Sectoral Movement as an Incentive for Interregional Migration

By Alexander Kubis

Summary. This work examines the potential connection between migration and sectoral movement. We understand interregional migration as a sustainable relocation of an individual's center of life between two regions. Different quality levels of the boundaries between the regions of the analysed area are considered. Sectoral movement is defined as the relative variation of the regional gross value added in the primary, secondary and tertiary sector.

The chosen area to analyse is the Federal Republic of Germany. For the regional classification we use the hierarchic nomenclature NUTS1, provided by the Statistical Office of the European Communities, EUROSTAT. The investigated area consists of the 16 German Federal States. Along with the spatial relationships we analyze the influence of sectoral changes on the flows of migration between these regions during the years 1995 to 2002.

The theoretical description of this migration is based on the observations of L.A. SJAASTAD(1962) as well as M.P. TODARO(1969) and J.R. HARRIS / M.P. TODARO (1970), who considered migration as a result of individual decisions due to a sophisticated complex process. Migration as an individual investment in human resources raises the question about the specific costs for an emigrant's human resources stock. When emigrating to a region, where he finds an adequate work, the emigration costs are lower.

His tendency to migrate should hence be in accordance with the corresponding sectoral supply of employment. Therefore, we investigate the hypothesis, whether the tendency to migrate increases, if the sectoral gross value added of a region i rises relatively to a region j.

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In the analysis of regional areas different approaches exist to determine flows of migration, which are caused by the eastward enlargement of the European Union. The coming unrestricted mobility of labour and residence poses the question of possible consequences for the border regions. To first understand migration movements within one country, this work examines interregional migration under consideration of sectoral changes. Economically motivated migration may cause relocation of an individual to another town or to another federal state. That is why interregional migration is understood as a sustainable movement of the individual's centre of life between two regions. In this sense, we investigate the internal migration of a country.

In theory, internal and international migration are distinguished. With respect to the theoretical background introduced in this work, both specifications simply describe different quality levels of a political boundary, which can then be considered in further work. From the existence of sectoral movement along axes of development, important information for a future developmental policy may be derived.

East Germany is subject to a massive structural change. Sectoral movements arise due to the rigidness of the centrally planned economy until 1990 and the resulting deficits. In the regions of East Germany, internationally competitive sectoral structures with own sustained economic growth have developed because of the inner-German solidarity pact. For example, the preservation of industrial cores or the utilisation of existing advantages of the agricultural sector produced competitive structures. However, all increase in productivity is associated with a high degree of automation, causing the existing internal migration from east to west within Germany. In this work, special attention is payed to the sectoral movement between the regions of Germany.

Theoretical Background of Migration

To classify this work within subject area, different macro- and micro-economical approaches can be distinguished. Macroeconomical approaches describe migration by the help of macroeconomical figures. The most important estimation approaches are based on gravity theory. Coming from the Newton principle of gravity, these economical approaches postulate the relation between the distance and the relative dimension of two regions and their probability of interaction (in this work: migration). Different applications have been developed in economy based on this hypothesis. In the field of migration, LOWRY (1966) formulated the model of gravitation as follows, where $M_{(i,j)(k,\ell)}$ denotes migration from a region j to another region i, page while changing from an employment in some sector ℓ to an employment in a sector k : [1]

(1) $$\ln M_{(i,j)(k,\ell)} = \beta_0 - \beta_1 \ln ALQ_{(i)} + \beta_2 \ln ALQ_{(j)} - \beta_3 \ln W_{(i)(2)} + \beta_4 \ln W_{(j)(2)} + \beta_5 \ln L_{(i)(2)} + \beta_6 \ln L_{(j)(2)} - \beta_7 \ln D_{(i,j)} + \varepsilon_{(i,j)(k,l)} .$$

Regional differences are modelled w.r.t. the exogenous variables unemployment rate ALQ, wage level in the secondary sector W_2 and the number of employees L. Moreover the Distance $D_{(i,j)}$ between regions i and j is included in the model. The model can be expanded by any theoretically reasonable exogenous pull and push factors. The interaction variable increases in correspondence to the closeness of two regions. The elasticities of the model are estimated on the basis of flows of migration caused by former EU-expansions towards the south to forecast the EU-expansion toward the east. The decisive disadvantage is the apparent arbitrariness of the variables. In particular, an economic foundation of distance is missing.

