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The Dynamics of Repeat Migration: A Markov Chain Analysis[1]

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This article studies repeat or circular migration between the host and home countries using panel data for Germany, distinguishing between factors generating single moves, circular migration, and absorption. Migrants are more likely to leave early after their first arrival in Germany, and when they have social and familial bonds in the home country, but less likely when they have a job in Germany and speak the language well. Once out-migrated, the return probability is mainly affected by remittances and family considerations. Circular migration is fostered by vocational training in the host country and older age. Whereas male migrants are 9 percent more likely to return to their home country than female migrants, gender is not significant for predicting the return to move back to Germany.

INTRODUCTION

The US congress, like many European governments and the European Commission, has recently examined the evidence on the determinants and structure of economic migrant flows. Policymakers are seriously re-examining guestworker programs and want to know the social and economic outcomes of such programs in the 21st Century (Castles, 2006; Martin and Ruhs, 2011). In this context, the mechanisms of return, repeat, and

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circular migration are important to understand. For example, if the free flows of workers are restricted, such migration stops, and labor migrants come with family members or reunite in the host country, stay there, and procreate (Zimmermann, 1996; Cornelius, 2005), while otherwise the flows might balance at lower levels.

Research has established that return migration is of considerable size and highly selective. Early contributions in the demography literature show that about 30 percent of the foreign-born individuals in the USA out-migrate again within a decade or two after arrival (Warren and Peck, 1980; Warren and Kraly, 1985). Jasso and Rosenzweig (1982) find that emigration rates vary substantially by nationality (ranging from 20% to 50%) and conclude that both proximity to the USA and the relative attractiveness of the home country are good predictors of emigration. Among legal immigrants in the USA between 1960 and 1980, European immigrants were the most likely to emigrate, Asian immigrants were the least likely, and immigrants from the Western Hemisphere were in-between (Jasso and Rosenzweig, 1990). The size of the outflow is highly uncertain (Bean *et al.*, 2001).

Based on information obtained after return to Mexico, Ranney and Kossoudji (1983) present a thorough statistical picture of a typical temporary migrant to the USA. Analyzing a longitudinal study on scientists and engineers in the USA, Borjas (1989) finds that emigration rates are sizable, and emigrants are characterized by poor labor market outcomes. Borjas and Bratsberg (1996) confirm the importance of out-migration from the USA. Studying the experiences of foreign-born individuals, they find that return migration intensifies the type of selection that generated the immigration flow in the first place. They show that in the 1980s, while emigration rates were lower than before, they still varied substantially by nationality, ranging from 3.5 percent for Asians to 34.5 percent for North Americans. As for their characteristics, Reagan and Olsen (2000) find that return migrants from the USA react to economic incentives, to cultural and linguistic ties, and are not skilled-biased.

In the European context, out-migration has been much higher than in the USA owing to legal restrictions and different migration policies. For Germany, the largest immigration country in Europe, Boehning (1981) estimates that more than two-thirds of the foreign workers admitted between 1961 and 1976 eventually returned home. The rates of return migration were particularly high for migrants from European Union countries, with 9 of 10 Italians, 8 of 10 Spaniards, and 7 of 10

Greeks ultimately going back. Those migrants who did not have the right to freely come and go, however, returned in much smaller numbers. Over the same period, only 5 of 10 Yugoslavs and 3 of 10 Turks returned home. Constant and Massey (2003) document an emigration rate of 18 percent for the guestworkers in Germany and find that return migration probabilities are strongly determined by the range and nature of social and labor market attachments to Germany and origin countries. The odds of returning are the highest during the first 5 years since arrival, grow higher toward retirement, and are significantly high for remitters.

While there are some theoretical contributions like Dierx (1988) to model the phenomenon of repeat migration, and one can find even some early examples of empirical research on internal repeat migration for the USA (Goldstein, 1958; DaVanzo, 1983; Dierx, 1988), Denmark (Goldstein, 1964), and Thailand (Prothero and Chapman, 1985), there is only five scarce empirical evidence in the context of international circular migration. In a framework for predicting migration dynamics over the life cycle, Bijwaard (2010) models migration flows allowing for both permanent and temporary migratory moves for departing and returning.

