Demographic Change and Regional Labour Markets: The Case of Eastern Germany

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CESIFO WORKING PAPER NO. 2315
CATEGORY 4: LABOUR MARKETS
MAY 2008

SUPPORT BY THE WGL LEIBNIZ ASSOCIATION WITHIN THE PROJECT "HOW TO CONSTRUCT EUROPE"

CESifo *Working Paper No. 2315*

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Abstract

Demographic change will be one of the most challenging issues for industrialized economies in the decades to come. In this paper, we focus on the impact of demographic change on labour markets. By setting up a stylized model of a regional labour market, we are able to analyze the interaction of labour demand and supply during demographic transitions. The simulation results for eastern Germany, a forerunner in the demographic process, show that the population decline will not help to reduce the currently high unemployment among the low-skilled dramatically. Among the high-skilled, scarcities will play a major role and could impede the development of industrial centers.

JEL Code: J1, J2, R1.

Keywords: demographic change, labour market, unemployment, long-run projection, general equilibrium.

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May 2007

1. Introduction[*]

Demographic change will be one of the most challenging issues for industrialized economies in the decades to come. While population has been increasing since World War II, population will decline in most countries around 2030. Moreover, as the population is ageing at the same time, the decline in the working age population will even be more pronounced and thus affect labour markets in a considerable way. This is our starting point. We focus on the impact of demographic change on labour markets – a much neglected issue in our view.

To study the subject we take eastern Germany as a laboratory example as eastern Germany is a forerunner in the demographic process. The shrinkage and ageing of the population has already started and will proceed much quicker than in most other industrialized regions. The population is expected to decline by 7.3 percent from 2005 until 2020. The working age population will even shrink by 16.5 percent. Eastern Germany is also a suitable laboratory in terms of unemployment. Unemployment figures have remained around 20 percent in many regions for the last decade with large differences with regard to the workers' skill levels.

How will labour markets react to the onset of demographic decline? On the one hand, the shrinking of the labour force could be a boon for the economies currently suffering from high unemployment. On the other hand, skilled-labour will become scarcer, thus putting the skill-intensive industries of the industrialized economies at a disadvantage. Furthermore, local demand of non-traded goods will decrease due to the shrinkage of the population. The latter effect reduces the total demand for labour. Thus, the net effect of demographic change on labour markets is far from obvious. Will unemployment figures go down? Will some skills

[*] This paper is part of the CESifo project on "How to Construct Europe". We thank Alessandra Casarico, Stephan Rudolph, Michael Stimmelmayr, seminar participants at the CESifo Area Conference on Employment and Social Protection and at the Max-Planck-Institute for Demographic Research, Rostock.

become scarce in the near future? Will local markets have to shrink due to decline in population?

We try to highlight some of these issues by setting up a stylized model of a regional labour market that is exposed to demographic change. The model is constructed as a computable general equilibrium model with rationing in the labour market. We view eastern Germany as a small open economy that partly produces goods for a large world market but also provides non-traded goods and services to the local population. Production requires the input of different types of skilled and unskilled labour which initially face differing risks of unemployment. Demographic change will have an effect on both the supply side and the demand side of labour markets. The supply of labour will be reduced potentially leading to lower unemployment of the low-skilled but also creating the risk of scarcities among the high-skilled. On the demand side, the shrinkage of the population will create lower demands for locally provided goods and services, thus leading to a contraction of the local labour market.

Overall, the findings of our simulations are the following. Demographic change will not help to reduce the high unemployment among the low-skilled dramatically. Unemployment will decrease only slowly. Among the high-skilled, scarcities will play a major role and could impede the development of the labour market. Due to complementarity effects, this scarcity may even spill over other skill groups preventing a significant decline of the unemployment rate among the medium-skilled workers.

We admit that our approach is to some extent speculative. Labour markets are exposed to many unpredictable shocks and they adopt to these changes with unforeseen innovations. Nevertheless, it may be very helpful to have projections based on the current state of information. The best we can do is to carry out status quo projections on the development of labour markets that are exposed to demographic shocks.

Our paper introduces two main innovations into the literature on the economics of demographic change. Firstly, it deals with labour markets whereas most of the literature so far

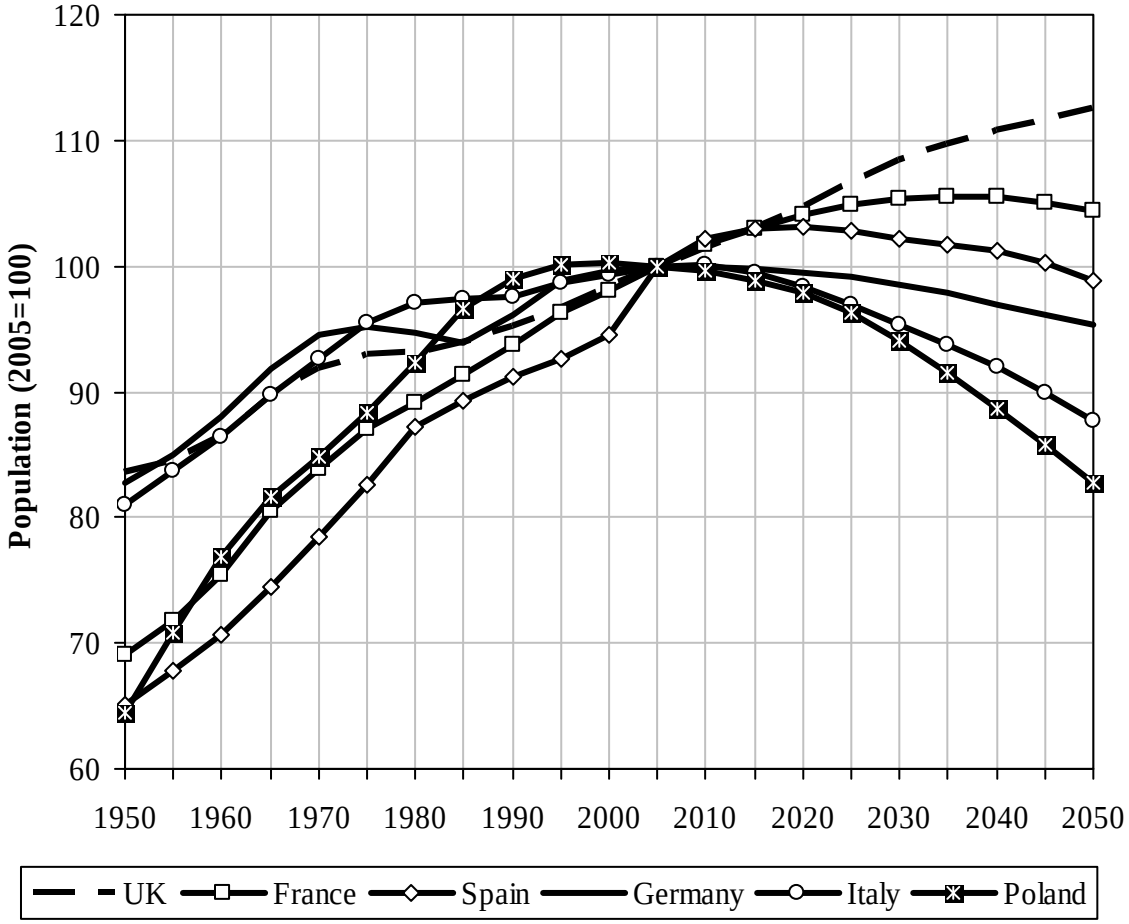
has focussed on capital markets [e.g., Abel (2001), Börsch-Supan, Ludwig and Winter (2002), Krueger and Ludwig (in press), Poterba (2001, 2004)] or public pension schemes [e.g., Casamatta, Cremer and Pestieau (2001), Demange and Laroque (1999), Fehr (2000)]. To our knowledge, Börsch-Supan (2003) is the only paper dealing explicitly with the consequences of a shrinking labour supply. It examines the human capital formation necessary to compensate for the impact of demographic ageing on domestic production. Secondly, we focus on the regional impact whereas most of the literature has dealt with national macroeconomic issues [e.g., Börsch-Supan (2003), Chong-Bum and Jeon (2000), Miles (1999)]. In our view, more attention has to be given to the local effects and to the microeconomic consequences of demographic change in the future.

Section 2 provides some important stylized facts about the demographic change and the current labour market conditions in eastern Germany. In Section 3, we develop a simple general equilibrium model of a (regional) small open economy that uses different skill types of labour to produce traded and non-traded goods. Section 4 describes the data used in the simulation model. Section 5 contains the simulation results for the eastern German labour market and discusses the impact of policy measures. Section 6 concludes.