Contrary to the gravity model, microeconomical attempts have an individual basis. The origin of these examinations can be found in the work of SJAASTAD (1962), as well as in the HARRIS / TODARO – models of migration (Todaro (1969) and Harris / Todaro 1970). Microeconomical models analyse an individual process of migration as a rational consideration of profit during some planning horizon. The idea of the human resource model of SJAASTAD is to describe migration as an individual, discounted decision of investment in human capital. Monetray and nonmonetary costs and inflow of profit are explicitly described for the both alternatives, to stay at a location or to relocate.

The central assumption of this model is that an agricultural worker from a rural region (j) emigrates to an urban region (i) to get a better employment. For this reason, his long-term income possibilities increase. Nonmonetary costs of migration are caused by building new social networks, but also by the search and acquisition of a new job.[2] Based on these thoughts, TODARO (1969), HARRIS / TODARO (1970) and others developed a model of migration.

At the time t of decision, net migration $\dot{M}$, weighted with the number B of workers of a region, depends on the ratio of the net present values $NPV_{(i,j)(t)}$ of the expected income of a

[1] cf. Lowry (1966), p.13.
[2] cf. Sjaastad (1962), p.84.

migration from region j to region i less the expected income $NPV_{(j,j)(t)}$ for a possible stay in the region j of origin, divided by $NPV_{(j,j)(t)}$ (equation 2):

$$(2) \qquad \left(\frac{\dot{M}}{B}\right)_{(i,j)(t)} = F\left[\frac{NPV_{(i,j)(t)} - NPV_{(j,j)(t)}}{NPV_{(j,j)(t)}}\right], \quad F' > 0.$$

These net present values from equation 2 result from the income Y during the planning horizon of length T, discounted with interest rate r. They vary for two regions, according to the assumptions, as follows:

$$(3) \qquad NPV_{(j,j)(0)} = \int_{t=0}^{T} Y_{(j,j)(t)} e^{-rt} dt,$$

$$(4) \qquad NPV_{(i,j)(0)} = \int_{t=0}^{T} p_{(t)} Y_{(i,j)(t)} e^{-rt} dt - C_{(i,j)(0)}.$$

While earnings in a region j result from an existing employment (equation 3), potential emigrants in region i succeed in finding a work in the urban sector only with probability p (equation 4). By shifting the centre of life, fixed costs C arise as well.

Considering the reasons of a migration, one should also determine factors which lead to a persistence in the region of origin. Possible advantages of an immobility should be identified, which can be induced by different monetary and nonmonetary aspects. The most elementary approach formulates fixed costs because of migration in combination with a short planning horizon. This encourages to stay in the region of origin, especially if there are only slight differences in the realization of income.

Besides the fixed costs, there are also specific regional network advantages, which are lost by migration.[3] As migration is connected with a different realization of income, we can ask for the extent of the loss in human capital. The emigrant possesses special knowledge to obtain a certain level of income in his region of origin. These immaterial location advantages determine the level of the reachable income. The simplest formal description formulates the reachable level of income w and, multiplicatively, a factor u, reflecting the individual regional advantages in realizing and utilizing the income (equation 5):[4]

$$(5) \qquad Y_{(j)} = w_{(j)} \cdot u_{(j)}.$$

[3] see Fischer (1999).
[4] cf. Möller (2002), p.4.

Different reasons like the retention period in a region[5] or a relative deterioration to the cohabitants of a region of origin[6] may as well influence the decision to migrate. BURDA (1995) and SIEBERT (1993) observe that in case of an economic convergence of regions a positive value of option results, if the decision to migrate is delayed. In this case, risk aversion leads to an effect of persistence in the region of origin.[7]

Sectoral model of migration

Assuming a possible loss in human capital through migration, this work intends to model and identify migration along sectoral axes of movement. If an individual emigrates to a region where he/she can find a work appropriate to his/her its qualifications, it is possible to decrease costs of the realization of income. His/Her addiction to migrate to a region with an appropriate sectoral offer of employment increases. Based on the considerations of HARRIS and TODARO, this work models migration for 3 different sectors: the primary, secondary and tertiary sector.

The primary sector covers particularly agriculture, but also fishing and forestry. The producing industry and the building industry form the secondary sector. The tertiary sector covers the main fields trade, hotel and restaurant industry and the transportation, as well as financial, leasing and corporate service providers, which can be public or private.

