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**Determinants of Female Migration
– The Case of German NUTS 3 Regions –**

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– The Case of German NUTS 3 Regions –

Abstract

Our study examines the regional patterns and determinants of migration flows of young women. At the NUTS-3 regional level, i.e. the district level (Kreise), the German internal migration flows of the year 2005 are explored. From descriptive statistics it can be seen that peripheral regions in East Germany face the strongest migration deficit with respect to young women, whereas agglomerations in West Germany but also in the East benefit from an intense migration surplus within this group.

An econometric analysis of determinants of regional migration flows gives evidence of the importance of labour market, family-related and educational migration motives. Generally speaking, young women tend to choose regions with good income and job opportunities, in addition they seem to be attracted by regions enabling an appropriate balance between family and career. Furthermore the existence of excellent educational facilities is a significant influence for young women's migration. This educationally motivated type of migration generates a long lasting effect on the regional migration balance, especially when the educational opportunities in the destination region are associated with adequate career perspectives for high qualified female graduates.

In view of considerable losses due to migration, the study shows various options for action. An important course of action is to incorporate policy measures improving regional employment and income opportunities. Secondly, extending vocational and academic offers addressed to women seems to be a suitable way to stimulate women's immigration. Moreover, enhancing the social infrastructure, which contributes to a satisfactory work life balance, might attract young women or at least reduce the number of them leaving a region.

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Zusammenfassung

Die Analyse untersucht die Determinanten der Binnenwanderungsströme junger Frauen in Deutschland auf NUTS-3-Ebene für das Jahr 2005. Es zeigt sich, daß die Regionen mit einem ausgesprochen negativen Wanderungssaldo junger Frauen in der ostdeutschen Fläche zu finden sind, während die Agglomerationen – auch die großen Städte in den neuen Bundesländern – von Zuzügen dieser Gruppe profitieren.

Auf der Grundlage sozialwissenschaftlicher Erklärungsansätze wird der Einfluß von drei vermuteten Wanderungsmotiven untersucht: das ökonomische Motiv einer Verbesserung der Einkommens- und Erwerbsposition, das Wanderungsmotiv im Zuge der Aufnahme einer Ausbildung bzw. eines Studiums sowie das Motiv einer Wanderung aus partnerschaftlichen und familienorientierten Gründen. Die Analyse belegt die Signifikanz der arbeitsmarkt-, familien- und bildungsbezogenen Wanderungsmotive. Im allgemeinen wandern junge Frauen in Regionen mit guten Einkommens- und hochwertigen Erwerbsmöglichkeiten, wobei die Vereinbarkeit von Familie, Partnerschaft und Beruf im genuinen Interesse dieser Gruppe zu liegen scheint. Ferner zeigt sich eine ausgeprägte Anziehungskraft von Regionen mit erstrangigen Bildungsangeboten. Dabei generiert diese Bildungswanderung einen nachhaltig positiven Effekt auf die Wanderungsbilanz, weil die jungen Frauen verstärkt dorthin ziehen, wo nicht nur Studienplätze vorhanden sind, sondern auch Arbeitsfelder für hochqualifizierte Hochschulabsolventinnen.

In regionalpolitischer Hinsicht zeigt die Analyse mehrere Handlungsoptionen auf, wie einer starken Abwanderungstendenz entgegengewirkt werden kann. Erstens sind Politikansätze, welche auf die Verbesserung der Qualität des regionalen Arbeitsplatzangebotes abzielen, wichtig, um erwerbsbezogene Abwanderung zu bremsen. Zweitens kann eine Erweiterung frauenspezifischer Bildungsangebote Zuwanderung stimulieren. Nicht zuletzt sollte sich die Vereinbarkeit von Familie und Beruf als Halte- bzw. Zuzugsfaktor erweisen – ein Ausbau der sozialen Infrastruktur in diesem Bereich ist damit angezeigt.

Determinants of Female Migration
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1 Introduction

The present study aims at identifying the main location factors of German regions explaining interregional mobility of young women. There are at least three reasons to concentrate on young female migration. First of all, the German experience after reunification shows a clear correlation between young female migration and regional development. In a static view rich regions seem to benefit from inmigration of young well-educated women whereas poor regions lose. More fundamentally, in a dynamic perspective „catching up regions" in East Germany attract young women while regions with poor economic performance face strong outmigration trends. Hence, female migration is at least an indicator of regional economic perspectives.[1] Secondly, young women not only are an indicator, they also *generate* regional economic performance since women normally exhibit a higher educational potential than men.[2] So they are of crucial importance for the regional human capital endowment, especially with respect to service and knowledge intensive sectors. Last but not least young women play the key role for long-run regional demographic development as they determine regional fertility levels. Also from this demographic point of view a separate examination of push and pull factors of interregional female mobility is of deep interest.

The empirical literature analysing determinants of regional mobility is usually based on survey data as on this level the actual migration motives of individuals or households can be captured most closely (Cushing and Poot 2004). These survey based studies normally rely on a limited sample size, so the impact of location factors at a small scale regional level cannot be examined.[3] The present study, therefore, switches from the indi-

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[1] This indicator role is less valid for the migration of young men. Since young men seem to be less mobile a lot of „falling behind regions" in Germany face a strong deficit of young women reinforcing the regional obstacles and leading to political and social erosion (cf. Section 2).

[2] „Females are now more likely to complete upper secondary education than males in almost every OECD country, a reversal of the historical pattern. " (*OECD* 2006, p. 43).

