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Social networks in determining migration and labour market outcomes: Evidence from the German Reunification

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Non-Technical Summary

Social Networks in Determining Migration and Labour Market Outcomes: Evidence from the German Reunification

This paper empirically examines social network explanations for migration decisions in the context of the German reunification. We address three closely related questions. Firstly, were East Germans with established social ties in West Germany more likely to emigrate than those without such connections? Secondly, can social network effects be detected among East German immigrants in the West German labour market? Thirdly, are East German immigrants with pre-migration networks in the West more integrated into their new communities than movers without pre-existing social ties?

Our first operational hypothesis is that social ties in West Germany played an important role in East Germans' migration decision-making process. A natural a priori idea might be, for instance, that the presence of established networks in West Germany facilitated migration by assisting integration in the host society ("integration hypothesis"). Moreover, it is also conceivable that potential migrants relied on social ties for information regarding employment opportunities ("information hypothesis").

This paper presents an attempt to test for both the information and the integration function of social networks. To examine the information hypothesis, we not only look at individuals' migration probability, but also migrants' realized labour market outcomes in terms of employment and earnings. To test whether pre-existing social ties also facilitated integration into West German society, we examine whether immigrants with pre-migration networks show higher levels of community involvement than movers without personal ties.

The empirical evidence yields three key findings. Using longitudinal data from the German Socio-Economic Panel, we first show that the presence of family and friends in West Germany is an important predictor for the migration probability of East Germans. We then explore whether pre-migration networks have a discernible impact on the economic and social assimilation of East German immigrants in West Germany. We find that East German immigrants are more likely to be employed, and to hold higher-paying jobs, when socially connected to the West prior to emigrating. East Germans immigrants with pre-migration networks also appear to be more integrated into their Western host communities than movers without pre-existing social ties.

Social Networks in Determining Migration and Labor Market Outcomes: Evidence from the German Reunification

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Abstract

This paper empirically examines social network explanations for migration decisions in the context of the German reunification. Using longitudinal data from the German Socio-Economic Panel, we first show that the presence of family and friends in West Germany is an important predictor for the migration hazard rate of East Germans. We then explore whether pre-migration networks have a discernible impact on the economic and social assimilation of East German immigrants in West Germany. We find that East German immigrants are more likely to be employed, and to hold higher-paying jobs, when socially connected to the West prior to emigrating. East Germans immigrants with pre-migration networks also appear to be more integrated into their Western host communities than movers without preexisting social ties.

Keywords: Migration; Social networks; Labor market outcomes; Community involvement.

JEL Classification: C23, J61.

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1. Introduction

Questions surrounding social networks are not only of fundamental importance for sociologists but have also engaged mathematicians and economists for many years. While formal models of network formation have entered the realm of economic analysis only over the last decade, it has long been recognized that patterns of social ties between individuals are important in determining human behavior and economic outcomes.[1] For example, a well established view among labor economists is that networks are vehicles for effective information transmission about job opportunities (see, e.g., Rees, 1966; Granovetter, 1974; Montgomery, 1991; Calvo-Armengol and Jackson, 2004). Social networks are also known to facilitate the economic and social integration of immigrants into their host country through the provision of social support and contacts useful in finding employment (see, e.g., Uhlenberg, 1973; Ritchey, 1976; Carrington et al., 1996; Munshi, 2003).

This paper explores the role of social networks in determining East-West migration decisions after the unification of Germany. It also examines whether social networks affect the labor market outcomes of East German immigrants participating in the West German labor market, and investigates whether socially connected immigrants are more integrated into their host communities. The starting point for our analysis is the empirical literature on German East-West migration patterns, with Burda (1993) and Hunt (2006) as the contributions most closely related to ours. Burda (1993) studies the determinants of migration propensities of East Germans, showing that the desire to move was particularly pronounced among the young and that potential wage increases did not significantly affect migration desires. Hunt (2006) explores the role of economic factors in explaining East-West migration patterns, demonstrating that rising source wages reduced Eastern emigration considerably, while rising source unemployment had little effect. Building on this literature, we address three questions related to network explanations of migration decisions. Firstly, were East Germans with established social ties in West Germany more likely to emigrate than those without such connections? Secondly, can social network effects be detected among East German immigrants in the West German labor market? Thirdly, are East German immigrants with pre-migration networks in the West more integrated into their new communities than movers without preexisting social ties?

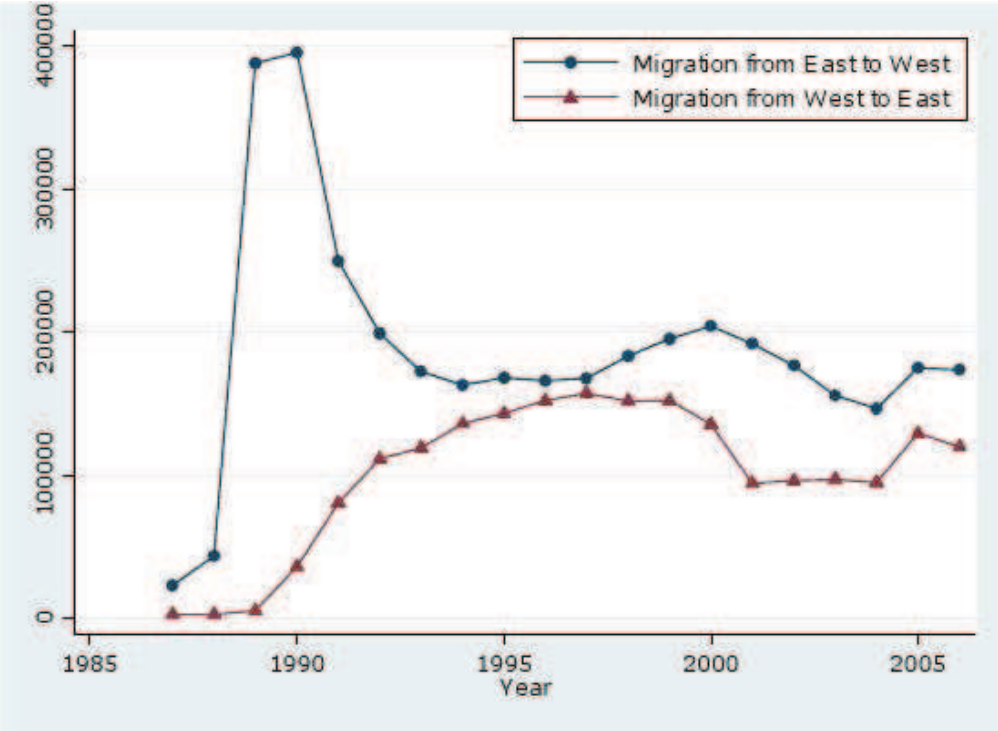
To address these questions, we analyze individual-level data from the German Socio-Economic Panel (SOEP), which was extended to East Germany in 1990. In 1991, East German respondents were asked about relatives, friends and colleagues in the West. Based on this question, we capture social connections by variables indicative of whether East German respondents knew anybody in West Germany in 1991. After that year, the panel structure of the SOEP allows us to follow individuals after migration from East to West Germany. Our first operational hypothesis is that social ties in West Germany played an important role in East Germans' migration