A very notable exception for international repeat migration is the study by Massey and Espinosa (1997), who establish that Mexicans in the USA are indeed repeat migrants and show that this phenomenon is even more common than return or onward migration. They find that repeat migration rises with prior experience in the USA, previous trips to the country, and occupational achievements there and is enhanced by the acquisition of migration-specific human capital. These results are stronger for documented than undocumented Mexicans, suggesting that holding legal documents facilitates repeat migration. Massey, Durand, and Malone (2002) show that the Mexican-US labor migration has been indeed circular and highly dynamic. Bean *et al.* (2001) discuss the serious implications of circular migration for the estimation of the size of unauthorized Mexican migrants in the USA. Using count data models, Constant and Zimmermann (2011) demonstrate that circular migration is not to be underestimated, as immigrants in Germany frequently move out only to return later. Studying skilled Indian and Chinese migration to Australia, Hugo (2009) finds evidence for the concept of bidirectional flows as well as circularity.

We postulate that the determinants of immigrating to the host country differ from the determinants of emigrating, and both differ from the determinants of repeat and circular migration. People immigrate because of tangible and intangible motives. Several theories, such as neoclassical

theory, human capital theory, the new economics of migration theory, the segmented labor market theory, the world systems theory, and social capital theory, give predictions and explanations for why people leave their countries to move to a new host country (Massey, 1999). This initial move is mostly viewed as a one-time, one-way move. Return migration might occur owing to the (ex-post corrective) realization of earlier sub-optimal decisions or owing to (ex-ante planning) predetermined intentions to return, and is, thus, viewed traditionally also as a one-time event. Repeat migration – while it has the appearance of an indecisive perpetual move – might be a way of optimizing one's economic, social, and personal situation at every period as it might denote a preference for frequent locational changes in maximizing utility. Further, while the initial move to the host country is governed by uncertainty, repeat migration is operating under a more complete information set on the socioeconomic conditions of both the home and host countries with the added advantage of experience in "migrating." In addition, circular migration captures the phenomenon of frequent or regular repeat migration between the home and various receiving countries.

We conceptualize a repeated move as (1) the return migration of a migrant to the home country, (2) the move from the home country back to the host country, given that the initial move to the host country has taken place, a repeat migration in the narrow sense, (3) and circular migration. Seeking to identify the underlying factors that drive individuals to move between countries, we propose a behavioral micro-theoretic framework, whereby some characteristics drive immigrants to an absorption state, and others keep pushing and pulling them between the two countries or generate circular migration.

For this purpose, we undertake a discrete-time event history analysis using a Markovian framework and a logit specification in a novel research setting. Using a very rich panel dataset on immigrants from the German Socio-Economic Panel (GSOEP), we focus on migrants from the so-called guestworker countries to examine their long-term commitment to their host country Germany.

MODEL SPECIFICATION

A Markovian Modeling Framework

We model the movement of immigrants between Germany and the home country as a discrete-time discrete-space Markov process. We assume that

the status of the immigrant at any period t is described by a stochastic process $\{E_t\}$ that takes values in a finite discrete state space $S = \{0, 1\}$. A Markov chain is a sequence of random values, whose probabilities at a time interval depend upon the value of the number in the previous time (Papoulis, 1984). We embody the idea that if an individual knows the current state, it is only this current state that influences the probabilities of the future state. At each time, the Markov chain starts anew using the current state as the new initial state. We assume that this Markov chain has two states, 0 and 1, indicating that an individual is in Germany or in the home country, respectively. The vector containing the long-term probabilities, denoted by π, is called the steady-state vector of the Markov chain.