[3] The micro studies usually focus on the East-West migration within Germany (*Burda* 1993 and *Burda* et al. 1998; *Hunt* 2000; *Bruecker and Truebswetter* 2007). Solely *Hunt* (2004) analyses regional migration on a smaller regional scale but still on NUTS-1 level. Besides this lack of regional differentiation, these studies do not explicitly deal with the gender dimension of regional migration. Most recently, *Zaiceva* (2007) focuses on women's labour market status after migration but again on the East-West level. For the UK *Faggian* et al. (2007) analyse the gender differences in graduate migration behaviour.

vidual to the aggregate level and analyses the patterns of regional migration instead of individual migration decisions. At this stage the impact of regional characteristics on migration behaviour can be studied. However, the instance deciding about migration, i.e. the individual, cannot be observed.[4] In contrast to the few recent papers also dealing with interregional migration on an aggregate level, we are able to discriminate between sexes and certain age groups, so the determinants of regional mobility of young women can be identified.[5] Moreover, we use an origin-destination migration dataset for the year 2005, so we know where the migrants come from and where they go.[6] Most papers just use net migration rates of a region as dependent variable. But to avoid spurious correlations the origin of inmigrants and the destination of outmigrants should be known and implemented in the estimation. Extending the existing literature, our paper furthermore focuses not only on labour mobility, i.e. a job related type of migration, but also on educational and social aspects of female migration. The variable which will be modelled is the migration flow of total female population aged 18 to 30 years, regardless, of labour market participation.

The remainder of the paper is organised as follows. The next section describes the spatial patterns of young women's interregional migration for the year 2005, which is the most actual data available. Section 3 outlines the theoretical concepts usually employed to explain regional mobility. Dataset and estimation procedure are discussed in section 4. The results are presented in section 5. A short conclusion completes the paper.

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[4]   To implement micro as well as regional information, a multilevel model has to be estimated. This is hardly possible on the basis of German data sets unless the analysis focuses solely on labour market mobility (Arntz 2006). For the US case see *Swain and Garasky* (2007), for China *Yang and Guo* (1999), for Estonia *Kulu and Billari* (2004).

[5]   A general literature survey can be found in *Greenwood* (1997). Interregional mobility within Europe is examined by *Huber* (2004) and by *Fidrmuc* (2003). More recent papers for the German case are Parikh and *van Leuvensteijn* (2003); *Burda and Hunt* (2001); *Kempe*r (2004).

[6]   In our analysis we use datasets provided by German Federal Statistical Office, German Federal Employment Office, German National Accounting of the Federal States as well as German Federal Office for Building and Regional Planning.

2   Interregional Migration of Young Women in Germany

Before analysing which parameters influence the migration behaviour of young women, current regional mobility patterns are initially illustrated. Figure 1 shows the rates of regional migration balance of women aged 18 to 30 for 2005 at district level (NUTS 3).

Figure 1:
Migration balance of women per population of women
- NUTS 3, aged 18 to 30 years, 2005 -
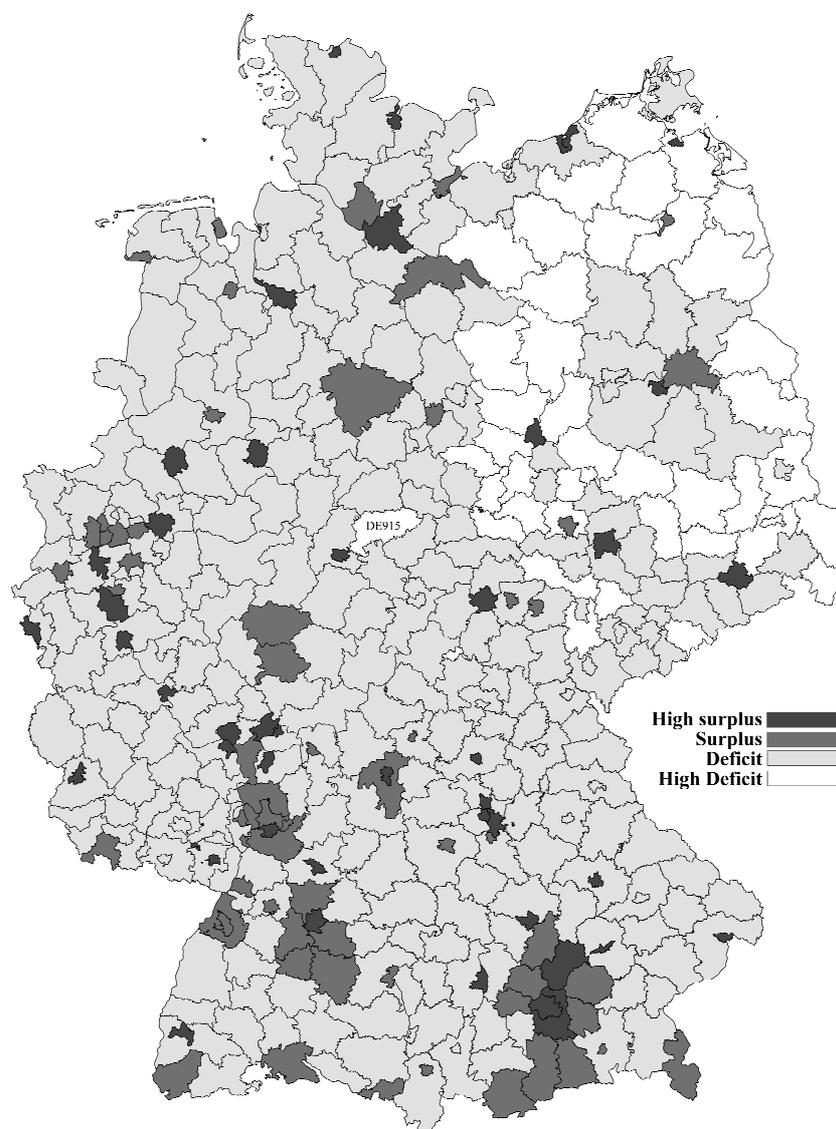
NUTS = Nomenclature des unités territoriales statistiques (French.), „systematics of regional units for statistics"; Germany: districts, urban communes as well as the federal states Hamburg and Berlin. High surplus resp. deficit corresponds to the upper resp. lower 10% quantile. Massive out-migration in the district of Goettingen (DE915) is caused by the border repatriation facility Friedland.