2. Stylized Facts

Most industrialized economies in Europe will face a rapid decline in their populations starting around 2030. The United Nations (2004) expects that populations will decrease by 11 percent in Italy, by 4 percent in Germany and by 17 percent in Poland up to 2050. Figure 1 shows the projected population size for some selected industrialized economies (2000=100).

Figure 1: Population in Selected Industrialized Countries

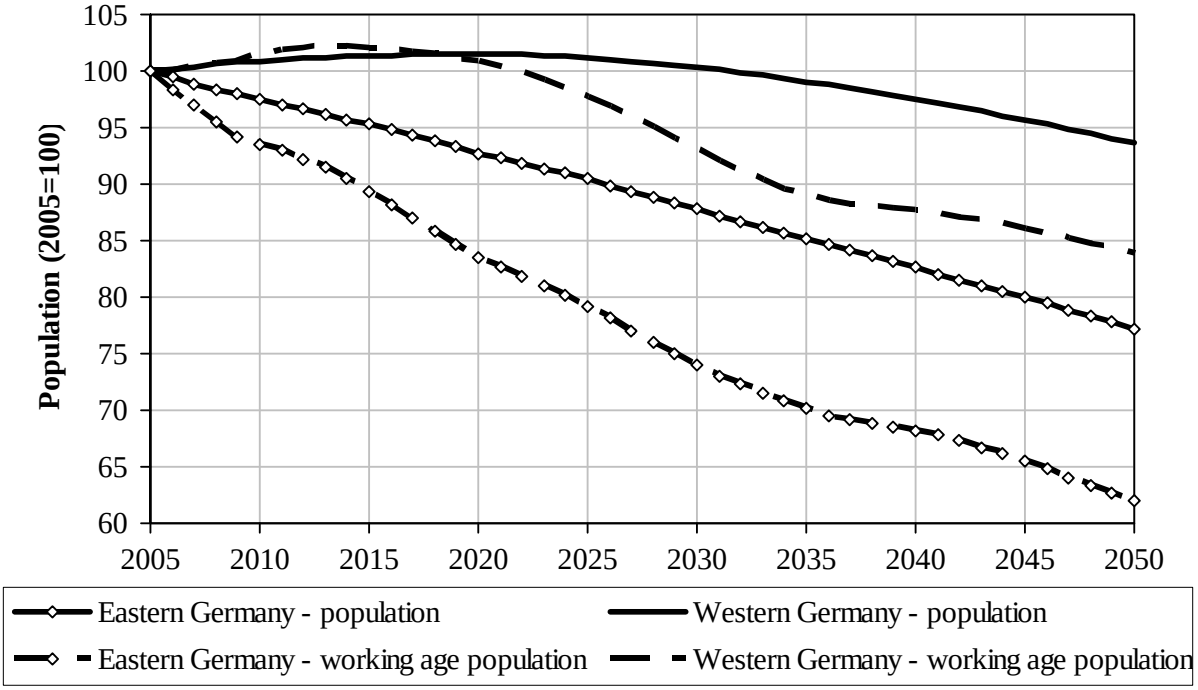


Source: United Nations (2004).

Eastern Germany provides a suitable laboratory for studying the consequences of such a drastic and rapid decline in population as the demographic change has already set in. Figure 2 shows the development of the population size in eastern and western Germany. Whereas the West German population will remain roughly constant until 2020, eastern Germany will loose 7 percent of its population. This development goes along with an ageing of the population. The average age of the East German population will rise by 5 years – increasing from currently 44 years to 49 years.[1]

[1] Note that the population projection of the United Nations differs from the German Federal Statistical Office due to different assumptions on migration and fertility. In the following analysis we use variant 5 of the 10th co-ordinated population projection of the Federal Statistical Office of Germany (2003).

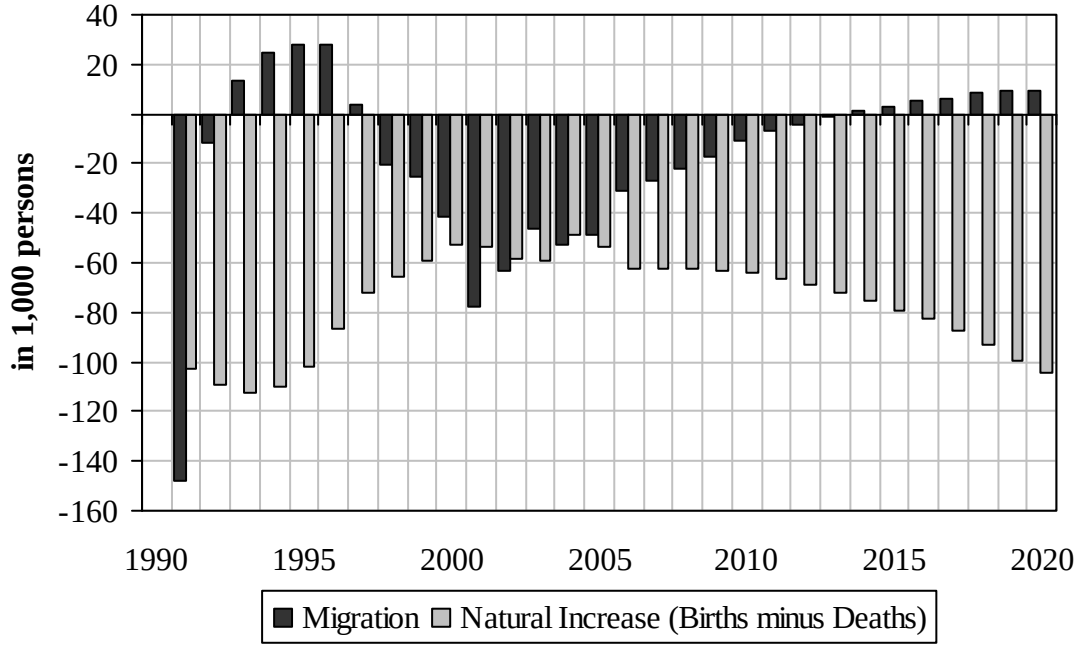
Figure 2: Development of Population in Eastern and Western Germany



Sources: Federal Statistical Office Germany (2003)

It is important to point out that – contrary to conventional wisdom – the major driving force behind the declining population is not migration but low fertility. With the exception of the years around German unification, natural population movements (births minus deaths) have been more important in numbers than the outmigration of the eastern German population (see Figure 3).

Figure 3: Components of the Population Development in East Germany



Sources: Federal Statistical Office Germany

Fertility in eastern Germany dropped after unification from 1.52 children to an all time low of 0.77 in 1994. Since then, fertility in eastern Germany has increased again slightly but is still somewhat lower than the West German fertility rate which is already among the lowest in Western Europe.

