium wages		High wages	
	Estimate	t-value	Estimate	t-value	Estimate	t-value
Proportion of long-term NMS migrants	-0.9065	2.21	-0.1205	1.04	-0.4325	1.11
Growth in proportion of long-term migrants	0.0742	0.40	0.0592	1.79	0.1389	0.84
Growth in proportion of long-term migrants	-0.1867	1.01	-0.0158	0.47	0.1570	0.70
Proportion of temporary NMS migrants	0.1337	3.06	0.0140	1.39	-0.0035	0.06
Growth in proportion of temporary migrants	-0.0239	1.41	-0.0014	0.59	0.0339	0.73
Growth in proportion of temporary migrants	-0.0355	1.68	-0.0090	2.13	-0.0102	0.63
Proportion of women	0.1224	1.18	-0.0224	2.00	0.1788	4.54
Average tenure	0.0061	7.31	0.0002	2.81	-0.0006	4.50
Average age	0.0073	3.24	0.0034	5.55	-0.0032	2.97
Log of added value per employee (in Euro's)	0.0688	2.59	0.0379	3.43	0.0101	1.12
Growth in log of added value per employee	0.0050	0.28	0.0189	2.69	-0.0034	0.52
Vacancy rate	0.0042	5.93	0.0023	11.37	0.0011	3.80
Workforce / 1,000,000	0.0562	6.87	0.0378	31.52	0.0677	12.77
Time period dummies	Included		Included		Included	
Industry × year dummies	Included		Included		Included	
Industry × month dummies	Included		Included		Included	
Region × year dummies	Included		Included		Included	
Constant	0.0073	1.10	0.0005	1.70	0.0034	2.38
Number of observations	41,758		42,770		43,182	
R <sup>2</sup>	0.52		0.80		0.72	

At the same time, we find a small but positive effect of temporary labour migration on the average wage level of native Dutch employees. This suggests that temporary labour migrants solve shortages in the labour market, enabling these region-sector combinations to increase production and increase the demand for complementary labour, leading to small increases in wage levels of native Dutch employees.

## 6. Conclusion

Labour migration from the Central and Eastern European countries of Estonia, Latvia, Lithuania, Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Bulgaria and Romania, together referred to as the New European Member States (NMS), has a modest impact on the Dutch labour market. In this paper we have analysed displacement and wage effects of these labour migrants using a combination of the area and skill-cell approach on administrative data of all employees in the Netherlands between 1999 and 2005. Despite the substantial growth since 2000 in the number of Polish labour migrants in particular, displacement of Dutch employees has hardly taken place. Also, effects on wages are barely noticeable. Since we use a complete set of data on employees, the estimated effects can be interpreted as general equilibrium effects.

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