Source: Own presentation.

These rates result from inmigration minus outmigration (net migration), weighted with female population in the examined age. It can be recognised that more than two thirds of German districts show a net loss in women due to migration in the examined age group (white and light grey). White coloured areas represent regions with a particular negative migration balance for young women. In contrast, dark areas mark districts with a considerable positive migration balance.

The figure illustrates two essential migration trends. Firstly, young women leave East German periphery on a large scale. West German periphery is affected by this trend as well, but to a more moderate degree. Secondly, regions with a positive balance most often represent urban centres (cf. Table 1).

Table 1:
Regions with the 10 highest resp. lowest rates of regional migration balance of women
- NUTS 3 without district Goettingen, aged 18 to 30 years, 2005 -

District	Rate of migration balance		District
	Lowest	Highest	
Niederschlesischer Oberlausitzkreis	-9.88%	22.92%	Mainz
Hoyerswerda	-9.55%	10.72%	Cologne
Demmin	-8.93%	9.41%	Magdeburg
Uecker-Randow	-8.37%	8.39%	Greifswald
Spree-Neiße	-7.80%	8.31%	Augsburg
Parchim	-7.69%	7.03%	Nuremberg
Nordvorpommern	-7.66%	6.11%	Dresden
Elbe-Elster	-7.04%	5.58%	Regensburg
Uckermark	-7.01%	5.38%	Leipzig
Altmarkkreis Salzwedel	-6.78%	5.34%	Düsseldorf

NUTS = Nomenclature des unités territoriales statistiques (French), „systematics of regional units for statistics"; Germany: districts, urban communes as well as federal states Hamburg and Berlin. – Rate of the migration balance$_i$ = inmigration$_i$ – outmigration$_i$ / population$_i$ (all variables for women, aged 18 to 30 years)

Source: Own calculation.

To some extent these two trends overlap: the tendency of migration out of East Germany is interfered by a trend towards agglomeration, so that East German centres benefit from inmigration of young women as well. Nevertheless, the New Federal States (without Berlin) in total lost about 20 000 young women in 2005 (cf. Table 2).

Figure 2 relates the rate of migration balance of women aged 18 to 30 to the proportion of men to women in this age group. Numerous East German regions show a high deficit in women. This deficit is accompanied by a strong tendency to women's outmigration.

Also in West Germany, regions with a higher share of male population tend to lose more females than other regions. Apparently, these regions have experienced a long-term trend of outmigration of young women, so the gender proportion is already influenced to

men's disadvantage. This development implies that women react more intensely on certain regional characteristics than men, and therefore they are more likely to migrate.

Table 2:
Total migration of women differentiated for East and West direction
- NUTS3, aged 18 to 30 years, 2005 -

		Destination	
		New Federal States (EAST)	Old Federal States (WEST)
Origin	New Federal States (EAST)	58 690	39 669
	Old Federal States (WEST)	19 886	399 957

Source: Own calculation.

Figure 2:
Rate of regional migration balance of women [a)] in relation to gender proportion [b)]
- NUTS 3, aged 18 to 30 years, 2005 -
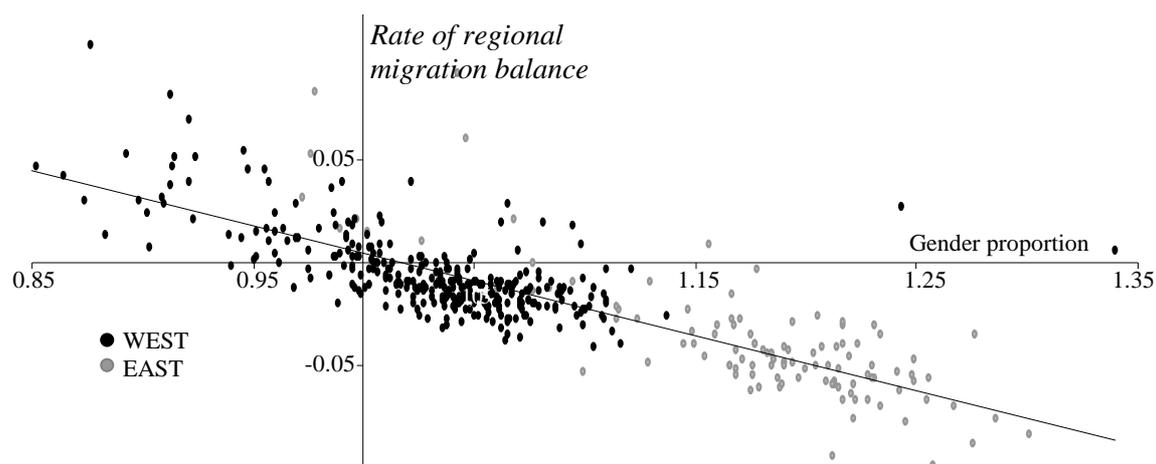
a) Rate of the migration balance$_i$ = inmigration$_i$ – outmigration$_i$ / population$_i$ (all variables for women, aged 18 to 30 years). – b) gender proportion$_i$ = number of male persons$_i$ / number of female persons$_i$ (all variables for age group 18 to 30 years)

Source: Own presentation.

If men would tend to migrate to a similar extent, the gender proportion would remain unaffected. The subsequent analysis concentrates on the migration behaviour of young women.