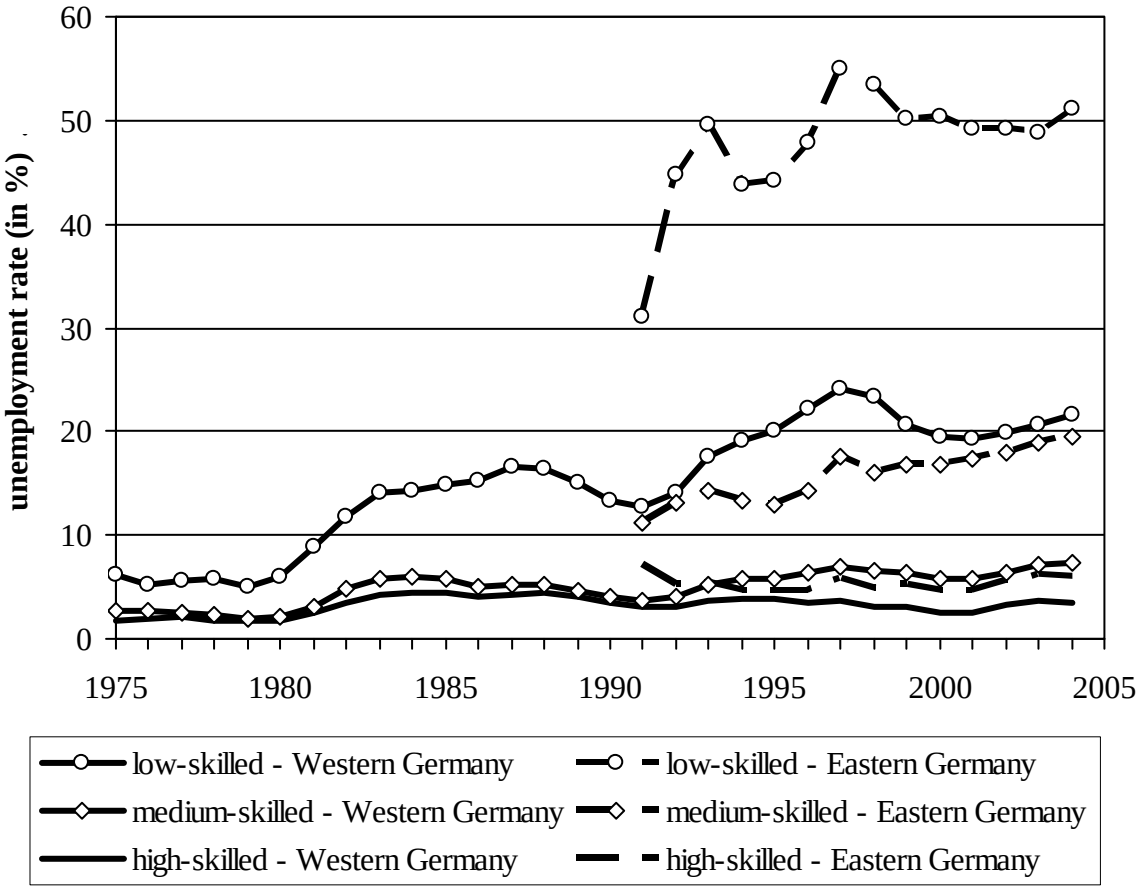
The decline and ageing of the eastern German population also affects the labour market. The working age population (15-64) is decreasing even faster than the population as a whole. As Figure 2 shows, the working age population will shrink by 16.5 percent from 2005 until 2020. Whether the reduction in the labour supply is larger or smaller than the change in the working age population is not a trivial question. On the one hand, an increasing share of the population is reaching ages with lower labour participation rates; this will even accelerate the shrinkage of the labour supply. On the other hand, younger cohorts exhibit higher educational attainments. This educational trend may slow down the shrinkage of the labour supply as labour market participation increases with skill levels. We will discuss the impact of the demographic change on the labour supply in Section 4.

The demographic change will affect an eastern German labour market that is far beyond of full-employment equilibrium. The average unemployment rate in eastern Germany amounted to 20.6 percent in 2005 showing significant regional differences. The underlying economic problems become more clearly visible when one breaks down the unemployment figures according to skill levels. Figure 4 depicts the development of the skill-specific unemployment rates in eastern and western Germany.[2] The unemployment rates for the high-skilled in eastern and western Germany show two things. First, the unemployment rates are low, basically around the level of natural unemployment created by job search and matching. Secondly, the eastern German unemployment rate is not much higher than the unemployment rate in the West. The picture completely changes when we turn to the low-skilled. The unemployment rate in western Germany is already at 20 percent but extends to 50 percent in eastern Germany. The skill-specific differences in the unemployment rates suggest that the driving force is an excessive wage compression. Wages for the low-skilled are far above the market clearing levels. The main reason why wages cannot adjust downwards (even in eastern Germany where labour unions play no major role) is the implicit minimum wage created by the German welfare system. Unemployment benefits and social assistance (ALG II) are more or less uniform across the country. This implicit minimum wage is, of course, no impediment for the labour market of the high-skilled but it creates major distortions at the bottom of the skill distribution. There are too few low-skilled jobs that are sufficiently productive to warrant wages above the implicit minimum wage.

As the differences in the unemployment risks are so large, we will have to take the differences in the labour market conditions for the skill groups into account when we set up our simulation model.

[2] The German labour office classifies all individuals without any vocational training as low-skilled. People with vocational training are counted as medium-skilled, and a university diploma qualifies for being high-skilled. Unfortunately, this classification is rather crude as the medium-skilled account for 67 percent of the labour force. 16 percent of the labour force are low-skilled and 17 percent are high-skilled.

Figure 4: Skill-Specific Unemployment Rates in Eastern and Western Germany



Source: Reinberg and Hummel (2005).

3. A Simple General Equilibrium Model

We view eastern Germany as a small open economy. Production takes place in two sectors. The traded sector produces a good that is competitively supplied in the world market. The price of the good is normalized to unity. In this sector, demographic change has only an impact on the supply side, e.g. due to a shortage of skilled workers, but not on the demand side which is exogenously given by the world market. The second sector produces a non-traded good for the domestic population. The price p is endogenously determined by the local demand and supply conditions.

Each sector consists of many competitive firms employing three types of labour: low-skilled (L), medium-skilled (M) and high-skilled (H). The production function exhibits the usual

standard properties and is denoted by $f_i^j(L_i, M_i, H_i)$ for firm i with $j = T, N$ for the traded and non-traded sector, respectively. Each firm takes the wage rates w^x ($x = L, M, H$) as given. Workers can move between the sectors so that wages are the same in the traded and non-traded sector for each skill group. Firms maximize their profits

$$\pi^j = p^j \cdot f_i^j(L_i, M_i, H_i) - \sum_{x=L,M,H} w^x \cdot x_i$$

(with $p^T = 1$). The profit-maximizing labour input is given by equalizing marginal productivity with (real) wages:

$$\frac{\partial \pi^j}{\partial x} = p^j \cdot \frac{f_i^j(L_i, M_i, H_i)}{\partial x_i} - w^x = 0\,. \qquad (1)$$

Hence, total labour demand for workers of skill group k is given by $x^D = x^{T,D}(w^L, w^M, w^H) + x^{N,D}(w^L, w^M, w^H, p)$ where $x^{j,D}$ is the labour demand in sector j derived from (1). As the amount of labour employed cannot exceed the supply, we have the following set of macroeconomic restrictions

$$x^D(w^L, w^M, w^H, p) \le \bar{x} \qquad \forall\, x = L, M, H \qquad (2)$$

where $\bar{x}$ denotes the (exogenous) labour supply for skill-group x. This labour supply will change over time in the process of demographic change (see the next section for detailed information on the development of labour supply). With respect to the adjustment process in the labour market, we assume that there is downward wage rigidity. Wages can be set above market clearing levels, e.g., as a result of (implicit) minimum wages.[3] Unemployment *per se* will not lead to an adjustment of wages. If demand exceeds supply for a specific skill group, however, wages can adjust upwards to market clearing levels.

[3] In Germany, the implicit minimum wage is determined by the level of social transfers. Social assistance defines a minimum wage below which hardly any labour is supplied. We assume throughout the paper that this implicit minimum wage is exogenously given.

The model is closed by determining the price in the non-traded sector. We assume that a constant share γ of local disposable income is spent on the non-traded good. Disposable income amounts to $(1-t)\cdot \sum_{x=L,M,H} w^x \cdot x^D + Z$ where t is the tax rate on labour income and Z are transfers (pensions, unemployment benefits …) to the local population. We will specify Z in more detail when we come to the simulation of the model. The amount spent on non-traded goods has to be equal to the value of non-traded goods produced in the region:

$$\gamma \cdot \left[(1-t)\cdot \sum_{x=L,M,H} w^x \cdot x^D + Z \right] = p \cdot f_i^N (L^D, M^D, H^D) . \qquad (3)$$

Equations (2) and (3) determine simultaneously the equilibrium prices and quantities. When the domestic labour force shrinks due to the demographic change, one or several of the inequalities in equation (2) may become binding. This may reduce the unemployment in the region but can also trigger wage adjustments when some skills become scarce.

4. Labour Force Projection

For the projection of the workforce in eastern Germany, we mainly use two data sets from the Federal Statistical Office: the population projection and the German Micro Census. The latter data set provides information on the skill-level of the workforce as well as on the employment status according to skill and age groups [Federal Statistical Office (2004)]. In addition, information on sectoral employment is given so that employees can be assigned to the tradable and non-tradable sector.[4] For the population projection, we use the variant 5 of the 10th co-ordinated population projection [Federal Statistical Office (2003)]. This projection is based on the population statistics of the year 2001, with the projection starting for the year 2002. Population projections are available for all German federal states until the year 2050 and they are differentiated by age and gender.

[4] See Appendix A for the classification of the industries into the tradable and non-tradable sectors.

We will need a projection of the labour supply up to 2020 as a key ingredient for the simulation model in Section 5. This projection will be based on the population forecast and on projections of: 1) the skill composition of the population by age and gender, and 2) labour participation. To determine the future skill composition of the population, we assume that all future cohorts mimic the educational choices of the current population aged 30 to 34. We use the age group 30 to 34 as a reference group as this cohort has already completed its formal education. Changes in the educational attainment beyond the age of 35 are fairly rare. The skill composition of the population aged 35 years and older shows age and gender specific differences: Men above the age of 45 are more high-skilled than women of the same age (see Table 1). Younger women display higher educational achievements than the older female workforce.