The migration between the regions of origin and destination is examined over time, dependent on the sectoral allocation. Three possible cases are analysed. The assumption of the original model is an individual working in the primary sector, which is our first case. Consequently, the other cases model a realization of income in the other two sectors.

Migration from region i to region j is examined dependent on different alternatives. On the one hand in the region of destination, the emigrant can get a job which is in the same sector as in the original region. Thus, he assures his asset of human capital and benefits from knowledge, resulting from his former realization of income. Alternatively, he can also find a job in one of the other sectors, which goes along with a loss in human capital.

The dependence of the flows of migration from the variation of different influencing variables is to be examined. Along with the effect of the income, a possible loss of human capital is analysed. We assume that a change from a region j to a region i can go along with a modification of the specific human capital. If the emigrate succeeds in finding a work in his

[5] cf. Fischer et al. (2000), p.18.
[6] cf. Stark / Taylor (1991), p.1176.
[7] cf. Straubhaar (2002), p.34.

sector in the destination region, the loss in specific human capital is smaller. The sum of the observed migration movement $M_{(i,j)(t)}$ of a region j to a region i at time t, can be split up according to sectors in the following way:

(6) $$M_{(i,j)(t)} = \sum_{k=1}^{K} \sum_{\ell=1}^{L} M_{(i,j)(k,\ell)(t)} \; .$$

The model distinguishes K sectors in the destination region, as well as L sectors in the original destination. The sectoral migration depends on the sectoral potential of migration $N_{(j)(\ell)(t)}$ in the original region and the sectoral marginal rate of migration $m_{(i,j)(k,\ell)(t)}$ (equation 7). The sectoral potential of migration corresponds to the population working in a sector, and the assigned members of their household:

(7) $$M_{(i,j)(k,\ell)(t)} = m_{(i,j)(k,\ell)(t)} \cdot N_{(j)(\ell)(t)} \; .$$

Furthermore, the sectoral marginal rate of migration can be displayed as a result of the following consideration of utility, in analogy to the HARRIS / TODARO migration model of equation 2 (equation 8):

(8) $$m_{(i,j)(k,\ell)(t)} = F\left[\frac{NPV_{(i,j)(k)(t)} - NPV_{(j,j)(\ell)(t)}}{NPV_{(j,j)(\ell)(t)}} ; \varepsilon_{(i,j)(k,\ell)(t)}\right],$$

(9) $$NPV_{(i,j)(k)(0)} = \sum_{t=0}^{T} \left(\frac{p_{(i,j)(k)(t)} Y_{(i,j)(k)(t)}}{(1+r)^t} - C_{(i,j)(\bullet)(0)} \right),$$

(10) $$NPV_{(j,j)(\ell)(0)} = \sum_{t=0}^{T} \frac{p_{(j,j)(\ell)(t)} Y_{(j,j)(\ell)(t)}}{(1+r)^t} \; .$$

Here again NPV denotes the net present value, Y is the income, C denotes the fixed costs of migration, p denotes the probability of income obtainment and r interest rate. In contrast to HARRIS / TODARO, in the sectoral migration model a probability of income obtainment is introduced for the original destination j as well. In the original destination, there is also a possibility to become unemployed. An individual migration occurs, if the expectations concerning the reduced earnings in planning horizon T in the destination region exceed those of the original region.

The model is tested on the basis of a macroeconomic data set, which provides the possibility of an analysis of flows of Migration from an original region to a destination region. The migration between the 16 German federal states from 1995 to 2002 is given. Three sectors are examined, which are identical for regions i and j. Initially, a reduction in dimension is achieved, since the dynamic effects are modelled via time dummies for the years (equation 11). For the corresponding year the specification is set to 1, otherwise it is set to 0. Hence, we have:

$$(11) \quad M_{(i,j)} = \sum_{t=0}^{T} M_{(i,j)(t)} = \sum_{k=1}^{K}\sum_{\ell=1}^{L} M_{(i,j)(k,\ell)} + \sum_{t=1}^{T} D_{(t)} .$$

The data set contains flows of migration of the years 1995 to 2002. Dummies are formed, which determine the dynamic variation from 1996 to 2002. However, in the tested model, no significant dynamic showed up. As the dummies show no influence on the remaining variables of the model, they are left out below and the model was formulated as a static model.