3   Theoretical Framework

In migration theory aggregate (macro) and individual (micro) concepts in explaining in-terregional movements have to be distinguished. Regarding the aggregate approaches usually applied in analysing regional migration flows one can further differentiate be-tween the gravity and the push-pull concept of migration. According to gravity theory, originally developed in physics, migration flows between regions are directly related to the size of origin and destination populations, and are negatively correlated to distance (Greenwood 1997). The push-pull approach is based on the simple hypothesis that the number of migrants between two regions is a function of pull factors attracting people to the destination as well as push factors driving them away from the origin region (Lowry 1966; Lee 1966). The main problem of this concept is the rather arbitrary identification of relevant push and pull factors. Macro theory does not tell which regional characteris-tics primarily affect migration flows since these flows are the aggregate outcome of many individual or household decisions.

This drawback can be resolved by switching to micro explanations of migration as these concepts concentrate on individual or household migration decisions. Again, two basic approaches can be distinguished. The *economic* party of this research field focuses on the behaviour of rational agents who calculate the costs and benefits of moving to an-other region. The most influential contributions to this debate can be found in the indi-vidual decision models of Sjaastad (1962), Todaro (1969), and Harris and Todaro (1970).[7] The basic idea of these models is to describe migration as an investment in human capital. In the standard Sjaastad model of human capital investment a person moves to another region if the expected and discounted income differential between des-tination and origin region exceeds the monetary and non-monetary migration costs. Due to the emphasis on expected income differentials, these economic models are frequently applied to explain regional labour mobility and, thus, job induced migration.

The more *socio-geographic* micro approach emphasises the relevance of life cycle as-pects for migration decisions (Rossi 1955; McAuley and Nutty 1982).[8] Different age groups seem to have specific needs as well as specific ties driving residential mobility. Since our investigation focuses on to the group of 18 to 30 year old women, we firstly assume the importance of educational motives to move to other regions. Women of about 20 years usually start their tertiary education and might choose a location depend-ing on its educational institutions. Secondly, this period of life is especially crucial for

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[7]   For the microeconomic analysis of *household* migration decisions see the seminal paper of *Mincer* (1978).

[8]   The literature linked to the life cycle theory primarily focuses on family migration and the related concept of housing careers (*Winstanley* et al. 2002).

founding a family or partnership. Even these more social factors might be important for the residential choice of young women.

To sum up, micro theories show the relevance of job related factors for young female migration but also some other factors belonging to rather non-economic spheres. Generally speaking, the causes determining young female migration can be divided into three groups:

    i)   labour market factors

    ii)   educational factors

    iii)   social & family factors.

In the next section we describe how these aspects are implemented in the estimation procedure and which data are used to approximate a region's characteristic w.r.t. these migration determining factors.

4   Econometric Model & Data

Our econometric model is primarily related to the push-pull concept, augmented by a distance variable stemming from the gravity concept of migration. The explanatory variables refer to the three theoretically identified groups of factors determining young female migration. The dependent variable represents the regional migration flow of women at the age of 18 to 30 years from the origin to the destination region:

$$(1) \quad MIG_{(i,j)} = \sum_{k=1}^{K} LABOUR_{(i,j),k} + \sum_{l=K+1}^{L} EDUCATION_{(i,j),l} + \sum_{m=L+1}^{M} FAMILY_{(i,j),m} + DISTANCE_{(i,j)} + u_{(i,j)}$$

Here, $MIG_{(i,j)}$ denotes the relative size of young female migration, calculated as number of female migrants of 18 to 30 years moving from region i to region j divided by the size of the corresponding female population in the origin region i. We use data from the migration statistics of the Federal Statistical Office, referring to the year 2005. We choose the NUTS-3 level (Kreise) as the regional unit. The sample contains 438 districts (without Berlin).

The variable *distance* (2005) is defined as the time in minutes required when going by car from the administrative centre of the origin to the administrative centre of the destination district. The remaining M explanatory factors are modelled as regional differences. They are described in more detail now.

4.1   Labour Market Factors: Income Levels and Job Opportunities

According to the human capital model of migration the difference between expected income at the places of origin and destination as well as the costs connected with migration determine the individual migration decision.[9] If the expected return of a relocation is positive, the place of origin will be left. The region maximising the return of migration is chosen as destination. In our analysis this economic calculus of potential migrants is implemented by regional *income levels (2004)*, which are measured as average gross wages per employee. The regional data does not allow to control for gender specific income differences, however, it can be presumed that these differences only slightly vary between regions. Hence, the difference in income levels can serve as a proxy for the difference in income levels of females.

A rational agent does not only consider the regional income level, she also assesses the probability to obtain the average regional income. This is taken into account by the regional *unemployment rate of women (2005)*. The rate serves as a measurement for the risk to stay below the regional income level. Table 3 shows the potential relevance of

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[9]   Cf. the classical works of *Sjaastad* (1962) as well as *Harris and Todaro* (1970).

unemployment for migration behaviour. Regions with a highly negative migration balance of young women show extremely high female unemployment rates.

Table 3:
Women specific unemployment 2005

	Unemployment [a]	Unemployment <25 [b]	Unemployment >55 [c]
Germany	8.3%	7.7%	5.8%
High surplus	8.2%	6.7%	6.2%
Surplus	8.4%	7.7%	5.7%
Deficit	7.6%	7.6%	5.2%
High deficit	15.7%	12.3%	10.1%

a) unemployed women per employable women. – b) unemployed women under 25 years per employable women under 25 years. – c) unemployed women over 55 years per employable women over 55 years.

Source: Own calculation.