[1] See Jackson (2006) for an insightful survey of the recent economic literature on social networks.

decision-making process. A natural a priori idea might be, for instance, that the presence of established networks in West Germany facilitated migration by assisting integration in the host society ("integration hypothesis"). Moreover, it is also conceivable that potential migrants relied on social ties for information regarding employment opportunities ("information hypothesis"). This paper presents an attempt to test for both the information and the integration function of social networks. To examine the information hypothesis, we not only look at individuals' migration hazard rate, but also migrants' realized labor market outcomes in terms of employment and earnings. Intuitively, if it is not just the mere presence of social contacts in a destination country that matters, but also the job market information disseminated, then one would expect socially connected migrants to display better labor market outcomes than unconnected ones. We therefore test whether East German migrants in the West German labor market are more likely to be employed and to have higher earnings when socially connected to the West prior to emigrating. To test whether preexisting social ties also facilitated integration into West German society, we examine whether immigrants with pre-migration networks show higher levels of civic participation than movers without personal ties. As well as being one important aspect of social capital, civic participation is widely regarded as a useful barometer of community involvement (Putnam, 2000).

The empirical evidence yields three key findings. First, the presence of family and friends in West Germany is a significant and quantitatively important predictor for the migration hazard rate of East Germans. Individuals with kinship affiliations in the West, for instance, were approximately 2.4 times more likely to emigrate from the East than those without connections. Second, in support of network effects in the labor market, we find statistically significant and positive coefficients when examining whether socially connected migrants display better labor market outcomes than unconnected ones. For example, an East German migrant who reports having a close relative in the West prior to emigrating is 9 percent more likely to be in full-time employment than the same migrant without personal contacts. Moreover, we also find that a socially connected migrant earns on average more than his unconnected counterpart. Thus, East German migrants are more likely to be employed, and to hold higher-paying jobs, when reporting pre-migration networks in the West. Third, in support of the integration function of social networks, we show that East German immigrants with pre-migration networks are more involved in their new communities than movers without social contacts, i.e., they are more likely to connect with their communities through formal (e.g., volunteer work in associations) and informal (e.g., meetings with friends and neighbors) means.

Our paper relates to several strands of the empirical literature on migration. As noted above, our work contributes to the literature on German East-West migration (Burda, 1993; Decressin, 1994; Burda et al., 1998; Hunt, 2001, 2006) by making an initial attempt at analyzing the role played by social networks in determining emigration decisions. Our paper is also related to recent empirical work seeking to document the existence of network effects. The



Source: Data from the German Federal Statistical Office.

Figure 1: German Migration, 1987-2006

closest antecedent to our paper in this respect is Munshi (2003) which tests for the presence of social network effects among Mexican migrants in the U.S. labor market. Results suggest that the same Mexican migrant is more likely to be employed when his network in the U.S. is larger. Moreover, disadvantaged subgroups (i.e., women, the elderly, less-educated persons) benefit the most from larger networks. Also related is Topa (2001) which formulates and estimates a model of local interactions in the labor market. Finally, Bertrand et al. (2000) examines the role of social networks in welfare participation.

The remainder of this paper is organized as follows. In the next section, we provide some background to East German emigration and discuss the theoretical basis for our study. Section three describes the data. Section four presents the results of our empirical analysis and checks for robustness. Section five provides some concluding remarks.

2. Background

2.1. German East-West Migration

Figure 1 illustrates German East-West migration flows from 1987 to 2006.[2] The political events in East Germany (the German Democratic Republic [GDR]) that eventually led to reunification with West Germany (the Federal Republic of West Germany [FRG]) are crucial to understanding the observed migration patterns. Before 1989, emigration from the GDR was severely restricted. In 1989, the emigration of roughly 180,000 East Germans before the fall

[2]For East-West migration flows prior to 1987 see Burda and Hunt (2001) and Hunt (2006).

of the Berlin Wall (via Hungary and Austria), and of another 210,000 thereafter, contributed decisively to the collapse of communism in East Germany (Fassmann and Munz, 1994). In 1990, another 395,000 East Germans emigrated to West Germany. With the reunification of the two parts of Germany in October 1990, this flow became an internal migration. After that year, emigration from the East diminished substantially up to 1994, and annual East-West migration flows have fluctuated between 150,000 and 200,000 movers ever since. Migration from West to East rose steeply before tailing off in 1997.

It is well understood that economic push and pull factors were important determinants of observed East-West migration patterns. On the one hand, Eastern real wages rose by 83 percent in the post-reunification period (Hunt, 2001), and this is likely to have decreased the net gains to migration ceteris paribus. On the other hand, Eastern unemployment also rose rapidly, and standard theory would suggest that this increased the net gains to migration and raised the probability of individuals moving to the West. Hunt (2006) demonstrates that rising wages worked strongly to reduce East-West migration, while rising unemployment did little to increase it. This result is predominately driven by the young being more influenced by rising wages than by rising unemployment. Against this broad economic backdrop, our aim is to provide a first glimpse at the role of social networks in determining individuals' migration decisions and migrants' labor market outcomes in the post-reunification period.

2.2. The Role of Social Networks

In theory, why should social networks play a role in the migration decision-making process? In the standard economic push-pull framework (see, e.g., Borjas, 1987), migration decisions are guided by a comparison of the present value of lifetime earnings between the regions of origin and destination. Expected earnings depend on both the wage conditional on future employment and the probability of future employment. The probability of migration rises when expected earnings are low in the region of origin or when expected earnings are high in the region of destination. If the evolution of key labor market variables is uncertain, then the probability of migration also rises with better access to job information.