To test the model, influence variables of the marginal migration rates are required. For this reason, the determination of appropriate indicators is described in the following. In a sector the probability to realize income is represented by the average probability not to become unemployed. For data technical reasons, we assume that the regional tight labour market is the same in all sectors. The unemployment rate ALQ of a region is defined as the proportion of unemployed relative to the working population B.

The sectoral working population of sector ℓ in region j is given by the sectoral population $N_{(j)(\ell)}$ weighted with a sector-specific labour participation (equation 12). The labour force of a region is given by the sum of the sectoral working populations (equation 13):

$$(12) \quad B_{(j)(\ell)} = \psi_{(j)(\ell)} \cdot N_{(j)(\ell)} ,$$

$$(13) \quad B_{(j)} = \sum_{\ell=1}^{L} \psi_{(j)(\ell)} \cdot N_{(j)(\ell)} .$$

The expected earned income of a region with respect to a certain sector is determined approximately by the corresponding annual gross value added (BWS), weighted with the specific employees. This proxy implies that with increasing gross value added per employee the particular wage level is rising as well.

The fixed costs of migration are displayed by the indicator DIST. It indicates the distance in minutes by car between the regions i and j and implies that with increasing distance costs are rising. Sectoral migration has no influence on these fixed costs. Accordingly, the following coherence can be assumed for the expected earnings:

$$(14)\qquad NPV_{(i,j)(k)} \approx \left(1-ALQ_{(i)}\right)\cdot \frac{BWS_{(i,j)(k)}}{B_{(i,j)(k)}} - DIST_{(i,j)},$$

$$(15)\qquad NPV_{(j,j)(\ell)} \approx \left(1-ALQ_{(j)}\right)\cdot \frac{BWS_{(j,j)(\ell)}}{B_{(j,j)(\ell)}}.$$

The particular marginal migration rate results as a function of the following influence variables (equation 15):

$$(16)\qquad m_{(i,j)(k,l)} = F\left[\frac{\left(\left(1-ALQ_{(i)}\right)\cdot \frac{BWS_{(i,j)(k)}}{B_{(i,j)(k)}} - DIST_{(i,j)}\right) - \left(\left(1-ALQ_{(j)}\right)\cdot \frac{BWS_{(j,j)(\ell)}}{B_{(j,j)(\ell)}}\right)}{\left(1-ALQ_{(j)}\right)\cdot \frac{BWS_{(j,j)(\ell)}}{B_{(j,j)(\ell)}}}; \varepsilon_{(i,j)(k,\ell)}\right].$$

To simplify notation, we set:

$$(17)\qquad A_{(i,j)(k,l)} = \frac{\left(1-ALQ_{i}\right)\frac{BWS_{(i,j)(k)}}{B_{(i,j)(k)}}}{\left(1-ALQ_{j}\right)\frac{BWS_{(j,j)(\ell)}}{B_{(j,j)(\ell)}}}\cdot N_{(j)(\ell)}.$$

A restriction of equal elasticities for all regions is set to allow an estimation. From this it follows that we estimate only a static two-region model (region i (origin) and region j (target)). Assuming a linear function F in equation 16, a first estimation equation for the case of three sectors results as follows:

$$(18)\qquad \begin{aligned} M_{(i,j)(k,l)} &= \alpha_0 + \alpha_1 A_{(i,j)(1,1)} + \alpha_2 A_{(i,j)(2,2)} + \alpha_3 A_{(i,j)(3,3)} + \alpha_4 A_{(i,j)(2,1)} + \alpha_5 A_{(i,j)(3,1)} + \alpha_6 A_{(i,j)(1,2)} \\ &\quad + \alpha_7 A_{(i,j)(3,2)} + \alpha_8 A_{(i,j)(1,3)} + \alpha_9 A_{(i,j)(2,3)} - \alpha_{10} \frac{3DIST_{(i,j)}}{\left(1-ALQ_{(j)}\right)\frac{BWS_{(j,j)(1)}}{B_{(j,j)(1)}}} N_{(j)(1)} \\ &\quad - \alpha_{11} \frac{3DIST_{(i,j)}}{\left(1-ALQ_{j}\right)\frac{BWS_{(j,j)(2)}}{B_{(j,j)(2)}}} N_{(j)(2)} - \alpha_{12} \frac{3DIST_{(i,j)}}{\left(1-ALQ_{j}\right)\frac{BWS_{(j,j)(3)}}{B_{(j,j)(3)}}} N_{(j)(3)} \\ &\quad - \alpha_{13} 3N_{(j)(1)} - \alpha_{14} 3N_{(j)(2)} - \alpha_{15} 3N_{(j)(3)} + \varepsilon_{(i,j)(k,\ell)} \end{aligned}$$

.