4.2 Educational Factors: Regional Education Facilities

Migration decisions of young adults are significantly determined by educational motives.[10] From Figure 1 and Table 1, it can be seen already that this conclusion also holds for young German females. Districts that are characterised by high level educational institutions can be found amongst the gaining regions. Conversely, the negative migration balance of East German periphery is supposed to be caused by a lack of adequate educational facilities.

Generally speaking, it can be presumed that persons with high educational potential (academic standard required for university entrance) move to regions with suitable third level educational institutions. Since these organisations are regionally concentrated, the strongest education-driven migration effects might be caused by this parameter. In contrast, the existence of vocational training opportunities might be less influential for migration behaviour since institutions offering such opportunities are allocated more evenly amongst the regions. However, a specific East effect might be expected, reflecting the lacking training availability in the new federal states. In the scope of the analysis, migration effects of third level education as well as of vocational training are considered. The first aspect is reflected by the *gender specific university/college availability (2004)* of a region, defined as the share in female students per female high school graduates. It is a measure for the regional capacity to absorb female school graduates with matriculation standard by the regional academic opportunities. A high university availability is, as a tendency, accompanied by a decreased outmigration resp. increased inmigration, so that the migration balance in the examined group should be positively correlated with this measure.

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[10] The Federal Office for Building and Regional Planning (Bundesamt für Bauwesen und Raumordnung) classifies migration at the age of 18 to 30 years generally as educational migration.

The effects of vocational training are implemented by *vocational training availability (2004)*, which represents the number of vacancies and mediated positions of a region per person seeking for vocational training.[11] Here as well it is presumed that an extensive training capacity, i.e. a high training availability, positively affects the migration balance.

Beyond these considerations, it is assumed that a further migration motive lies in the change from educational to employment phase. In particular for university graduates, the question of the subsequent start of employment arises. Therefore, the offer of high-grade positions is important for the regional migration balance. The model takes this aspect into account by incorporating the share of female students per number of female persons working in a S&T occupation – measured in HRSTO classification[12] (*female students per HRSTO women (2004)*). It can be expected that women with an adequate level of education move to these regions with the beginning of their employment phase, if they have not already done so at the beginning of their tertiary education. Thereby, educational and earning motives cross.

4.3 Partnership and Family Factors: Two Concepts

Migration motives can be found not only in the fields of labour market and education, migration often is privately motivated and affected by partnership and family issues. It has to be pointed out that these motives do not stand isolated, but integrate the earning and income motive. Basically, we can assume two partnership resp. family models: Either, a reconciliation of work and family life is aimed at, i.e. both partners have an employment and try to realise significant parts of child education by external child care opportunities. Or the duties are split w.r.t. employment and family management, which means, however, that the sole earner has to generate the necessary resources.[13] In this context it is assumed that women prefer regions where

   i)   sufficient and adequate job offers for women are available,

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[11]   It has to be remarked as a limiting condition that only in-firm training is covered. The external training which is of particular importance in East Germany cannot be considered adequately.

[12]   According to the definition for the measurement of human resources in science and technology, laid down in the OECD manual (Canberra Manual), the HRSTO class [Human Resources in Science and Technology Occupations] includes all persons employed in a scientific and technologic (S&T) job which is based on the ISCO-88 classification of occupation. Therefore, the ISCO-88 COM group 2 and 3 form the HRSTO-jobs, cf. *OECD* (1995).

[13]   *Juerges* (2006) shows the relevance of the distinction between sole earner ("traditional") and double income ("egalitarian") couples for their migrations decisions. Furthermore, *Zaiceva* (2007) provides evidence that women reduce their work supply after migration, but do not give it up entirely in case of migration in East-West-direction.

ii)   a high flexibility in labour organisation is possible and a good supply of child care opportunities is provided, so that job and family are compatible,

iii)   an adequate offer of potential partners can be found, who feature on their part a range of earning and income chances.

Thereby, the first two aspects are less decisive for the sole earner model, while all three aspects are of high importance in the model of double-income households. Now we focus on these three aspects in more detail.

i) The potential labour market for women is considered by taking the proportion of *women specific professions (2005)* of a region. For characterising job offer as specific for women, the particular share in employed women within the different occupation groups according to the present BA (Bundesanstalt für Arbeit, German Federal Employment Office) classification is determined.

Figure 3:
Proportion of women in the job groups
- Sorted decreasingly by German average share in women, 2005 -
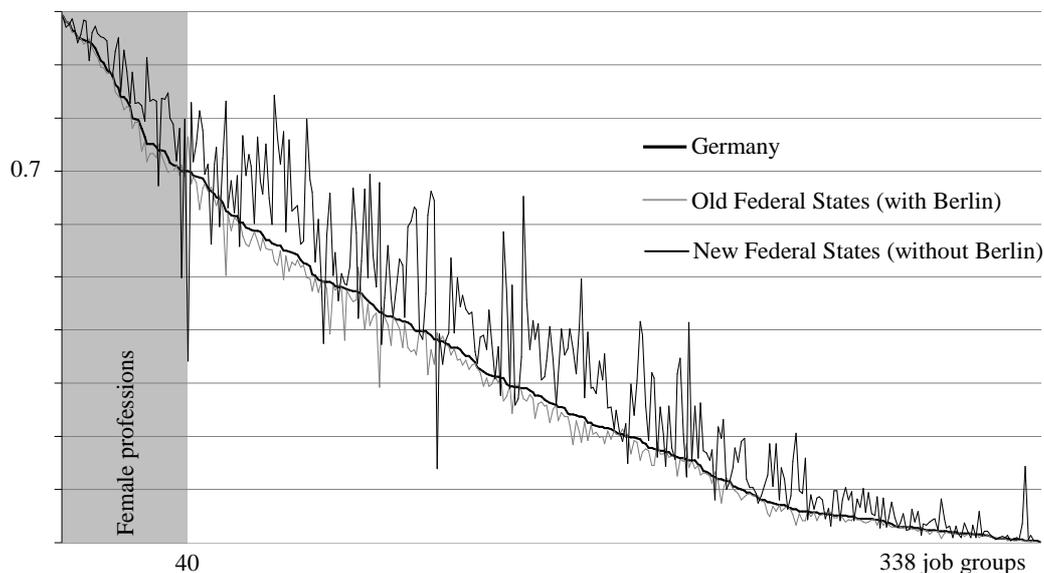
Source: Own presentation.