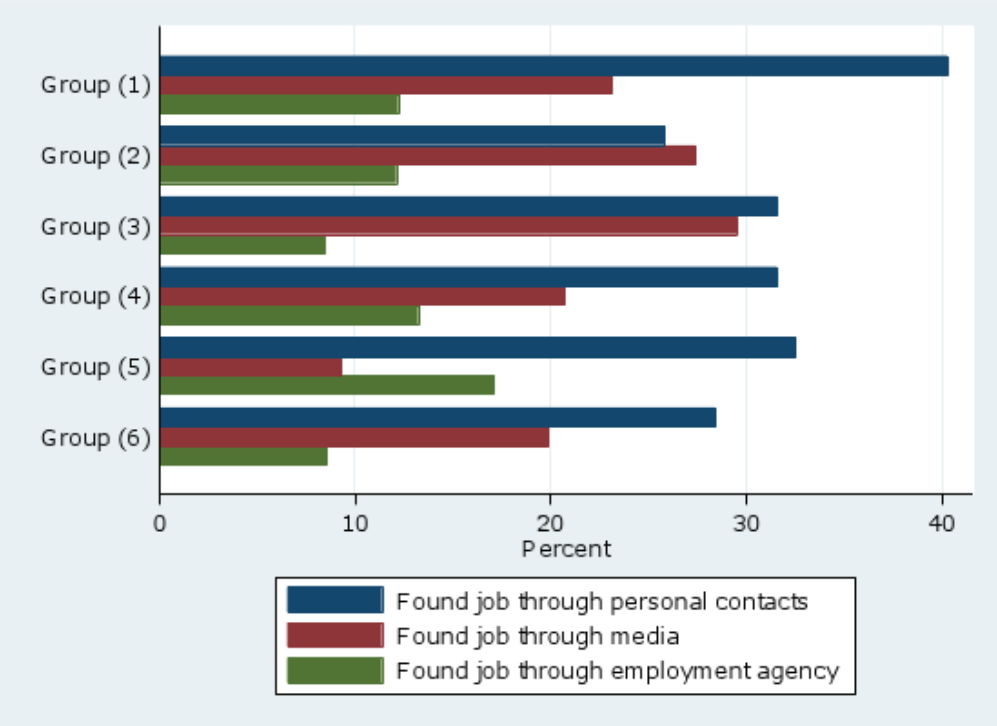
The basic implication of considering friendship and kinship ties in the analysis of migration decisions is easy to grasp. In general, these relationships tend to connect individuals to communities (Ritchey, 1976). Within the push-pull framework, if relatives and friends are located in the region of origin, migration is deterred, but if they reside in the region of destination, migration is more likely and directed toward their location. We are particularly interested in whether the existence of "family-social" connections in the destination area is an important consideration for potential migrants in their migration decision. Our hypothesis is that social ties matter for two reasons: information and integration. The information channel emphasizes that the distant location of relatives and friends fosters migration by increasing potential migrants' awareness of conditions—particularly job opportunities—in the destination area. In

addition, it has long been recognized that many individuals find jobs through friends and relatives (Rees, 1966; Granovetter, 1974; Montgomery, 1991). The integration channel emphasizes that the distant location of relatives and friends encourages migration by increasing individuals' potential for adjustment in the destination area (Uhlenberg, 1973).

Both mechanisms highlight how the presence of social networks in a destination area can increase the probability of migration. In the context of German reunification, one would therefore expect that individuals with social ties in West Germany were more likely to emigrate from East Germany than those without pre-existing connections. We investigate this hypothesis by estimating how individuals' migration hazard rates depend on the existence of pre-migration networks in West Germany. To test for the information function of social networks, we examine migrants' realized labor market outcomes in terms of employment and earnings. If potential migrants expect social networks to play an important role in their post-migration job-search process, and if this expectation is fulfilled in a migration equilibrium, then one would expect the same East German migrant to display better labor market outcomes when connected to the West prior to moving.

That pre-migration networks played an important role for East German immigrants in the West German labor market is descriptively illustrated in Figure 2. The figure provides a glimpse at how different subgroups of the German population found out about their current job. East German migrants are distinguished by whether or not they were socially connected to the West prior to emigrating. The importance of pre-migration networks as sources of employment information is immediately apparent, and the following generalization seems fair. Approximately 30 percent of *all* employed individuals found their jobs through friends or relatives. For our purposes, however, the interesting observation is that the importance of finding new jobs through personal contacts is by far the highest among East German migrants who had kinship networks in West Germany prior to emigrating. Indeed, in this subgroup approximately 40 percent found their current job via personal contacts. Overall, this first descriptive evidence is consistent with earlier studies showing that it is particularly migrant communities who benefit from the information transmitted through preexisting networks (Borjas, 1992; Munshi, 2003).

Finally, to examine the integration function of social networks, we look at whether immigrants with pre-migration networks are more involved in their new communities than movers without personal contacts. The issue of integration in host societies poses many challenges to migrants. One key purpose of such integration is to build up social capital that enables them to participate meaningfully in the host society. As noted by Putnam (2000), individuals typically accumulate social capital by connecting with their communities in two different ways: formally through participation in civic associations, political parties, or unions; and informally through meeting with friends, relatives, or neighbors. In what follows, we present new evidence on the relationship between pre-migration networks and both the formal and informal community involvement of East German immigrants.



Notes: Differences in job-search methods for SOEP respondents who are employed at the time of the interview. Three different job-search methods are considered: personal contacts (friends, relatives), media (newspaper, internet), and employment agencies (federal employment office, private recruitment agencies). Job-finding methods are reported for six different population subgroups: (1) East German migrants who had relatives in the West before moving; (2) East German migrants who had friends in the West before moving; (3) East German migrants who had colleagues in the West before moving; (4) East German migrants without preexisting social contacts; (5) East German stayers; and (6) West Germans. Source: SOEP, 1992-1999, authors' own calculations.