Now, we reduce the sectoral model to the central influence variables. The factors α_{13} to α_{15} reflect the influence of the migration potential of the original region. Assuming equal labour participation over all regions and sectors and further assuming full employment for all populations ($\psi = 1$), the migration potential $N_{(j)}$ is equivalent to the sectoral working population $B_{(j)}$. Allowing for equation 12, this assumption permits the following simplification:

(19) $$B_{(j)} = N_{(j)(1)} + N_{(j)(2)} + N_{(j)(3)} .$$

The resulting indicator is a measure for the influence of the size of the original region.
It may be plausible that the probability of emigration is greater in large regions. In a second step, fixed costs of migration are summed up for all sectoral combinations of migration, to receive a measure for the influence of this cost factor:

(20)

$$\frac{3DIST_{(i,j)}}{\left(1-ALQ_{(j)}\right)\dfrac{BWS_{(j,j)(1)}}{B_{(j,j)(1)}}}N_{(j)(1)} + \frac{3DIST_{(i,j)}}{\left(1-ALQ_{j}\right)\dfrac{BWS_{(j,j)(2)}}{B_{(j,j)(2)}}}N_{(j)(2)} + \frac{3DIST_{(i,j)}}{\left(1-ALQ_{j}\right)\dfrac{BWS_{(j,j)(3)}}{B_{(j,j)(3)}}}N_{(j)(3)} = D_{(i,j)} .$$

A first simplified notation of the model follows:

(21) $$\begin{aligned} M_{(i,j)(k,l)} = {} & \alpha_0 + \alpha_1 A_{(i,j)(1,1)} + \alpha_2 A_{(i,j)(2,2)} + \alpha_3 A_{(i,j)(3,3)} + \alpha_4 A_{(i,j)(2,1)} + \alpha_5 A_{(i,j)(3,1)} + \alpha_6 A_{(i,j)(1,2)} \\ & + \alpha_7 A_{(i,j)(3,2)} + \alpha_8 A_{(i,j)(1,3)} + \alpha_9 A_{(i,j)(2,3)} - \alpha_{10} D_{(i,j)} - \alpha_{13} B_{(j)} + \varepsilon_{(i,j)(k,\ell)} \end{aligned} .$$

The larger the fixed costs of migration, the lower should be the observed flows of migration.
The remaining costs include the influence of existing differences in income as well as a possible loss in human capital in the case of migration. If the individual finds a work in the same sector in the destination region, we assume holds, that this migration is purely income induced. In the case of internal migration, this type of migration should not be connected with a loss in human capital. This means, that these indicators ($A_{(i,j)(k,l)} \forall k = \ell$) provide an identical information. For this reason, they are limited to the same elasticity. Renumbering elasticities leads to:

(22) $$\begin{aligned} M_{(i,j)(k,l)} = {} & \alpha_0 + \alpha_1 \left(A_{(i,j)(1,1)} + A_{(i,j)(2,2)} + A_{(i,j)(3,3)}\right) + \alpha_2 A_{(i,j)(2,1)} + \alpha_3 A_{(i,j)(3,1)} + \alpha_4 A_{(i,j)(1,2)} \\ & + \alpha_5 A_{(i,j)(3,2)} + \alpha_6 A_{(i,j)(1,3)} + \alpha_7 A_{(i,j)(2,3)} - \alpha_8 D_{(i,j)} - \alpha_9 B_{(j)} + \varepsilon_{(i,j)(k,\ell)} \end{aligned} .$$

If an individual changes not only the region but also the sector, where his / her earnings result from, this is connected with a possible loss in human capital. He / she needs specific sectoral knowledge of income realization. It can be presumed that existing knowledge from the occupation in the other sector has just a limited compatibility. These indicators ($A_{(i,j)(k,l)} \forall k \neq \ell$) contain, in addition to differences in income, information of a possible loss in human capital, too.