A minimum quota of women of 70% is taken to define a women specific profession. So, 40 women specific professions can be identified according to BA classification. The most important occupations for women are, besides office clerks and salespersons, di-

verse social jobs (care nurses) as well as pre-primary education teaching positions.[14] The Figure 3 shows all 338 occupational fields, sorted by share in women.

ii) Compatibility of work and family life is measured by the following indicators: part-time labour market, employment rate and kindergarten availability. The potential part-time labour market for well-trained women is represented by the share in women employed part-time in a S&T profession per all female part-time employees (*HRSTO women's part-time share in women (2005)*).

Table 4:

Proportion of employed women per women at working age according to employment characteristics

- 2005 -

	Part-time job [a]	Part-time job & HRSTO [b]	Employed [c]	Employed & HRSTO [d]
Germany	14.4%	4.8%	46.3%	14.8%
High surplus	19.6%	6.8%	67.5%	23.9%
Surplus	15.3%	5.0%	48.1%	15.9%
Deficit	12.8%	4.1%	39.4%	11.7%
High deficit	10.8%	4.0%	40.7%	12.7%

a) women in part time job per women aged 18 to 65 years, b) women in highly qualified part time job per women aged 18 to 65 years, c) employed women per women aged 18 to 65 years, d) employed women in highly qualified job per women aged 18 to 65 years. Without administrative district of Goettingen (covered by German Social Security System)

Source: Own calculation.

Participation rate of women (2005) is measured by employed women per women at working age. *Kindergarten availability (2002)* measures the share of day care places per children under 6 years in the corresponding region.[15] Table 4 visualises that inmigration regions are characterised by a particularly large supply of part-time possibilities and a high employment rate. The fact that part-time possibilities are of particular relevance for women is mirrored by the observation that part-time work is typically dominated by women. In Germany, 85% of persons working in a part-time employment, are women.

iii) Empirical evidence from the German Microcensus 2004 shows that partnership decisions cross educational borders only to a minor extent (cf. Figure 4). Especially well-trained women mainly choose partners with at least the same level of education. For men, this thesis only holds to a limited extent, which indicates a trend towards the

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14 See Appendix: Table A1.

15 The negative correlation (r=-0,39) between highly qualified part time jobs and kindergarten availability reflects last but not least the good offer of all-day childcare facilities in East German regions. This is accompanied by a family model predominating in these regions, in which both partners aim for full time employment.

spreading of the male-oriented sole earner model. Against this background, women with educational potential are supposed to relocate to regions with a high share in high qualified male population. Either young single women increase their chances to find an adequate partner there, or they move with their present male partner who maximizes his career perspective and, thus, chooses a region with good job opportunities for high qualified men.[16] This aspect of partnership matching is considered by two measures.

Figure 4:
Educational structure of life partnerships
- aged 30 to 40 years [a)], 2004 -
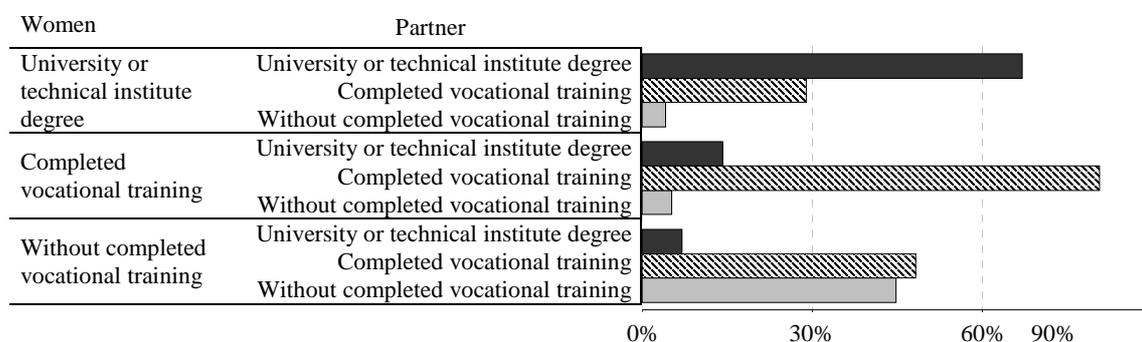
a) It can be assumed that the final educational level is reached at the aged of 30 years. So the actual influence of the educational level on partnership decisions can be observed in the analysed age group for the first time.

Source: Own presentation.

On the one hand, the share in men in S&T occupations per male employees is calculated (*HRSTO men's share in men (2005)*). This proportion of S&T occupations within the employment structure of men reflects the asset of high qualified men in a region. On the other hand, regional *women's share in high school graduates (2004)* is comprised. A low share of female high school graduates signals a high probability to find an adequate male partner within the region.

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16 Due to the regional level of our analysis we cannot distinguish between solely moving women and migrating women in partnerships. So both explanations – increasing the chance of finding a new partner or increasing the job chances of the present partner – have to be taken into account.