Table 1: Skill Composition by Age and Gender in East ernGermany (2003)

	Men				Women			
Age	**low-skilled**	**medium-skilled**	**high-skilled**	**in training**	**low-skilled**	**medium-skilled**	**high-skilled**	**in training**
15 – 19	4 %	1 %	0 %	96 %	3 %	1 %	0 %	96 %
20 – 24	16 %	45 %	1 %	39 %	12 %	39 %	2 %	47 %
25 – 29	13 %	65 %	8 %	13 %	12 %	65 %	11 %	12 %
30 – 34	10 %	72 %	17 %	-	8 %	73 %	18 %	-
35 – 39	8 %	75 %	16 %	-	8 %	76 %	16 %	-
40 – 44	7 %	78 %	15 %	-	7 %	78 %	16 %	-
45 – 49	7 %	75 %	18 %	-	8 %	76 %	16 %	-
50 – 54	6 %	73 %	20 %	-	9 %	76 %	15 %	-
55 – 59	6 %	72 %	22 %	-	12 %	75 %	13 %	-
60 – 64	7 %	73 %	20 %	-	14 %	77 %	9 %	-

Source: own calculations based on Federal Statistical Office (2004).

With respect to labour participation, we assume that the age specific labour force participation rates for each skill group remain constant over time. The participation rates in eastern Germany show three typical features: 1) labour supply is hump-shaped in age, 2) participation

increases with skill level, and 3) male participation rates are higher than female participation rates (see Table 2).

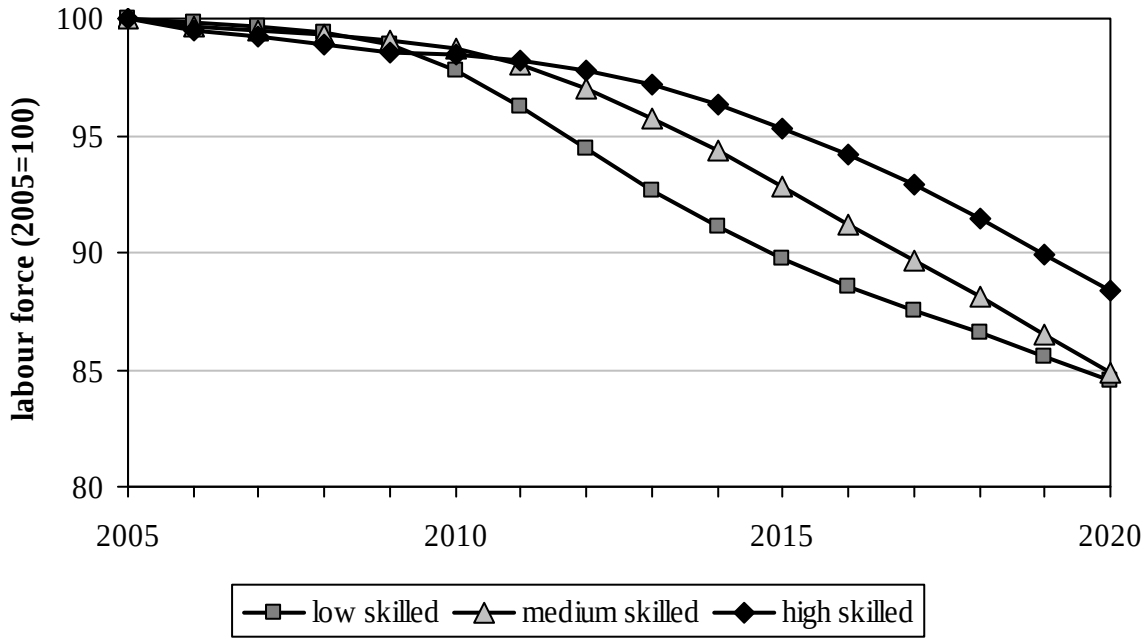
Table 2: Participation Rates by Age and Gender in Eastern Germany (2003)

Age	Men			Women		
	low-skilled	medium-skilled	high-skilled	low-skilled	medium-skilled	high-skilled
15 – 19	81.6 %	90.3 %		64.1 %	79.7 %	
20 – 24	90.9 %	95.4 %	72.8 %	68.1 %	87.1 %	79.9 %
25 – 29	89.7 %	94.3 %	90.4 %	65.9 %	88.4 %	86.5 %
30 – 34	91.7 %	97.4 %	95.5 %	65.2 %	92.4 %	92.9 %
35 – 39	88.4 %	97.4 %	98.8 %	77.0 %	93.5 %	93.3 %
40 – 44	88.7 %	96.3 %	98.1 %	76.8 %	94.9 %	95.8 %
45 – 49	86.7 %	95.7 %	98.7 %	78.6 %	92.4 %	97.5 %
50 – 54	79.7 %	92.5 %	96.5 %	73.2 %	89.5 %	94.3 %
55 – 59	72.9 %	84.6 %	94.0 %	63.8 %	81.1 %	89.8 %
60 – 64	23.3 %	35.5 %	62.5 %	13.5 %	22.6 %	47.0 %

Source: own calculations based on Federal Statistical Office (2004).

Combining the projection of the population forecast by qualification and the skill specific labour force participation, we obtain the labour force projection according to skill groups (Figure 5). There will be a reduction in the number of low-skilled up to 2020 (- 15.4 percent). The medium-skilled labour force will experience shrinkage of 15.1 percent with most of the reduction setting in after 2010. Due to the slightly higher educational attainment of younger cohorts, the group of the high-skilled will shrink somewhat slower than the two other skill groups (- 11.6 percent). In Section 5.4, we will discuss policy measures which lead to alternative labour supplies of the high-skilled.

Figure 5: Labour Force Projection



Source: own calculations.

5. Simulation

We first specify the production function, which is used for simulating the consequences of the demographic change. In a second step, the simulation model is calibrated to reflect the current situation in the eastern German labour market. In Section 5.3, a baseline simulation is conducted which will serve as our benchmark case. This section also contains a sensitivity analysis to evaluate the impact of alternative exogenous wages on the simulation results. Finally, we simulate several policy measures that aim at increasing the size of the high-skilled work force in eastern Germany.

5.1 Specification of the Production Function

For simulating the effects of the demographic change in eastern Germany, a production function has to be specified for the general equilibrium model developed in Section 3. In particular, the current and future labour demands in each sector (tradable and non-tradable)

have to be simulated for the three skill groups. To allow for substitutability and complementarity between different skill groups, the functional form of the production function has to be very flexible [Hamermesh (1993), Cahuc and Zylberberg (2004)].

We have chosen the translog production function as it satisfies all requirements for our simulation model. Due to its flexibility, it has been extensively used in previous empirical investigations.[5] For instance, Fitzenberger and Franz (1998) show that for Germany a translog specification adequately describes the functional relationship between labour as well as capital inputs on the one hand and output on the other hand.

Assuming Hicks-neutral technical change, the translog production function is specified in the multiplicative form as follows [Boisvert (1982)]:

$$Y^j = a_0 \cdot \prod_{x=L,M,H,K} x^{a_x^j} \cdot \prod_{x=L,M,H,K} x^{0.5 \cdot \left(\sum_{z=L,M,H,K} b_{xz}^j \cdot \ln(z) \right)}$$

where Y_i^j denotes the output in sector j (j=T, N) and x represents the input factors. The coefficients a_x^j and b_{xz}^j $\left[x, z \in \{L, M, H, K\}\right]$ are parameters that contain information on the output elasticities as well as partial substitution elasticities between the inputs. The coefficient a_0 measures total factor productivity. There are three restrictions to obtain a linear homogeneous functional relationship:

$$\sum_i^n a_i = 1 \qquad \sum_i^n b_{ij} = 0 \qquad b_{ij} = b_{ji} .$$

In addition to the factors discussed in Section 3, we have explicitly included fixed capital (K) in the production function. This production function has now to be specified for the traded and non-traded sector.

[5] See Christensen, Jorgenson and Lau (1973) as well as Boisvert (1982) for a detailed discussion of the translog function

5.2 Calibration of the model

In order to simulate the impact of demographic change on the labour market, the model has to capture the current situation of the eastern German labour market. We specify the exogenous parameters of the production function so that the number of employees in each of the two sectors is replicated by the model in the base year.

The parameter values of the production function are based on the estimates by Fitzenberger and Franz (1998); see Appendix B for the parameter values. The parameters define the substitution and complementarity relationships between the input factors, i.e. between the three skill levels of labour as well as between labour and capital.