There exists a signal extraction problem. The cause of migration can in such cases not be derived from the expected differences in income when migrating to another sector. To exactly specify the influence of a possible human capital effect, we have to consider different sectoral migration decisions. If the sectors of destination and origin are identical, the decision is definitely induced by income, according to the assumptions of the model. In order to identify possible effects, a variance decomposition is performed. For this purpose, the indicator consisting of income effects and sectoral effects is regressed to those indicators which exclusively reflect income effects (equations 23):

(23) $$A_{(i,j)(k,\ell)} = \beta_{(k,\ell)} \cdot \left(A_{(i,j)(1,1)} + A_{(i,j)(2,2)} + A_{(i,j)(3,3)} \right) + u_{(i,j)(k,\ell)} \quad \text{with } k,\ell = 1,2,3 \;\; \forall k \neq \ell \,.$$

The „exogenous" variables exclusively explain income induced migration. The residual $u_{(i,j)(k,l)}$ includes information on the facts which could not be explained by income induced variables. Variance because of a sectoral human capital effect is moving to the residual. In a second step, the output indicators are replaced as follows:

(24)

$$\begin{aligned} M_{(i,j)(k,l)} = \alpha_0 & \\ & + \left(\alpha_1 + \alpha_2 \hat{\beta}_{(2,1)} + \alpha_3 \hat{\beta}_{(3,1)} + \alpha_4 \hat{\beta}_{(1,2)} + \alpha_5 \hat{\beta}_{(3,2)} + \alpha_6 \hat{\beta}_{(1,3)} + \alpha_7 \hat{\beta}_{(2,3)} \right) \left(A_{(i,j)(1,1)} + A_{(i,j)(2,2)} + A_{(i,j)(3,3)} \right) \\ & + \alpha_2 \hat{u}_{(i,j)(2,1)} + \alpha_3 \hat{u}_{(i,j)(3,1)} + \alpha_4 \hat{u}_{(i,j)(1,2)} + \alpha_5 \hat{u}_{(i,j)(3,2)} + \alpha_6 \hat{u}_{(i,j)(1,3)} + \alpha_7 \hat{u}_{(i,j)(2,3)} \\ & - \alpha_8 D_{(i,j)} - \alpha_9 B_{(j)} + \varepsilon_{(i,j)(k,l)} \end{aligned} .$$

This can be simplified as:

(25) $$\begin{aligned} M_{(i,j)(k,l)} = \delta_0 & + \delta_1 \cdot \left(A_{(i,j)(1,1)} + A_{(i,j)(2,2)} + A_{(i,j)(3,3)} \right) \\ & + \delta_2 \hat{u}_{(i,j)(2,1)} + \delta_3 \hat{u}_{(i,j)(3,1)} + \delta_4 \hat{u}_{(i,j)(1,2)} + \delta_5 \hat{u}_{(i,j)(3,2)} + \delta_6 \hat{u}_{(i,j)(1,3)} + \delta_7 \hat{u}_{(i,j)(2,3)} \\ & - \delta_8 D_{(i,j)} - \delta_9 B_{(j)} + \varepsilon_{(i,j)(k,l)} \end{aligned} .$$

The factor δ_1 measures the income effect of the whole model. Because of a multicollinearity problem between the indicators of the human capital effect, the human capital effect of the whole model is estimated at first. For this reason, the corresponding elasticicities form equation 25 are restricted to be equal:

$$\begin{aligned} M_{(i,j)(k,l)} = \delta_0 \; & + \delta_1 \cdot \left(A_{(i,j)(1,1)} + A_{(i,j)(2,2)} + A_{(i,j)(3,3)} \right) \\ & + \delta_2 \cdot \left(\hat{u}_{(i,j)(2,1)} + \hat{u}_{(i,j)(3,1)} + \hat{u}_{(i,j)(1,2)} + \hat{u}_{(i,j)(3,2)} + \hat{u}_{(i,j)(1,3)} + \hat{u}_{(i,j)(2,3)} \right) . \\ & - \delta_3 D_{(i,j)} - \delta_4 B_{(j)} + \varepsilon_{(i,j)(k,l)} \end{aligned} \tag{26}$$

The summarized results of the estimation are shown in Table 1.