The state probability (row) vector is:

$$\pi = [\pi_0 \quad \pi_1] \tag{1}$$

where π_0, π_1 are the probabilities that a person is in Germany or in the home country. Under the assumption that the system converges and is in the steady-state, the state probabilities do not depend on the year of observation. This is the stationary distribution of the chain and satisfies the equation

$$\pi = \pi * P \tag{2}$$

where

$$P = \begin{pmatrix} p_0 & p_1 \\ p_2 & p_3 \end{pmatrix} \tag{3}$$

is the transition probability matrix with $P_0 + P_1 = P_2 + P_3 = 1$. Even if the system converges in the long run, the Markov chain equation does not need to hold in the short run. However, if this equation is closely approximated by real data, this indicates that the Markov assumption is useful in describing reality. The transition probability is the commanding factor in a Markov chain. It is a conditional probability that the system will move to state 1 (or 0) in the next time period, given that it is currently in state 0 (or 1). The Markov chain obtains the much desired efficient estimates when the transition probabilities are properly determined.

The transition probabilities of an immigrant m from one state to the other or to the same state depend only on the current state, and on the socioeconomic characteristics of the individual, X_m. These independent variables affect the individual's probability of being in a given state.

Specifically, P_0 is the probability that an immigrant, who is in Germany in the current period, stays in Germany in the next period, while P_1 is the probability that an immigrant, who is in Germany in the current period, returns to his or her home country in the next period. Similarly, P_2 denotes the transition probability that an immigrant, who is currently in the home country after having returned from Germany, will return back to Germany in the next period. Lastly, P_3 denotes the transition probability that the returnee immigrant, who is currently in the home country, will stay in the home country in the next period. Out of these transition probabilities, we need to model only P_1 and P_2 given the adding-up constraints of $P_0 = 1 - P_1$ and $P_3 = 1 - P_2$.

We estimate the transition probabilities P_1 and P_2. The closed form for the probability that a person will move from one state to the other from time t to $t + 1$ then is:

$$P(E_{t+1} = i | E_t = j) = \frac{e^{\beta_{ij}' x_{mt}}}{\sum_k e^{\beta_{ik}' x_{mt}}} \quad i, j, k = 1, 2 \quad \forall t \tag{4}$$

with $\beta_{11} = \beta_{22} = 0$, $\beta_{12} = \beta_1$, and $\beta_{21} = \beta_2$. The characteristics X_m will help us explain how a person evolved into getting to that specific state and how his or her choice is influenced for the next move. Note that these characteristics may or may not be changing over time. Lastly, we calculate the steady probability vector (π) to find the probability that an individual is in a certain state.

A Behavioral Micro-Theory of Repeat Migration

Assume that the transition probabilities in the Markov chain approach are fixed. Then, any well-behaved empirical state probability vector converges quickly to its steady-state value to fulfill Eqn 2. However, at the level of the individual, the transition probabilities can be estimated using micro-data. Hence, the Markov chain approach we are suggesting takes the estimated transition probabilities from Eqn 4 as pre-determined for the next move. The pre-determined transition probabilities may evolve over time following the structure of the real population under study.

The standard Markov model fits well in a macro setting, where one deals with group behavior of repeat migration. This is consistent with the theory of cumulative causation introduced by Myrdal (1957) and Massey

(1990), where current movements generate additional migration. Migration creates the social structure to maintain it by providing information and reducing costs in the port of the host country and through the functioning of ethnic networks from both the sending and the receiving country. Consequently, return migrants create incentives for new migrants and hence lead to a circular stream of movers from the same ethnic group.

However, such considerations can only explain repeat migration at a group level, while our concern is repeat migration at the individual level. Unlike ethnic groups, individuals cannot iterate between states forever, but will be finally absorbed in the country of origin or destination. And individual repeat migration can only occur, if we can identify behavioral factors that can generate both movements to the home and to the host country.

Conceptually, there are three types of variables that are of importance for the dynamic process: (1) There are factors that generate absorption to the home or host country (*absorption factors*). These can be determinants that reduce the likelihood of out-migration either from the host or the home country. (2) There are factors that either pull or push migrants, where particular variables generate a one-way outflow either to the home or to the host country (*pull/push factors*). (3) There are factors that can cause and produce circular migration, namely repeated repeat migration, implying that these variables have a positive impact on mobility independent of whether they are placed in the home or host country (*circular factors*).