In determining the wage structure in eastern Germany, we calculate skill-specific gross wages from the German Socio-Economic Panel (GSOEP). The remuneration is skill specific but not sector specific, i.e. employees with the same skill level receive the same wage in all branches.[6] Whereas wages are considered as exogenous in the calibration of the model, they are determined endogenously as soon as there is a bottleneck in a skill specific labour market segment. We assume that skill specific wages will rise as soon as the unemployment rate in a specific labour market segment hits a threshold level which is set to an unemployment rate of 3 percent in our baseline scenario. This is a simple but appropriate way to model the stylized fact of downward rigid wages in Germany. With regard to the transfers (Z) as well as the tax rate (t) we use official data from the German Pension Insurance (2006) and the Federal Statistical Office (2005).

5.3 Baseline Scenario

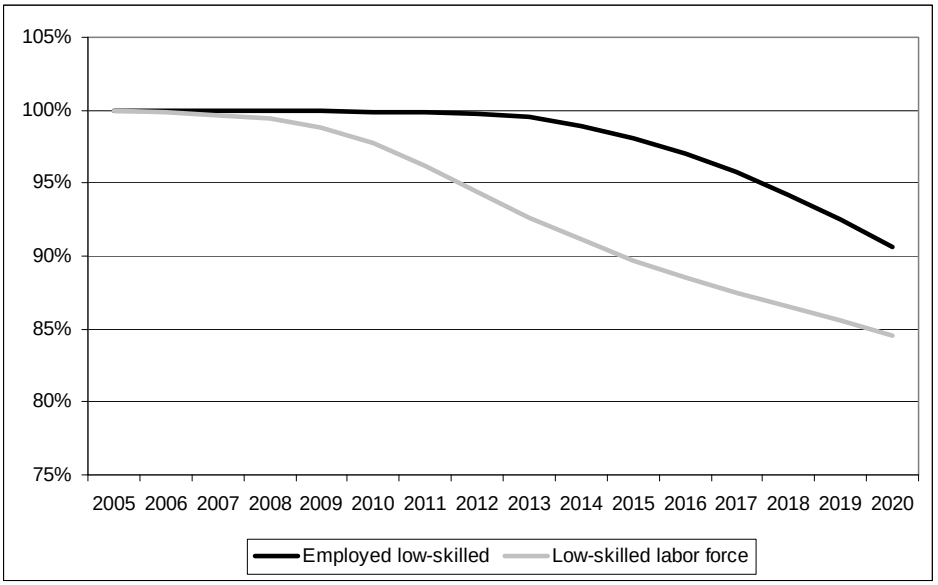
In the baseline scenario, we assume that the wages of all skill groups rise with the exogenous total factor productivity (TFP) growth in the period 2005 - 2020 as long as the unemployment

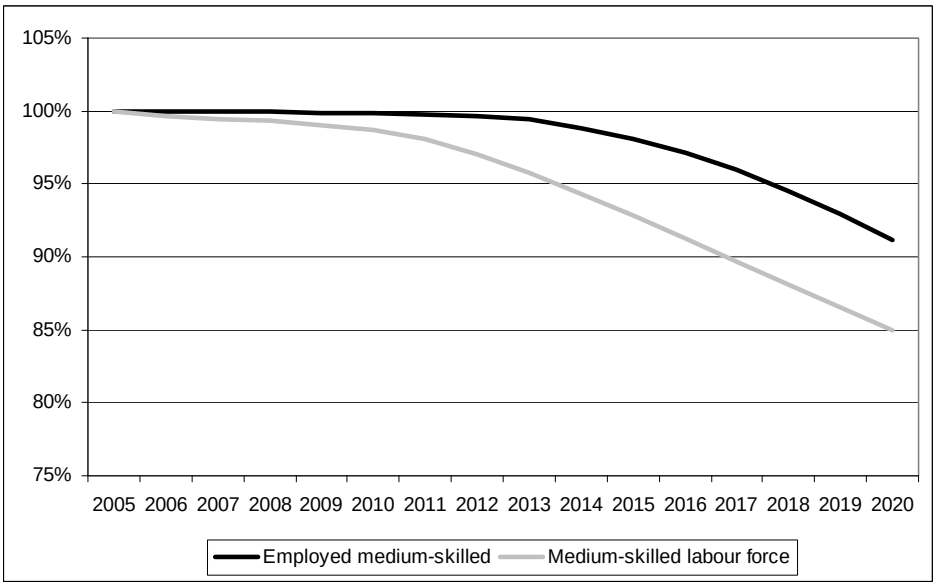
[6] In a recent paper Lee und Wolpin (2006) analyze the inter-sectoral mobility of workers between the service sector and the production sector in the United States. The authors find that relative wages in the production and

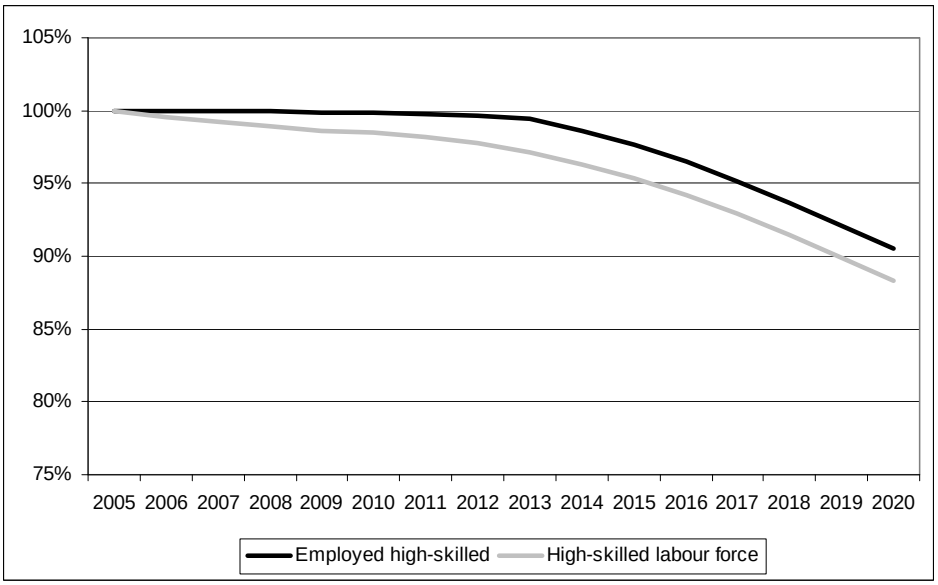
rate exceeds the critical level (3 percent). Hence, the baseline model reflects changes in labour demand that are purely due to demographic changes but do not capture any relative changes in input prices, i.e. increases or decreases in skill-specific wages. Labour demand will develop differently in the two sectors. In the tradable sector – where the international demand for goods eventually determines the demand for workers – the amount of labour demanded will remain constant. In contrast, labour demand decreases in the non-tradable sector due to the overall decline in the demand for local goods which in turn is the result of the shrinking population in eastern Germany. The number of employees with medium skill levels will display a decline by 8.8 percent within the period 2005-2020. The decrease is even somewhat more pronounced within the other skill groups, i.e. 9.4 percent and 9.5 percent for the low-skilled and high-skilled, respectively. In addition to the decline in the number of employees, we compute the decline in the number of the skill specific labour force (Figure 6). Overall we find that the reduction in the labour force is stronger than the decline in the number of employees.

service sector in the United States remained constant over time which is consistent with wage arbitrage between sectors.

Figure 6: Employment and Labour Force: Simulation Results for the Baseline Scenario (2005-2020)







Source: own calculations.

For high-skilled workers we find a bottleneck around the year 2013 when, the unemployment rate would fall below the 3 percent level which we define as the critical level for labour shortage. Without wage adjustments, labour demand would exceed labour supply by 20 thousand high-skilled workers in the year 2014 and by 90 thousand in the year 2020. The scarcity of high-skilled labour will drive up wages. According to our simulation, wages will increase on average by roughly 6 percent p.a. in the period 2013 to 2020 thus leading to significantly more income inequality (see Appendix C for the development of wages).[7] Hence, from the year 2013 onward the unemployment rate remains at the 3 percent level which is captured by the parallel curves in Figure 6 (employed high-skilled and high-skilled labour force).

Note, however, that such a strong increase in wages for the high-skilled will necessarily lead to an additional inflow of workers (or an outflow of firms). Hence, the simulation result may also be used to question the reliability of the assumption in the population projections.

With regard to the low- and medium-skilled, labour supply will decrease as well. However, due to the high number of unemployed persons, there will be no shortage of low- and/or medium-skilled workers in the projection period. Unemployment among medium-skilled and low-skilled workers will decline by 5 and 6 percentage points, respectively. Overall total employment in eastern Germany will decline by 600 thousand workers, i.e. from 6.7 to 6.1 million.