Figure 2: Job-Search Methods

3. Data

This study uses individual-level data from the German Socio-Economic Panel (SOEP). The first wave of the SOEP was a nationally representative sample of the population of the former West Germany living in private households in 1984. In 1990, the panel was extended to include around 4,500 residents in 2,200 households of the former GDR. The SOEP collects detailed information on people's geographic mobility, labor market status, occupation, education and family background. Importantly for our study, SOEP respondents are followed over time after a move, and they (and co-resident adults) are interviewed at approximately one-year intervals subsequent to moving. Thus, individuals migrating from East to West Germany are followed in the survey.[3]

Our sample consists of individuals who resided in East Germany when surveyed in 1991 and have been followed over time up to 2007. We restrict our sample to East Germans aged 18-54, who have finished their general education, are not working in agriculture, and are not self-employed. The sample comprises 1,378 East German women and 1,302 men.

[3]For further details about the SOEP see `http://www.diw.de`.

Table 1: Descriptive Statistics, Social Connections in 1991

	All	Men	Women
Relatives in the West	0.12	0.11	0.13
Friends in the West	0.11	0.13	0.10
Colleagues in the West	0.07	0.08	0.06
No networks in the West	0.70	0.69	0.72
Number of individuals	2,680	1,302	1,378

3.1. Explanatory Variables

The social network variables to be used in this study are the responses of East German SOEP panel members to a question posed in the survey year 1991. In that year, all respondents who lived in East Germany at the time of the interview were asked about social contacts with persons in West Germany. The precise question reads: "Do you have relatives outside of your household or good friends or colleagues who have moved to West Germany or to West Berlin since July 1, 1990?". Four answer categories were given: (1) no; (2) yes, close relatives; (3) yes, close friends; (4) yes, colleagues from work. We derive three dichotomous social network variables. The first variable, *Relatives in the West*, equals one for East Germans who report having close relatives who migrated from East to West Germany shortly after the collapse of the Berlin Wall, and zero otherwise. Similarly, the variable *Friends in the West* equals one if a respondent living in East Germany reports having close friends who moved to West Germany, and zero otherwise. The third variable, *Colleagues in the West*, equals one if a colleague from work left the region of the former GDR to West Germany, and zero otherwise. Being socially connected therefore implies that there is some earlier migrant known personally to the respondent, with whom he became acquainted either before or immediately after the collapse of communism. The distribution of the social network variables is shown in Table 1. Overall, 12 percent of East Germans report having close relatives in West Germany, 11 percent indicate having friends and 7 percent of respondents report having colleagues who moved from East to West Germany. The majority of East Germans are unconnected. Indeed, 70 percent of all respondents report no social ties to earlier migrants.

For each individual, we control for a rich set of socioeconomic variables, such as age, gender, marital status, the presence and number of children aged 18 or younger in the household, the highest general educational degree,[4] whether homeowner or not, and average post-government household income. In addition, we also account for economic and regional background variables by controlling for occupational status and region of residence (at the federal state level) as

[4]We distinguish between three types of general schooling. The variable low education equals one for East Germans with no school degree or 8 years of schooling, and zero otherwise. The variable medium education equals one for individuals with 10 years of schooling, and zero otherwise. Finally, the variable high education equals one for individuals with an upper secondary school degree (Abitur or Hochschulreife), and zero otherwise.

Table 2: Descriptive Statistics, Socioeconomic Characteristics in 1991

	All	Relatives in the West	Friends in the West	Colleagues in the West	No networks in the West
Age	36.66	37.26	31.58	35.79	37.45
Female	0.51	0.57	0.44	0.44	0.52
Married	0.75	0.81	0.53	0.81	0.77
Children in household	0.61	0.64	0.63	0.61	0.60
Number of children	1.00	1.03	0.99	1.04	0.99
Homeowner	0.32	0.30	0.28	0.26	0.33
Low education	0.26	0.31	0.16	0.20	0.27
Medium education	0.44	0.42	0.57	0.53	0.42
High education	0.30	0.27	0.28	0.27	0.32
Household income[a]	20,210	19,608	19,025	21,527	20,356
Occupation, 1990					
Energy	0.16	0.16	0.18	0.21	0.15
Mining	0.06	0.05	0.08	0.06	0.06
Manufacturing	0.12	0.14	0.09	0.16	0.11
Construction	0.12	0.13	0.14	0.12	0.12
Trade	0.09	0.08	0.09	0.05	0.09
Transport	0.10	0.09	0.09	0.05	0.11
Bank or Insurance	0.17	0.16	0.17	0.17	0.17
Services	0.06	0.05	0.05	0.06	0.06
Others or not applicable	0.13	0.14	0.11	0.10	0.13
Federal State, 1990					
East Berlin	0.07	0.05	0.09	0.06	0.07
Mecklenburg-Vorpommern	0.12	0.14	0.15	0.12	0.11
Brandenburg	0.17	0.15	0.15	0.19	0.17
Saxony-Anhalt	0.20	0.21	0.17	0.20	0.20
Thueringen	0.16	0.18	0.16	0.12	0.17
Saxony	0.28	0.28	0.29	0.31	0.28
District Size					
$\leqq$ 2,000	0.28	0.27	0.21	0.24	0.30
2,000 – 20,000	0.22	0.20	0.22	0.22	0.22
20,000 – 100,000	0.23	0.25	0.28	0.28	0.21
$\geqq$ 100,000	0.27	0.27	0.29	0.26	0.27
Number of observations	2,680	310	301	185	1,883

Notes: [a]Household income is post-government annual household income.

measured in the first survey year 1990.[5] Finally, we control for a set of district size dummies. Summary statistics for the survey year 1991 are reported in column 1 of Table 2. The average East German respondent is around 37 years old. 51 percent are women and 75 percent are married. Around 1 in 3 respondents owns property and 61 percent of East Germans have children aged 18 or younger living in the household.

Given that we use non-experimental data, East Germans who have social ties in West Germany might not be a random group, and being acquainted with earlier migrants is not unlikely to be associated with certain socioeconomic or regional characteristics. Columns 2-5 of Table 2 display the means of the explanatory variables by social network types. Since the three network variables are not mutually exclusive, mean difference tests are impossible, but

[5]In some regressions, we also control for individuals' employment status.

the summary statistics are nevertheless informative. East Germans with friends or colleagues in West Germany in 1991 are slightly younger than the other groups, and only 44 percent are female. There are no huge differences between the groups with respect to the presence and number of children in the household, homeownership, higher education, household income, federal states or district size.