Table 1: High aggregate sectoral model of migration

Dependent Variable: $M_{(i,j)(k,l)}$
Method: Least Squares*
R-squared: 0.349742
Samplesize: 1856

Label		Coefficient	Prob.
CONST	δ_0	4423.092	0.0000
INCOME	δ_1	2.005012	0.0000
SECTOR	δ_2	-1.958156	0.0331
FIXCOST	δ_3	-45.23906	0.0000
POPULATION	δ_4	0.175595	0.0901

*Newey-West HAC Standard Errors & Covariance (lag truncation=7)
Source: own calculation with EViews.

For the observed sample, only the following factors are interpreted which show an significant influence for the migration volume at the 5% level. The larger the expected difference in income between two regions i and j (meaning larger expected income in region i), the larger is the expected migration volume between region i and j. At the same time, a necessary sectoral movement is connected with a slump in flows of migration. The residuals of the first equations (equations 23) reflect the additional difference in income in case of a simultaneous change to another sector. The corresponding δ-values can be interpreted as a human capital effect. Accordingly, a sectoral movement leads to a negative human capital effect. The increase in fixed costs of migration, measured by the indicator distance, affect possible flows of migrations negatively.

The population of the original region is insignificant in estimation and does for this reason not contribute to an explanation of interregional migration behaviour. Altogether, the fit of the high aggregate model is not optimal, yet. The high autonomous migration potential (constant) refers to this point, too. However, the model already verifies decisive influence factors. In more elaborated models, further socio-economic factors are to be integrated, checking their validity. Migration proceeds to relatively close destination regions with a higher income level and a similar sectoral structure. Expecting a negative human capital effect when changing sectors leads to a migration alongside sectoral axes. A structural change in some region is often connected with economization in jobs. An individual, affected by economization, has to decide whether to emigrate or not. Since a rational decision considers possible negative influences on the expected income, the estimation results lead to the presumption that a possible migration will aim at a region with a similar sectoral structure. To specify our statements, we ease the restriction of the human capital effect. For the following estimation results, we assume that human capital loss in migration is equal when starting from a certain sector and changing to some different sector:

$$
\begin{aligned}
M_{(i,j)(k,l)} = \delta_0 & + \delta_1 \cdot \left(A_{(i,j)(1,1)} + A_{(i,j)(2,2)} + A_{(i,j)(3,3)} \right) \\
& + \delta_2 \left(\hat{u}_{(i,j)(2,1)} + \hat{u}_{(i,j)(3,1)} \right) + \delta_3 \left(\hat{u}_{(i,j)(1,2)} + \hat{u}_{(i,j)(3,2)} \right) + \delta_4 \left(\hat{u}_{(i,j)(1,3)} + \hat{u}_{(i,j)(2,3)} \right) . \\
& - \delta_5 D_{(i,j)} - \delta_6 B_{(j)} + \varepsilon_{(i,j)(k,l)}
\end{aligned}
\tag{27}
$$

The summarized results of the eased estimation are shown in the following Table 2.

Table 2: Sectoral Modell of migration

Dependent Variable: $M_{(i,j)(k,l)}$
Method: Least Squares*
R-squared: 0.356406
Samplesize: 1856

Label		Coefficient	Prob.
CONST	δ_0	4474.978	0.0000
INCOME	δ_1	1.947756	0.0000
SECTOR(j=1)	δ_2	0.310820	0.8805
SECTOR(j=2)	δ_3	-3.236429	0.0146
SECTOR(j=3)	δ_4	-2.039866	0.0473
FIXCOST	δ_5	-45.89075	0.0000
POPULATION	δ_6	0.157053	0.1110

*Newey-West HAC Standard Errors & Covariance (lag truncation=7)
Source: own calculation with EViews.

The human capital effect is significant for the secondary and the tertiary original sector. The results point out a slightly stronger negative human capital effect in the secondary sector. A human capital effect for emigrants from the primary sector could not be shown.

In this work we could get interesting insight into interregional migration behaviour, considering relevant influences. Using this further developed microeconomically funded model, the influence of sectoral structure on the individual migration behaviour could be approved. All significant influence factors show the expected effective direction.

The sectoral human capital effect has to be considered in general in case of international migration. But the relative influence on the international migration behaviour is subject to a lot of further assumptions and restrictions. Basically, a better prediction of the regional migration behaviour should be possible. This is work in progress.

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