Identifying the Transmission Channels

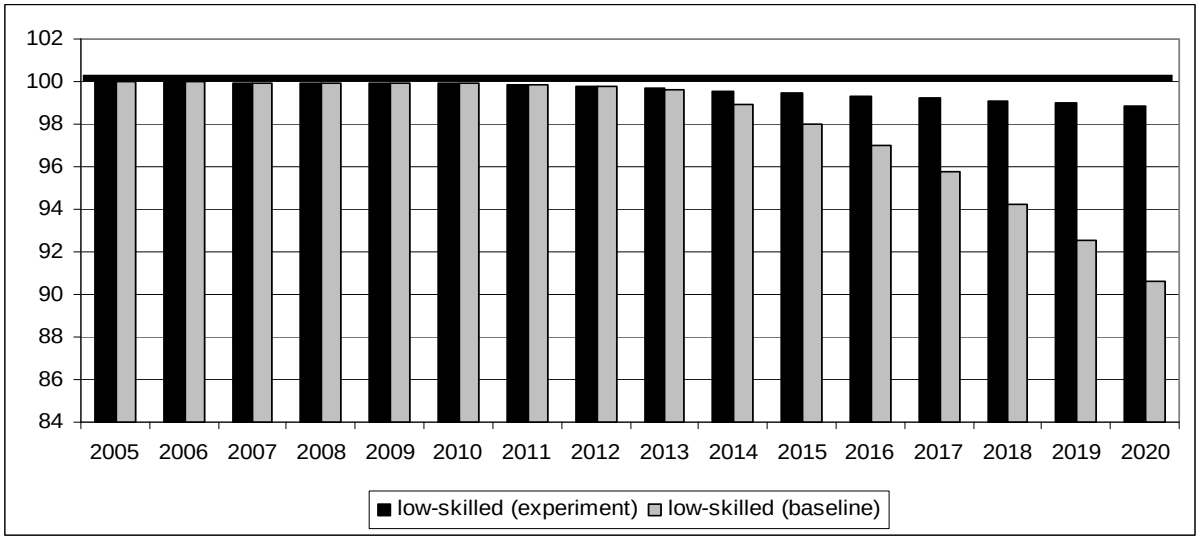
Our results so far indicate that the scarcity of high-skilled labour may play a significant role in eastern German labour markets. At the same time, the high unemployment among low- and medium-skilled workers persists. Total employment among the low- and medium-skilled will

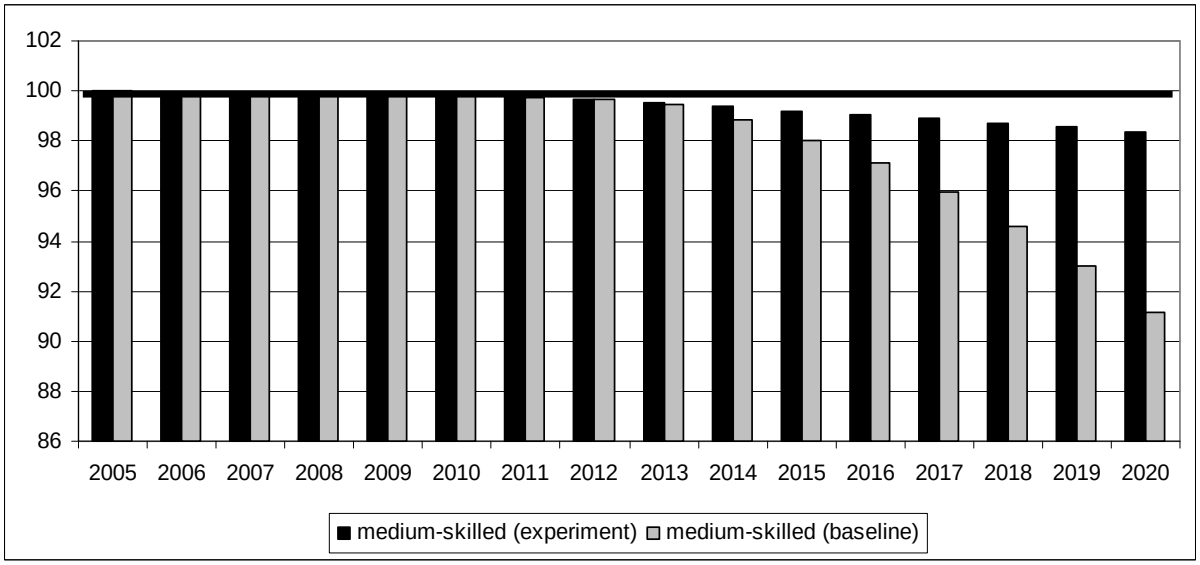
[7] Note that such large changes in relative wages would not only trigger an inflow of additional high-skilled workers but also lead to skill upgrading in the long run as the skill premium rises.

even decrease towards the end of our simulation period. In this section, we will try to identify the transmission channels for this decline in employment. There are two possible causes for declining employment. First, a decline in the local demand for non-traded goods could force the producers of these goods to demand fewer workers. Secondly, complementarity of high- and medium-skilled workers with the high-skilled may be responsible for the declining demand. Due to the demographic change, fewer high-skilled workers are employed in the traded and non-traded sectors. When low- and medium-skilled workers are complements in the production process, the scarcity of high-skilled will spill over to the other labour market segments.

To single out the magnitude of these two effects, we conduct the following thought experiment. Suppose that any additional labour demand is met by high-skilled workers from outside eastern Germany once high-skilled labour becomes scarce. Hence, the labour supply of the high-skilled is infinitely elastic at the current wage. However, the additional income of these (imported) workers is not spent locally. The additional workers do not contribute to the local demand for non-traded goods. Figure 7 shows the labour demand for medium- and low-skilled workers with and without the additional labour supply. The simulation results show that the driving force behind the decline in employment is the complementarity with the high-skilled workers (difference between black and grey bars). The inflow of additional workers helps to stabilize the demand for medium and low skills. Only a small fraction of the total decline can be attributed to the shrinking demand for non-traded goods (difference between black horizontal line and black bars).

Figure 7: Labour Demand for Low- and Medium-skilled Workers with and without Additional Labour Supply of High-skilled Workers





Sensitivity Analysis

In addition to the baseline scenario, we carry out the simulations with an alternative development of wages. The baseline scenario assumes that wages grow with total factor productivity as long as there is no scarcity within a skill group. This is, for instance, compatible with union wage bargaining where unions claim productivity gains for their clientele. In the alternative scenario, we assume that wages remain constant as long as unemployment exceeds the 3 percent threshold.

Our simulation results prove to be quite robust since the bottleneck for the high-skilled only varies slightly (+/- two years). Constant wages lead to higher employment levels in all skill groups. Compared to the baseline scenario, there are 20 thousand more high-skilled, 54 thousand more medium-skilled and 6 thousand more low-skilled workers in the year 2013. However, since the bottleneck of the high-skilled is only deferred for two years (2015), skill-specific employment levels will converge to those of the baseline scenario until the end of the projection period.

To summarize, demographic change will not solve the labour market problems in eastern Germany as the unemployment rates among the low-skilled will decrease only slowly. Among the high-skilled, scarcities could play an important role impeding the decline in total unemployment.

5.4 Policy Measures

The baseline scenario shows a scarcity of high-skilled after 2013. This raises the question to what extent the eastern German states will be able to satisfy the excess demand from internal sources (i.e. without additional migration beyond the assumptions of the population projection). We consider three alternative sources for additional labour supply of high-skilled workers: 1) female labour participation, 2) increased participation rates among older workers, 3) increasing the share of high-skilled through education. For all three policy options, we

simulate a realistic scenario to evaluate the magnitude of the effects. See Table 3 for a survey of the effects on the labour supply of the high-skilled and Figure 8 for the associated additional employment of low- and medium-skilled workers.

Table 3: Alternative Labour Force Scenarios

		2010	2015	2020
Women	Participation rate (baseline)	88.7 %	86.2 %	86.3 %
	Participation rate (alternative)	89.7 %	88.7 %	88.8 %
	Δ high-skilled labour supply	+7,600 / +0.6 %	+17,600 / +1.4 %	+16,900 / +1.4 %
Older Workers	Participation rate 55-59 years (baseline)	90.4 %	90.2%	89.9 %
	Participation rate 55-59 years (alternative)	92.6 %	94.7%	94.5 %
	Δ high-skilled labour supply	+4,900 / +2,4 %	+9,000 / +5.0 %	+10,300 / +5.2 %
	Participation rate 60-64 years (baseline)	58.3 %	54.8 %	54.6 %
	Participation rate 60-64 years (alternative)	62.5 %	63.9 %	63.7 %
	Δ high-skilled labour supply	+6,800 / +7.0 %	+19,600 / +16.6 %	+17,800 / +16.7 %
Education	Share of high-skilled baseline	16.0 %	16.5 %	16.6 %
	Share of high-skilled alternative	16.3 %	17.3 %	17.8 %
	Δ high-skilled labour supply	+20,800 / +1,6 %	+59,200 / +4.6 %	+85,700 / +7.1 %

Source: own calculations.