3.2. Outcome Variables

Each year, the SOEP collects information on individuals' region of residence and asks respondents about their current labor market status. Our first outcome variable indicates whether an East German moved to West Germany in a given year. Overall, slightly more than 5 percent of all East Germans in our sample migrated to West Germany. In line with the official statistics displayed in Figure 1, the majority of East Germans in our sample moved to West Germany during the early 1990s. Indeed, 4.5 percent of all respondents migrated between 1992 and 1995, while less than 1 percent moved to Western federal states between 1996 and 2007.[6]

As mentioned earlier, if preexisting networks play an important role in immigrants' job-search process, then one would expect East German migrants to display better labor outcomes when socially connected to the West prior to moving. We therefore examine migrants' realized labor market outcomes in terms of full-time employment and economic inactivity. During the period 1992-2007, 70 percent of all East German migrants are employed full-time, and 7 are economically inactive. We are also interested in whether socially connected migrants are likely to hold higher-paying jobs, and therefore examine wether pre-migration networks have an effect on immigrants' labor earnings. Over the period 1992-2007, the gross monthly labor earnings of the average East German immigrant are approximately €3,600.[7]

If pre-migration networks facilitate integration in host societies, there should be higher levels of community involvement among socially connected immigrants. We therefore explore the formal and informal ways in which East German immigrants connect with their new communities. To do so, we make use of a SOEP question that reads "Which of the following activities do you take part in during your free time? Please check off how often you do each activity: at least once a week, at least once a month, less often, never." To measure the degree of formal community involvement, we construct the binary variable *Civic Engagement*, which equals one for East German migrants who report ever being engaged in volunteer work in clubs or social services, and zero otherwise.[8] To measure the degree of informal community involvement, we derive the dichotomous variables *Meet with Friends* and *Help out Friends*. The former (or

[6] In line with Hunt (2006), we find a 1 percent per year average emigration rate in the SOEP during the 1990s. Hunt (2006) also discusses potential reasons for why the emigration rate in the SOEP is lower than in the official statistics.

[7] Gross monthly labor earnings are deflated using the Consumer Price Index and are expressed in 2000 prices.

[8] In unreported regressions, we also examined the effects of social networks on the likelihood to be involved in a citizens group, political party or local government. Fewer than 4 percent of East German migrants report taking part in these civic activities, and only 1 percent report being involved at least once a month. Because of the low level of variation in this outcome variable, we decided not to report the estimates here.

Table 3: Empirical Kaplan-Meier Survivor Functions, by Social Network Type in 1991

Years	Relatives in the West	Friends in the West	Colleagues in the West	No networks in the West
3	0.98	0.94	0.97	0.99
6	0.96	0.92	0.96	0.98
12	0.94	0.90	0.93	0.97
16	0.92	0.87	0.93	0.96

latter, respectively) equals one for East German migrants who report meeting with (or helping out, respectively) friends, relatives or neighbors at least once a month, and zero otherwise. On average, 13 percent of all East German immigrants are ever engaged in voluntary work, 62 percent report meeting with friends at least once a month, and 37 percent help out friends at least once a month.

4. Results

4.1. East-West Migration

Table 3 compares Kaplan-Meier survivor functions of socially connected East Germans with those of unconnected East Germans. These non-parametric estimates shed some first light on the migration probabilities of different population subgroups, but do not account for heterogeneity across social network types. The picture that is emerging here is that unconnected individuals are more likely to "survive" in East Germany than their connected counterparts, i.e., they are less likely to emigrate to West Germany. For example, 98 percent of East Germans who report being unconnected to the West in 1991 still live in the East after 6 years, compared to 96 percent (respectively, 92 percent) of those who have relatives (respectively, friends) in the West. The survival rates after 16 years are 0.92 for those with relatives in the West and 0.87 for those with friends in the West, respectively. In contrast, the non-parametric survival rate after 16 years for those without social networks is 0.96. It is important to note, however, that the samples of those with and without personal networks might not be randomly drawn. Consequently, this non-parametric exercise may be confounded by observed and unobserved population heterogeneity.

To address these issues, we now present estimates of discrete time proportional hazard models that take unobserved heterogeneity into account. The dependent variable in our migration analysis is the annual migration hazard rate, $\theta(t, X)$, which represents the probability that an East German with socioeconomic characteristics X moves to West Germany during year t, conditional on having resided in the region of the former GDR up until the end of year $t-1$. In line with the previous literature (Ham and LaLonde, 1996; Hunt, 2002; Jenkins and Garcia-Serrano, 2004; Tatsiramos, 2008), we model this hazard using a reduced-form specification.

The hazard function for duration of residence in East Germany is modeled in discrete time, because the length of residence is observed in yearly intervals. We use logistic models which are estimated by maximum likelihood methods. Accounting for unobserved heterogeneity, the discrete annual migration hazard for a given person can be written as:

$$ln[\theta(t, X)] = ln[\theta_0(t)] + \beta' X + \mu,$$

where $\theta_0(t)$ is the baseline hazard function, the vector X captures explanatory variables and μ is a random variable with mean zero and finite variance.[9] We place no restriction on the shape of the baseline hazard and allow for a fully non-parametric baseline hazard.

Table 4 displays the results from migration hazard regressions for East Germans, accounting for unobserved heterogeneity. We present results for three different model specifications. The first model [column (1)] only contains our social network variables, female, age and duration dummy variables. In a second step, we add a more complete set of socioeconomic controls: marital status, presence and number of children in the household, homeownership, educational dummies, long-term average household income and occupational status as reported in 1990 [column (2)]. Finally, the third model specification [column (3)] also controls for local labor market characteristics in the region of origin and district size dummies. The latter might be important because living in smaller towns or rural areas might deter migration because of the close-knit nature of the communities (Burda, 1993).

The reported estimates concern the East-West migration hazard rate, so a positive value is associated with a higher probability to move to West Germany. The key estimates are those on the three personal network dummies. The estimates in column (1) of Table 4 indicate that individuals with relatives and friends in the West have a significantly higher propensity to migrate to West Germany. We get similar results on the relationship between family networks and the migration hazard when we add further control variables [columns (2) and (3)], although the relationship between friendship affiliations and the probability to move looses its significance. The effect of kinship affiliations is not only statistically significant, but also large in magnitude. For example, the coefficient of 0.866 for having relatives in the West in column 3 is slightly larger than the estimate on having higher levels of education, which captures differences in the migration probability between less and more educated East Germans. In contrast to kinship and friendship affiliations, having colleagues in the West is not significantly related to individuals' migration decisions. To quantify the differences in the migration hazard, we also calculated odd ratios. The results of this exercise suggest that individuals with kinship affiliations in the West are approximately 2.4 times more likely to be emigrants than those without social connections.