5   Econometric Results

The influence of the factors described in the previous sections is reviewed in the following in the scope of a multivariate regression analysis. The number of women aged 18 to 30 years, who move from an origin region i to a destination region j in the year 2005, acts as explanatory variable. For reasons of standardisation, migration flows are weighted with the group of women from origin region i at the examined age. Since the analysis is performed at district level, there are 437 potential destination regions for every origin region (except Berlin).[17] All explanatory variables are modelled as a difference of destination minus origin region.[18] Besides the estimation for all German migration flows, three regionally separated estimation are realised. Separate regressions refer to migration streams between East and West Germany (East↔West), within West Germany (West↔West), as well as within East Germany (East↔East). The influence of different determinants on the particular migration streams of young women is shown in Table 5.[19]

A large part of the expected effects is confirmed by the estimations, however some unexpected results occur.[20] The models' comparatively low coefficients of determination are due to the selected regional level of aggregation – the selectivity of the model is still relatively low at this level.[21] However, the analysis at this disaggregated level is necessary, since changing to a higher regional aggregation level there would result in a massive region specific loss of information, so that e.g. we could not distinguish clearly between periphery and agglomeration. Focusing initially at the overall results for Germany, it can be seen that earning advantages in the destination region lead to an increased in-moving in general. The unemployment rate of women is not relevant in the overall model. As the distance variable shows, female migration, on the one hand, is the higher the closer the regions of origin and destination are together. On the other hand, distance filters the local migration of women to neighbouring districts, i.e. within the borders of functional regions. Existing network structures (parents, friends, etc.) are preserved when migrating to nearby regions, in the range of medium distances, keeping up networks can be ensured at least by means of weekend contacts.

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[17]   Berlin is not considered because of the lacking assignment possibility to West or East Germany.

[18]   Only gross wage is integrated in the model approach in the form of a ratio of destination to origin region. Distance is defined as the distance between destination and origin region by car (in minutes).

[19]   If the analysed motives explain migration flows of young women, this does not exclude the opportunity that they also have influence on the migration calculus of their male counterparts.

[20]   A direct comparison of the weight of the examined determinants cannot be performed due to their differing scaling levels.

[21]   The coefficient of determination improves considerably, if the estimations are conducted at higher regional aggregation levels (e.g. federal states).

Table 5:

OLS estimation equations for the migration of women [a]

- aged 18 to 30 years, 2005 -

Dependent Variable: migration from origin to destination per inhabitant of origin region in the age group

Independent Variables [b]	Total	West↔West	East↔East	East↔West
Income level	0.207[***]	0.394[***]	0.406	0.242[***]
Unemployment rate of women	0.001	0.003[**]	0.3e-3	0.001[***]
Distance between origin and destination	-0.003[***]	-0.003[***]	-0.008[***]	-0.4e-3[***]
Gender specific university/college availability	0.1e-3[***]	0.2e-3[***]	0.5e-3[***]	0.6e-4[***]
Vocational training availability	0.002[***]	0.003[***]	0.015[***]	0.002[***]
Female students per HRSTO women	-0.003[***]	-0.005[***]	-0.017[***]	-0.002[***]
Women specific professions	-0.058	0.136	-0.669	-0.011
Participation rate of women	-0.109[***]	-0.199[***]	-0.142	-0.066[***]
HRSTO women part time share in women	1.027[***]	0.408	6.516[***]	1.197[***]
Kindergarten availability	0.001[***]	0.001[**]	0.003[**]	0.001[***]
HRSTO men share in men	0.537[***]	0.263[**]	5.596[***]	0.210[***]
Women's share in high school graduates	-0.100[*]	-0.080	0.353	-0.014
Constant	0.673[***]	0.645[***]	1.691[***]	-0.009[***]
Dummy district Goettingen	0.422[***]	0.475[***]		0.358[***]
Dummy East↔West	-0.017[**]			
Dummy East↔East	0.172[***]			
R²	0.053	0.056	0.107	0.064
Prob>F	0.000	0.000	0.000	0.000
N	191 406	105 950	12 432	73 024

a) level of significance: [*] 0,1; [**] 0,05; [***] 0,01. – b) The exogenous variables, except distance, are defined as the difference between the parameter value of destination region minus origin region. In the case of a regional gross wage, the ratio of destination and origin region is applied instead of the difference. The reference for regional dummies is migration within West Germany (West↔West).

Source: Own calculation.

Concerning the second migration motive – the education driven migration – we find a highly significant effect of gender specific university/college availability, which clearly indicates female migration towards university regions. The vocational training availability of a region has a strong positive influence on the stay resp. the migration of women aged 18 to 30 years. Besides, it is beneficial if graduated women can find adequate jobs in the region after finishing their education. Correspondingly, insufficient of labour market opportunities for these high qualified women leads to outmigration from the region, despite of comprehensive education facilities. In other words, educational migration only generates positive long-run effects, if women can stay in the region after reaching their final educational degree.[22]

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[22] Otherwise regions with adequate educational institutions would have no intensified inmigration, as contrary to the moving-in of high school graduates, university graduates would leave the region again.

In view of the partnership and family motive of migration, evidence of the importance of work family compatibility is supplied. Indeed, the share of women specific jobs is not significant, which can be explained by the fact that few qualified employments can be found among them and regional variation of opportunities for these jobs is rather low. However, the estimation confirms the importance of flexibility in labour organisation for women in highly qualified jobs (HRSTO part-time quota). A good kindergarten availability significantly stimulates young women migration to the destination region. Participation rate has an unexpected negative effect which can be explained by the fact that this parameter indirectly measures the regional share in (not employed) female students. In this respect, the negative coefficient underlines the relevance of the educational motive.