Female Labour Participation

A comparison of gender-specific participation rates shows that women are less integrated in the labour market than men (see Table 2). Increasing female labour force participation is one of the most prominent (and disputed) policy goals in Germany. For the policy experiment, we assume that the difference in participation rates between high-skilled men and women will be reduced by 50 percent up to the year 2015. Since we want to isolate the effect of higher labour supply of high-skilled women, the labour force participation of low- and medium-skilled women remains constant. The total high-skilled labour force will be higher by 1.4 percent in the year 2020 compared to the baseline scenario.

As our simulation results show the impact of higher female labour participation on high-skilled labour market in eastern Germany is fairly small. This is due to the already (relatively) high labour force participation of high-skilled women in eastern Germany. Higher female labour force participation shifts the constraint in high-skilled labour by two years. Labour demand for high-skilled reaches the 3 percent constraint in unemployment now by 2015 (instead of 2013). The additional employment also spills over to the other two labour market segments. In 2020, there will be additional employment of 70,000 and 8,000 for the medium- and low-skilled, respectively.

Higher Labour Participation among Older Workers

We modify the participation rates of older workers, i.e. men and women aged 55 and above. Compared to other European countries, the age group 55 years and older displays relatively low participation rates in eastern Germany. Table 4 shows the eastern German participation rates of the population aged 55 to 64 in comparison to the Swedish ones. While 83 percent of the high-skilled men and 87 percent of the high-skilled women aged 55 to 64 years are still active in the Swedish labour market, the respective labour force participation in eastern Germany amounts to 76 percent and 69 percent only. In our policy simulation, we analyse an increase of the participation rates for the population aged 55-64. In particular, we assume that the differences to the Swedish labour force participation (see Table 4) will halve by 2015.

Table 4: Participation Rates of Older Population (55-64 years) in Eastern Germany and Sweden (2005)

	Men			**Women**		
	Eastern Germany	**Sweden**	**Δ**	**Eastern Germany**	**Sweden**	**Δ**
Low-skilled	47.9 %	69.4 %	21.5 %-points	36.4 %	63.2 %	26.8 %-points
Medium-skilled	59.4 %	81.1 %	21.7 %-points	50.3 %	76.6 %	26.3 %-points
High-skilled	76.3 %	83.2 %	6.9 %-points	68.7 %	87.2 %	18.6 %-points

Source: Statistics Sweden (2006), own calculations.

Higher participation rates of older workers imply an increase in the high-skilled labour force by 2.3 percent. An increase in the participation rates of older workers entails a postponement in the shortage of high-skilled workers by three years to the year 2016. Compared to the scenario with female labour participation, the potential for additional high-skilled workers is much larger for two reasons. First, the possible change in participation rates is much larger, and second a growing share of the population will reach the age group 55-64 as society ages.

Due to the complementarity of skills, the increase in labour supply among older high-skilled workers also has an impact on the medium-skilled and low-skilled labour force. All in all, employment in these two skill groups will rise by 115,000 and 12,000, respectively, when compared to the baseline scenario.

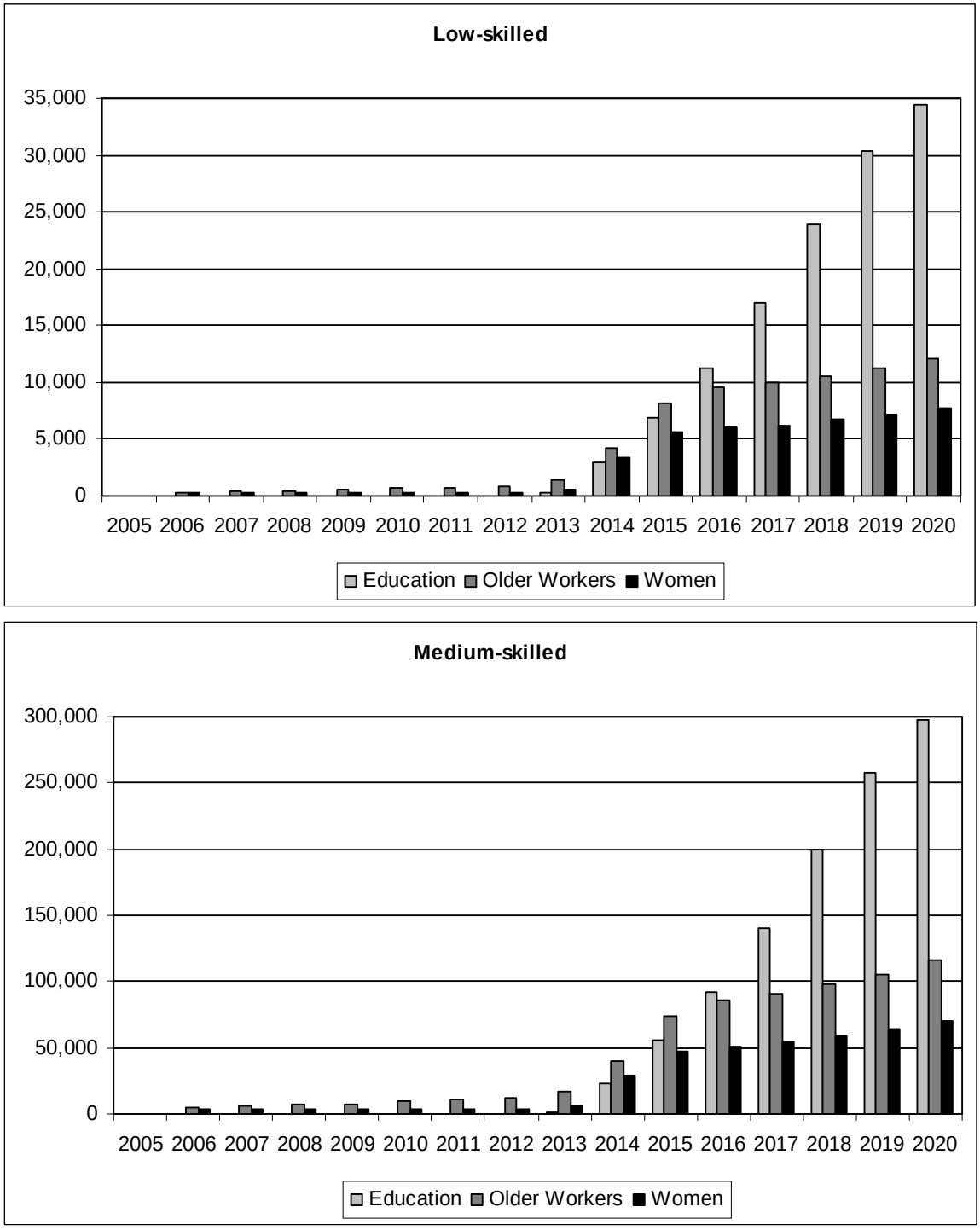
Higher Education

In this scenario, we assume that the share of the high-skilled among the young labour force will increase from currently 16 percent to 20 percent up to the year 2015. This increase in the education of the high-skilled may be due to higher university enrolment rates as a consequence of promotion of tertiary education. The high-skilled labour force will increase by 7.1 percent up to 2020. Since we assume that the additional high-skilled are exclusively drawn from the medium-skilled group, the medium-skilled labour force will shrink by 1.9 percent while the low-skilled labour force remains constant.

We find that the increase in higher education significantly improves the labour market situation in eastern Germany. The bottleneck of highly qualified workers is shifting to the year 2019, i.e. six years later compared to the baseline scenario. Since the education policy shifts workers from medium to high skills, this policy has also a direct impact on the labour market for the medium-skilled. According to our simulation results low-skilled unemployment could shrink by almost by 100 thousand individuals by 2005 whereas the decrease would amount to 900 thousand persons in the group of the medium-skilled. The total

number of high-skilled employees would decline by 3.1 percent in the period 2005-2020. Hence, if it is possible to enhance the number of the highly qualified, the entire labour market in eastern Germany would benefit from this development.

Figure 8: Additional Employment of Medium- and Low-skilled Workers due to Alternative Policy Measures



Source: own calculations.