[9] Ignoring unobserved heterogeneity of East-West migration determinants across individuals may result in biased estimates of the parameters (see, e.g., Van den Berg, 2001). The assumption is that μ is distributed independently of the explanatory variables X and time t. Note that covariates can be both time-varying and fixed over time.

Table 4: Hazard Estimates of Moving from East to West Germany

Model	(1)		(2)		(3)	
	Coef.	**S.e.**	**Coef.**	**S.e.**	**Coef.**	**S.e.**
Relatives in the West	0.927	(0.215)**	0.912	(0.225)**	0.866	(0.230)**
Friends in the West	0.487	(0.235)*	0.293	(0.247)	0.266	(0.253)
Colleagues in the West	-0.058	(0.402)	-0.211	(0.409)	-0.154	(0.410)
Age $\leq$ 29	1.443	(0.268)**	0.809	(0.330)*	0.701	(0.340)*
Age 30-35	1.382	(0.287)**	1.158	(0.345)**	1.013	(0.351)**
Age 36-45	1.342	(0.260)**	1.226	(0.297)**	1.098	(0.302)**
Female	0.066	(0.173)	0.240	(0.194)	0.284	(0.198)
Duration dependence						
1-2 years	-4.647	(0.387)**	-5.000	(0.590)**	-5.441	(0.723)**
3-4 years	-4.153	(0.261)**	-5.065	(0.520)**	-5.536	(0.673)**
5-6 years	-4.978	(0.289)**	-6.023	(0.546)**	-6.563	(0.699)**
7-8 years	-6.337	(0.392)**	-7.475	(0.616)**	-7.872	(0.742)**
9-10 years	-6.458	(0.383)**	-7.708	(0.595)**	-8.197	(0.723)**
11-12 years	-6.308	(0.382)**	-7.484	(0.596)**	-7.987	(0.732)**
13-14 years	-6.563	(0.389)**	-7.668	(0.611)**	-8.232	(0.748)**
15-16 years	-8.117	(0.557)**	-9.254	(0.730)**	-9.783	(0.850)**
17 years	-10.712	(1.030)**	-11.847	(1.135)**	-12.385	(1.211)**
Married			-0.637	(0.219)**	-0.687	(0.228)**
Children in household			-0.386	(0.355)	-0.406	(0.357)
Number of children			0.072	(0.197)	0.040	(0.198)
Homeowner			-2.180	(0.362)**	-2.174	(0.373)**
Medium education			0.996	(0.316)**	1.037	(0.326)**
High education			0.671	(0.328)*	0.690	(0.336)*
Average household income[a]			0.030	(0.004)**	0.030	(0.004)**
Occupation in 1990						
Energy			1.044	(0.419)*	0.899	(0.424)*
Mining			0.362	(0.542)	0.176	(0.551)
Construction			0.458	(0.464)	0.385	(0.468)
Trade			1.134	(0.446)*	1.108	(0.450)*
Transport			0.631	(0.473)	0.473	(0.479)
Bank or Insurance			0.708	(0.442)	0.545	(0.447)
Services			0.970	(0.504)+	0.806	(0.509)
Others			0.297	(0.489)	0.269	(0.499)
District size						
2,000 - 20,000					1.231	(0.368)**
20,000 - 100,000					0.262	(0.397)
$\geq$ 100,000					0.270	(0.395)
Person-year observations	24,305		24,305		24,305	
Number of individuals	2,680		2,680		2,680	

Notes: Discrete-time logistic hazard rate regressions accounting for unobserved heterogeneity. Reference categories are: Age 46-55, no or low general education, manufacturing (occupation in 1990) and district size $\leq$ 2,000. The regression in column 3 also controls for a maximum set of federal state dummy variables measured in 1990. [a] Annual post-government household income averaged over all years valid information is available, divided by 1,000. +, *, ** significant at the 10 percent, 5 percent and 1 percent level, respectively.

The results for the effects of other individual and local labor market characteristics on the migration hazard can be summarized as follows: younger East Germans and those who are more educated have a significant higher likelihood to emigrate. In contrast, those who are married and own their own homes are less likely to move from East to West Germany. These results are in line with Hunt (2006), who also reports that East German emigrants are likely to be younger and and to stem disproportionately from high-skilled groups. In addition, there exists a positive and statistically significant relationship between long-term household income and individuals' likelihood to move to Western federal states. There are also regional differences, since individuals from source regions with 2,000 - 20,000 inhabitants are more likely to migrate than those from more remote areas (the reference category is the group of individuals living in a district with fewer than 2,000 inhabitants). The duration dummy variables have a significant negative effect on the East-West migration hazard and decrease monotonically in magnitude as survival time increases. This suggests that the probability to move to West Germany decreases over time.

4.2. The Information Hypothesis: Labor Market Outcomes at the Destination

We have so far observed that the presence of relatives in West Germany is an important predictor for the migration hazard rate of East Germans. Our objective in this section is to assess whether there are social network effects among East German migrants in the West German labor market. A key hypothesis of this study is that migration may take place on the basis of information about job opportunities in the destination area. Some simple testable implications of network effects follow from this hypothesis. If preexisting social ties play an important role in individuals' job-search processes once migration has occurred, then one would expect the same East German migrant to display better labor market outcomes when connected to the West prior to moving. We therefore examine the labor market outcomes of East German migrants in terms of full-time employment, economic inactivity,[10] and monthly labor earnings.

Due to the panel structure of the SOEP, we are able to control for unobserved heterogeneity by estimating various random effects panel models. Our estimation sample includes all East Germans who migrate from the East to the West at some point during the sample period. The units of observation are the person-years in which the migrants are located in West Germany. The reference group is migrants who are socially unconnected ("no networks in the West") at the beginning of the sample period. We control for the full set of socioeconomic background variables, except for household income because of obvious endogeneity problems. In addition, we add indicator variables for panel years to account for cyclical influences on labor market outcomes. For the sake of brevity, we only report selected coefficients.