Concerning the partnership migration motive, a „supply of adequately highly qualified men" has been examined as a migration objective for women between 18 and 30 years. This aspect was assumed to play a decisive role for high skilled women, because they rarely choose partners with a lower level of education (Figure 3). The overall estimation for Germany confirms these assumptions. According to this estimation result, a high share of male high school graduates as well as an adequate „supply of men" working in S&T fields, positively affects migration balance of women aged 18 to 30 years.[23]

Considering the migration flows differentiated by origin and destination regions in Table 5 makes obvious that the essential determinants of women's migration also show up in the subgroups.[24] The non-significant income effect of migration within East Germany might indicate that the earning motive is rather underrepresented as a reason for East↔East migration. That means that East German women rather relocate to West Germany in order to improve their labour market situation, than to stay in the new federal states.[25] The significantly positive coefficient of the women specific unemployment rate for migration within West Germany as well as for migration between East and West German regions is surprising. Seemingly, young women rather relocate to regions with higher unemployment. This fact does not need to disprove the job related migration motives, as women orientate towards their *own* labour market, which does not need to be represented adequately in the *regional* labour market characteristics.

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[23] As mentioned above, the positive correlation between female immigration and the regional share of high skilled men can be interpreted in two ways. On the one hand young *single* women might move to this regions to increase their chance of finding an adequate partner. Or young women *in relationships* relocate to this district – probably as tied mover – for their present partner increases his own labour market outcome.

[24] This shows, amongst others, in the fact that there is no significant change of sign between the estimation alternatives.

[25] However, individual income chances are not necessarily reflected in regional wage level in any case.

6   Conclusion

Our empirical analysis confirms the significance of labour market, educational, and social factors in explaining young female migration. Generally speaking, young women move to high income regions with outstanding job opportunities. Facilities promoting work-life balance seem to be another important location factor stimulating female inmigration. Moreover, the regional endowment with educational institutions attracts young women of 18 to 30 years.

From a regional political perspective one major challenge is to implement appropriate actions to counteract the trend of substantial female outmigration.[26] From our analysis three essential fields of action can be identified, which are, admittedly, not really new in policy discussion, but are emphasised by our empirical findings. The first aspect focuses on the improvement of individual income perspectives. So every kind of policy instruments designed to stimulate regional productivity growth might work as an appropriate means to cope with the female brain drain. Secondly, the support of childcare and the promotion of part-time job arrangements should improve the regional migration balance. Thirdly, an extension of regional education establishments and courses could have a positive impact on the migration balance. However, this method only works if the increasing number of potential graduates finds adequate jobs within the region. Otherwise they will leave the region after completing their studies.

With regard to the excessive amount of female outmigration in particular disadvantaged peripheral regions it might be questioned that the migration flows can really be converted under maintainable costs. It seems more promising to concentrate the political effort on the leading centres within larger areas. So women of peripheral districts at least can be kept in the same federal state; hence migration-driven external effects due to different locations where costs and returns of public education investments are allocated can be avoided.

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[26] From a neoclassical point of view regional outmigration might be seen as a necessary tool to overcome regional disparities and, thus, should be supported instead of restrained. As new growth theory has shown, that effect might be reversed if the migrants take their human capital with them. Under this condition regional mobility speeds up regional *divergence*. For a discussion see *Drinkwater* et al. (2003); *Fratesi and Riggi* (2007). A similar effect appears in the framework of labour search models (*Uhlig* 2006).

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Appendix

Table A1:
Women specific professions 2005

BA-Classification	Profession	Women employed in 1000	Share of women	
			Germany	East-Germany (without Berlin)
856	Receptionist	521	0.99	0.99
685	Assistant chemist	50	0.98	0.97
855	Dieticians and nutritionists	55	0.98	0.98
864	Pre-primary education teaching associate professionals	393	0.96	0.99
902	Beauticians and related workers	14	0.96	0.97
923	Domestic helpers and cleaners	130	0.95	0.94
782	Stenographers and typists	287	0.95	0.96
353	Underwear tailors and sewers	6	0.95	0.98
352	Outerwear sewers	14	0.95	0.98
921	Housekeepers and related workers	55	0.94	0.91
053	Tree and shrub crop growers	39	0.94	0.96
901	Hairdressers and barbers	155	0.93	0.97
857	Life science technicians	84	0.92	0.96
356	Sewers not elsewhere classified	16	0.91	0.95
773	Cashiers and ticket clerks	133	0.90	0.95
933	Helpers and cleaners in offices, hotels and other establishments	526	0.89	0.89
783	Data entry operators	33	0.88	0.88
853	Nursing associate professionals	704	0.86	0.93
351	Tailors, dressmakers	13	0.86	0.95
844	Pharmacists	8	0.84	0.85
931	Bleaching-, dyeing- and cleaning-machine operators	42	0.83	0.89
354	Embroiderers	1	0.82	0.83
852	Physiotherapists and related associate professionals	138	0.80	0.89
861	Social work professionals	408	0.80	0.83
702	Travel consultants and organisers	70	0.80	0.83
873	Secondary and special education teaching professionals	121	0.78	0.82
682	Shop salespersons and demonstrators	1 332	0.76	0.79
772	Bookkeepers	179	0.75	0.91
734	Telephone switchboard operators	76	0.75	0.83
376	Leather wear tailors	5	0.75	0.83
731	Tellers and other counter clerks	3	0.74	0.83
854	Institution-based personal care workers	235	0.74	0.67
683	Business services agents and trade brokers not elsewhere classified	27	0.74	0.84
823	Librarians and related information professionals	44	0.74	0.83
851	Modern health associate professionals (except nursing) not elsewhere classified	4	0.72	0.85
781	Office clerks	3 671	0.71	0.80
862	Highly qualified social work professionals	245	0.71	0.79
784	Assistant and other office clerks	151	0.71	0.72
304	Optometrists and opticians	31	0.70	0.78
377	Glovers	0.2	0.70	0.50

Source: Own Calculation.