6. Conclusion

Eastern Germany is a forerunner in the demographic change that will be experienced in many countries throughout Europe in the decades ahead. In this paper, we use eastern Germany as a laboratory for the impact of demographic change on labour markets. The current situation provides an interesting setting. There is high unemployment among the low-skilled. At the same time, firms are experiencing (local) shortages of high-skilled labour.

Our simulation model, which captures the time period up to 2020, shows that there might be a bottleneck of high-skilled employees after the year 2013. This shortage could lead to a significant increase in the wages of the high-skilled and make it more difficult to find appropriate workers in the local labour markets. The wage increase will also lead to rising income inequalities as there will be no upward pressure in the other labour market segments.

The distinction between a tradable and non-tradable sector proves to be decisive since the majority of the eastern German labour force is employed in the non-tradable sector. Due to the population decline, the lower demand for non-tradable goods will result in a slightly lower demand for workers in eastern Germany. The tradable sector will not fully compensate this decrease so that the total labour demand in eastern Germany is likely to decrease from 6.7 at present to 6.1 million in the year 2020. Since the labour supply will decline more strongly than labour demand, total unemployment numbers could decrease.

The results of the simulation should be interpreted with caution. There are several important aspects that have been neglected in the analysis so far. For instance, we ignore possible effects of an aging society on the worker productivity. The empirical literature [e.g., Daveri and Maliranta (2007), Skirbekk (2003)] has not yet reached a consensus on this topic. Furthermore, we exclude possible shifts between the sectors by assuming the same total factor productivity growth in the traded and no-traded sectors and by imposing a constant expenditure share for non-traded goods. Some of these assumptions should be relaxed in future research.

What preliminary policy implications can be drawn from our analysis? The reduction of the unemployment rates among the low-skilled seems to be good news at first glance. However, one has to take into account that adequate access to high-skilled labour pool is a necessary condition for many firms in their location choice. Regions experiencing a dramatic decline in its working age population such as eastern Germany could be at a disadvantage in regional competition due to the relative shortage of high-skilled labour. Policy measures aiming at an increase in the high-skilled labour supply could alleviate the burden. Education and immigration policy as well as changes in early retirement policies are obvious examples for such measures.

References

Abel, A. (2001): "Will Bequests Attenuate the Predicted Meltdown of Stock Prices when the baby Boomers Retire?", *Review of Economics and Statistics* 83, 589-595.

Boisvert, R.N. (1982): *The Translog Production Function: Its Properties, its several Interpretations and Estimation Problems*, Working Paper 82-28, Department of Agricultural Economics, Cornell University, Ithaca.

Börsch-Supan, A., A. Ludwig and J. Winter (2002): "Ageing and International Capital Flows", A. Auerbach and H. Herrmann (Eds), *Ageing, Financial Markets and Monetary Policy*, Springer, Heidelberg, 55-83.

Börsch-Supan, A. (2003): "Labor Market Effects of Population Aging", *Review of Labour Economics and Industrial Relations* 17, 5-44.

Cahuc, P. and A. Zylberberg (2004): *Labor Economics*, MIT Press, Cambridge, Massachusetts.

Casamatta, G., H. Cremer, and P. Pestiau (2001): "Demographic Shock and Social Security: A Political Economy Perspective", *International Tax and Public Finance* 8, 417-431.

Chong-Bum, A. and S. H. Jeon (2006): "Demographic Change and Economic Growth: An Inverted-U shape Relationship", *Economics Letters* 92, 447-454.

Christensen, L.R., D.W. Jorgenson and L.J. Lau (1973): "Transcendental Logarithmic Production Frontiers", *Review of Economics and Statistics* 55, 28-45.

Daveri, F. and M. Maliranta (2007): Age, Seniority and Labour Costs: Lessons from the Finnish IT Revolution, *Economic Policy* 49, 117-175

Demange, G. and G. Laroque (1999): "Social Security and Demographic Shocks", *Econometrica* 67, 527-542.

Fehr, H. (2000): "Pension Reform during the Demographic Transition", *Scandinavian Journal of Economics* 102, 419-443.

German Pension Insurance (2006): *Ergebnisse auf einen Blick: Stand August 2006*, Statistische Analysen, Berlin.

Federal Statistical Office (2003): *10th Coordinated Population Projection*, Wiesbaden.

Federal Statistical Office (2004): *Microcensus – Scientific Use File 2004*, Wiesbaden.

Federal Statistical Office (2005): *Sample Survey of Income and Expenditure 2003*, Wiesbaden.

Fitzenberger, B. (1999): *Wages and Employment across Skill Groups. An Analysis for West Germany*, Physica-Verlag, Heidelberg.

Fitzenberger, B. and W. Franz (1998): "Flexibilität der qualifikatorischen Lohnstruktur und Lastverteilung der Arbeitslosigkeit: Eine ökonometrische Analyse für Westdeutschland", in B. Gahlen, H. Hesse and H. J. Ramser (Eds.): *Verteilungsprobleme der Gegenwart. Diagnose und Therapie*, Wirtschaftswissenschaftliches Seminar Ottobeuren, Band 27, Mohr Siebeck, Tübingen..

Hamermesh, D.S. (1993): *Labor Demand*, Princeton University Press, New Jersey.

Kahn, J. A. and J. S. Lim (1998): "Skilled Labor-Augmenting Technical Progress in U.S. Manufacturing", *The Quarterly Journal of Economics* 113, 1281-1308.

Krueger, D. and A. Ludwig (in press): "On the Consequences of Demographic Change for Rates of Returns to Capital, and the Distribution of Wealth and Welfare", *Journal of Monetary Economics*, forthcoming.

Lee, D. and K.I. Wolpin (2006): "Intersectoral Labor Mobility and the Growth of the Service Sector", *Econometrica* 74, 1-46.

Miles, D. (1999): "Modelling the Impact of Demographic Change upon the Economy", *Economic Journal* 109, 1-36.

Poterba, J. M. (2001): "Demographic Structure and Asset Returns", *Review of Economics and Statistics* 83, 565-584.

Poterba, J. M. (2004): "Impact of Population Aging on Financial Markets in Developed Countries", *Kansas City Federal Reserve – Economic Review* 89, 43-53.

Reinberg, A. and M. Hummel (2005): "Vertrauter Befund: Höhere Bildung schützt auch in der Krise vor Arbeitslosigkeit", *IAB Kurzbericht* 09/2005.

Skirbekk, Vegard (2003): *Age and Individual Productivity: A Literature Survey*, Max-Planck-Institute for Demographic Research, Working Paper 28, Rostock.

Statistics Sweden (2006): *Statistical Yearbook of Sweden 2006, Stockholm*.

United Nations (2004): *World Population Prospects: The 2004 Revision*, http://esa.un.org/unpp.

Appendix A: Tradable and Non-tradable Sectors

The following table shows the allocation of the different sectors to the traded and non-traded sectors following the classification of Fitzenberger and Franz (1998).

Tradable Sector	Non-Tradable Sector
Agriculture and Forestry (A)	Energy supply (E)
Fishery (B)	Construction (F)
Mining (C)	Retail (G)
Manufacturing (D)	Hotel and restaurant industry (H)
Banking and Insurance (J)	Communications and information transmission (I)
	Real estate (K)
	Public administration (L)
	Education (M)
	Health and Social system (N)
	Other public services (O)
	Private households with personnel (P)
	Exterritorial organizations / statutory corporations (Q)

Appendix B: Specification of the Translog Production Function

Parameter	Tradable Sector	Non-Tradable Sector
A_0	17.000	10.000
a_L	0.120	0.165
a_M	0.525	0.475
a_H	0.355	0.360
b_{LM}	-0.071	0.144
b_{LH}	0.001	0.001
b_{LK}	0.039	-0.025
b_{MH}	-0.007	-0.070
b_{MK}	-0.068	-0.019
b_{HK}	0.018	0.041

Appendix C: Development of wages for alternative scenarios

Year	Low-skilled	Medium-skilled	High-skilled			
			Baseline Scenario	Female Workers	Older Workers	Higher Education
2005	36	44	100	100	100	100
2006	36	44	100	100	100	100
2007	36	44	100	100	100	100
2008	36	44	100	100	100	100
2009	36	44	100	100	100	100
2010	36	44	100	100	100	100
2011	36	44	100	100	100	100
2012	36	44	100	100	100	100
2013	36	44	100	100	100	100
2014	36	44	104	100	100	100
2015	36	44	108	102	100	100
2016	36	44	114	107	104	100
2017	36	44	121	113	110	100
2018	36	44	131	122	118	100
2019	36	44	143	133	128	101
2020	36	44	158	146	140	107

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