The main results, reported in Table 5, can be summarized as follows. First, with regard

[10]Full-time employment is a binary variable which takes on a value of one at each point in time a migrant reports being employed full-time, and zero otherwise. Similarly, economic inactivity is a dummy variable which equals one at each point in time a migrant reports being economically inactive, and zero otherwise.

Table 5: The Information Hypothesis — Labor Market Outcomes of East German Immigrants

	(1) Full-time employed	(2) Economic inactive	(3) (Log) Earnings
Relatives in the West	2.996	-3.858	0.163
	(0.641)**	(0.962)**	(0.092)+
Friends in the West	0.354	-2.109	0.033
	(0.691)	(0.894)*	(0.101)
Colleagues in the West	0.325	-2.869	0.027
	(1.071)	(1.419)*	(0.170)
Age $\leq$ 29	0.775	1.452	0.006
	(0.696)	(0.896)	(0.057)
Age 30-35	0.530	-0.601	-0.082
	(0.590)	(0.725)	(0.043)+
Age 36-45	0.557	-1.161	-0.045
	(0.445)	(0.616)+	(0.034)
Female	-6.963	7.463	-0.552
	(1.004)**	(1.245)**	(0.082)**
Married	-2.424	-0.201	-0.133
	(0.567)**	(0.616)	(0.042)**
Children in household	-1.339	1.234	0.065
	(0.700)+	(0.842)	(0.050)
Number of children	-0.260	1.098	-0.039
	(0.450)	(0.527)*	(0.034)
Homeowner	0.252	-1.020	-0.058
	(0.476)	(0.741)	(0.037)
Medium education	0.716	1.477	0.485
	(0.756)	(0.841)+	(0.100)**
High education	1.979	0.981	0.911
	(0.853)*	(1.007)	(0.114)**
Person-year observations	1,076	1,076	847
Number of individuals	145	145	131

Notes: Columns (1) and (2) are random effects logit regressions and column (3) reports estimates from a standard random effects panel model. Reference categories are: Age 46-55, no or low general education. All regressions also control for occupation and a maximum set of federal state dummy variables as measured in 1990, district size dummies, a maximum set of current federal state and time dummies and a constant. The regression in column (3) also controls for a part-time employment dummy, while labor earnings for marginal employment (e.g. labour earnings below 400 Euros) are excluded from the regression. $^{+}$, *, ** significant at the 10 percent, 5 percent and 1 percent level, respectively.

to employment [column (1)], the findings suggest that pre-migration family networks impact positively on post-migration employment. More precisely, the same East German migrant is more likely to be employed full-time when he has relatives in the West at the beginning of the sample period. The presence-of-family coefficient of 2.996 is not only highly significant, but also quantitatively important. Indeed, the corresponding marginal coefficient suggests that having pre-migration family networks in the West increases the probability of post-migration full-time employment by almost 9 percent. Second, we also find highly significant and negative coefficients when examining whether socially connected migrants are less likely to be economically inactive than unconnected ones [column (2)]. This accords perfectly with the evidence that socially connected migrants are more likely to find employment. Third, in support of network effects in terms of labor earnings [column (3)], we find that migrants with preexisting kinship

affiliations in the West earn on average 16 percent more than their unconnected counterparts. Note, however, that the effect on labor earnings is less precisely estimated compared to the employment regression.[11]

Taken together, the results presented so far provide a consistent pattern of evidence in favor of the information hypothesis. Not only are socially connected individuals more likely to become emigrants, but pre-migration kinship networks are also seen to positively influence post-migration labor market outcomes. A natural interpretation of these findings is that the distant location of relatives increases potential migrants' awareness of job opportunities at the destination. This in turn positively impacts on the probability of migration and, conditional on migrating, the levels of labor market success achieved.

4.3. The Integration Hypothesis: Community Involvement at the Destination

We now consider whether the data supports the view that the presence of social networks at the destination increases immigrants' potential for adjustment and integration into the host society. To this end, we examine whether, all else being equal, East German immigrants with pre-migration networks in the West are more involved in their new communities than movers without such social ties. For contemporary sociologists (see, e.g., Putnam, 2000), participation in voluntary associations is not only an important facet of social capital, but also forms the hallmark of *formal* community involvement. An unobtrusive indicator of *informal* community involvement is the practice of meeting up with friends or neighbors. We now provide some evidence on the relationship between pre-migration networks and immigrants' formal and informal community involvement.

As before, our estimation sample includes all East Germans who migrate from East to West Germany at some point during the sample period, and the units of observations are the person-years in which the migrants are located in West Germany. To measure the degree of formal community involvement, we use the variable *Civic Engagement*, which indicates whether a migrant volunteers in clubs or social organizations on a regular basis. As proxies for informal community involvement, we use the variables *Meet with Friends* and *Help out Friends*, which indicate whether a migrant meets with or helps out friends and neighbors on a regular basis. We estimate three random effect logit regressions, thereby controlling for unobserved heterogeneity. Besides the full set of socioeconomic background variables, we also include employment status dummies as controls.

Table 6 reports the results. Column (1) shows that there is a positive and significant relationship between pre-migration networks and immigrants' formal community involvement. Interestingly, it is not just the presence of family and friends that matters, but also the presence

[11] In unreported regressions, we also examined the effects of social networks on net monthly labor earnings and on annual labor earnings. The latter are adjusted for various bonuses (e.g. Christmas bonus pay, holiday pay). In line with the present results, we find the largest social network effects for those having relatives in the West, but the coefficients were not always precisely estimated.

Table 6: The Integration Hypothesis — Community Involvement of East German Immigrants

	(1) Civic Engagement	(2) Meet with friends	(3) Help out friends
Relatives in the West	1.797	-0.353	-0.151
	(0.901)*	(0.412)	(0.429)
Friends in the West	3.714	1.083	1.002
	(1.167)**	(0.501)*	(0.463)*
Colleagues in the West	4.926	-0.624	1.883
	(1.386)**	(0.886)	(0.886)*
Age $\leq$ 29	-0.376	1.951	0.513
	(0.911)	(0.546)**	(0.501)
Age 30-35	1.378	1.505	0.599
	(0.835)+	(0.484)**	(0.425)
Age 36-45	1.392	0.388	0.089
	(0.648)*	(0.384)	(0.370)
Female	-0.118	0.676	-0.567
	(0.779)	(0.390)+	(0.399)
Married	-1.290	0.276	0.081
	(0.723)+	(0.368)	(0.365)
Children in household	-0.511	0.279	-0.215
	(0.883)	(0.570)	(0.545)
Number of children	-0.413	-0.622	0.020
	(0.487)	(0.342)+	(0.334)
Homeowner	3.022	-0.607	-0.802
	(0.783)**	(0.427)	(0.407)*
Medium education	-5.153	1.111	-0.025
	(1.520)**	(0.514)*	(0.538)
High education	-2.901	1.926	0.359
	(1.304)*	(0.583)**	(0.585)
Average household income[a]	0.009	-0.002	-0.017
	(0.014)	(0.008)	(0.010)+
Person-year observations	747	515	517
Number of individuals	141	134	134

Notes: Random effects logit regressions. Reference categories are: Age 46-55, no or low general education. The estimates also control for occupation and a maximum set of federal state dummy variables as measured in 1990, district size dummies, a maximum set of current federal state and time dummies, employment status dummies and a constant. $^{+}$, *, ** significant at the 10 percent, 5 percent and 1 percent level, respectively.

of colleagues. The effects are also sizeable. Immigrants with established friendship affiliations in the West, for instance, are 3 percent more likely to be engaged in volunteer work than their unconnected counterparts. The corresponding marginal effect for those with colleagues in the West is 17 percent. Of the other regressors included marriage and education appear to block formal community involvement, while homeownership fosters it. In column (2), we look at informal community involvement in terms of meeting friends and neighbors on a regular basis. The pattern of results changes slightly with differences in effect between kinship and friendship networks. Indeed, while there is a robust positive and significant effect of friends in the West on informal community involvement, the effect of relatives in the West is not precisely estimated. Of the other regressors only a few are statistically significant at conventional levels. Being female and educated is associated with higher levels of informal community involvement. Perhaps not surprisingly, migrants are less likely to strike up informal connections as the number

of dependent children increases. In column (3), we repeat the previous exercise for informal community involvement in terms of helping out friends and neighbors. There is again robust evidence that migrants are more likely to get informally involved with friends and neighbors under the auspices of preexisting friendship networks.

Overall, the findings suggest that immigrants with pre-migration networks are more likely to connect with their host societies through formal and informal means. Taken at face value, this is consistent with the integration function of social networks being important. Indeed, it is not implausible to think of the observed community involvement effect stemming from preexisting social networks being central in embedding new migrants into the host society.

4.4. Discussion

This section discusses various exercises that are designed to investigate the sensitivity of our results and discusses some caveats. Instead of presenting estimates from all sensitivity checks, we discuss the key results of each analysis.

Endogeneity of Social Networks. It is important to air a caveat to the perspective developed so far. While the present estimates account for unobserved individual heterogeneity, social networks might be endogenous in the employment and community involvement regressions (Munshi, 2003). What we would need in order to avoid this endogeneity bias is an instrument that determines whether individuals have pre-migration networks in the West but that is uncorrelated with their post-migration employment and community involvement. We explored whether local unemployment rates and average income levels at the origin county level in East Germany could be used as instruments for social networks in the employment and community involvement regressions.[12] In addition, we examined whether distance from the former East-West border could be used as an instrument. Unfortunately, none of these instruments turned out to be strong enough in the first-stage regression to conduct meaningful IV estimations. Munshi (2003) studies network effects among Mexican migrants in the U.S. labor market. Compared to IV estimates, he reports downward-biased OLS estimates of social network effects in terms of employment at the destination.[13] Provided that similar mechanisms are at work in the German context, our estimates provide lower bounds of social network effects among East German migrants in terms of labor market outcomes and community involvement at the destination.

Robustness of Results. We have subjected our results to a battery of robustness checks. First, we have seen that if relatives are located in the region of destination, then migration is more

[12]Such instruments would only be valid if local labor conditions in the East have no direct impact on labor market outcomes in the West.

[13]The author argues that favorable labor market conditions in the U.S. might have induced return migration among migrants who have managed to save enough could explain the downward biased OLS estimates. Measurement error of the social network variables might be another reason.

likely. However, the higher the density of the network of friends and family in the region of origin, the lower would one expect the probability of migration to be. We therefore re-estimated our migration hazard models by controlling for individuals' connectedness in East Germany in 1991. In the SOEP, respondents are asked how far away their relatives live. As proxies for social connectedness in the region of origin, we generated four dummy variables that were equal to one if the father, the mother, the son, or the daughter lived in the same town as the respondent, and zero otherwise. The inclusion of these four dummy variables did not change our main results. Second, in our analysis West Berlin is considered as part of West Germany, and East Berlin as part of East Germany. Previous research shows that East Berliners are more likely to commute and to emigrate than other East German residents (Burda and Hunt, 2001). In unreported regressions, we therefore re-estimated the models with samples in which we dropped individuals living in East Berlin in 1991 from the analysis. The results were very similar to those reported here. Finally, the impact of pre-migration social networks on post-migration employment and community involvement might be stronger in years immediately after migrants' arrival. We therefore re-estimated the labor market and community involvement regressions focusing on the first five years after migration occurred. In addition, we estimated the models by only looking at migrants' employment and community involvement during the 1990s. The results were consistent with the ones reported in Tables 5 and 6, suggesting that our insights are robust to estimates across different sub-samples.

5. Conclusion

This paper has tried to elaborate on the role of social networks in determining East-West migration decisions after the unification of Germany. It also examines whether social networks have a discernable impact on the economic and social assimilation of East German immigrants in West Germany. Our results show that the presence of social networks in West Germany is a significant and quantitatively important predictor for the migration hazard rate of East Germans. We discussed two main theoretical channels via which social networks can affect the probability of migration. The first is via the way in which the distant location of family and friends facilitates migration by increasing migrants' potential for integration in the host society ("integration hypothesis"). The second considers how immigrants' chances of finding employment at the destination are affected by the job information transmitted through preexisting networks ("information hypothesis"). Our results suggest that, in the case of German East-West migration, both channels are important. Indeed, not only are pre-migration networks seen to positively influence post-migration labor market outcomes, but connected migrants also appear to be more integrated into their new communities than movers without established social ties.

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