Variables that may contribute to the *absorption factor* are family characteristics (being married, location of partner), non-EU origin (Turk, ex-Yugoslav) with legal mobility restrictions, and integration indicators in Germany (years since first arrival, speaking German fluently, employed in Germany, German citizenship, prestige of job in Germany, home ownership in Germany). They suggest motives to stay in a particular country for longer if not permanently. The *pull/push factor*, indicating single moves or a pair of moves, could be captured by the remittance motive leading eventually to a move back home or back to Germany if currently at home. It could be also family creation motives by single males who return to the home country to find a bride (but potentially take them with them and move back to the host country). Moving to the home country is the more likely if the location of young children is there. All these factors suggest some mobility. The *circular factor* with the implication of repeated repeats of individuals is supposed to be generated by

human capital variables (vocational training, education in Germany and home country, and experience [measured by age]). Differences in the evaluation of higher education and training on the labor markets created by the economic cycles and departing employment demands and occupational trends in the labor supply in the respective countries provide an incentive for a higher mobility.

While push/pull factors generate single repeat migrations, it is only circular factors that ensure the existence of systematic dynamic processes at the individual level. Absorption factors enforce a degenerative process that brings individuals to a final (absorbing) state, either in the home or in the host country. The empirical analysis will enable us to examine the relevance of the factors groups.

DESCRIPTION OF THE DATASET, VARIABLES, AND HYPOTHESES

The GSOEP

The GSOEP, administered by DIW Berlin, is a nationally representative survey in Germany of persons aged 16 or older that started in 1984. It covers legal immigrants living in a household whose head was from Italy, Greece, Spain, Yugoslavia, or Turkey – the so-called guestworkers. The GSOEP oversamples guestworkers, provides excellent information on their pre-immigration experiences, their degree of sociopolitical integration into the German community, and documents actual return migration (SOEP Group, 2001). It maintains good participation rates: Rendtel (2002) shows that the attrition rate is 5.6 percent.

The GSOEP is especially suited for analyzing emigration probabilities because it has a high degree of accuracy and a good record of following individuals who move within Germany, and a good record of tracking immigrants who return back to Germany after they had gone to their homeland. Return migrants are re-interviewed about their situation and background characteristics when they are back in Germany so that no bias is established. Temporary drop-outs or persons who could not be successfully interviewed in a given year are followed until there are two consecutive temporary drop-outs of all household members or a final refusal.

The guestworker sample of the GSOEP contains individuals who came from selected countries that had guestworker treaties with Germany in the 1960s. They mostly stayed for long in the host country, and share

a long-run affiliation with the host country, contrary to the name "guestworker."[2] We cover the period 1984–1997. Each year, we exclude immigrants on active military duty because military personnel follow different moving trajectories and may skew our emigration estimates. There were only a dozen such exclusions over the entire panel. Our sample contains all individuals over 16 years of age who were successfully interviewed in a given year. This longitudinal sample contains 4,613 guestworkers, of whom 2,382 are men and 2,231 are women. Out of these migrants, we document 2,857 repeat migrants or migrants who have exited Germany at least once. They constitute 62 percent of the guestworker sample. Table 1 presents the yearly sample observations and the final longitudinal sample by gender.

To implement our event history analysis, we restructure the GSOEP data into "person-years," which becomes the effective unit of our analysis. A person-year is a 1-year fraction of a person's life during which the event in question (a move to another country) may or may not occur. Each yearly fraction of a person's life is treated as a distinct observation. The person-year file contains information about the occurrence or non-occurrence of the event, as well as the values of relevant independent variables (with or without temporal variation); it is the life history of each person.

The final person-year file has 33,493 observations, representing detailed longitudinal histories of immigrants' experiences and behavior from the moment immigrants entered the sample until emigration, death, or the final survey date. The variables we employ in our analysis may be either fixed or time-varying. The variables that change from year to year include age and years since first arrival. Those variables that are referring to fixed characteristics, such as gender, education before migration, and ethnicity, remain constant over person-years.

Variables and Hypotheses

The transitions are driven by behavior based on individual characteristics and exogenous forces. Hence, in the model, we enter as covariates a

[2]We model migrants from the guestworker generation countries, but the term "guestworker" might be misleading. Most of the migrants are in Germany for a long time, and their likely final destination is Germany and no longer the country of origin. A large part of the original guestworker migrants returned finally home and are not in the sample. Therefore, the remaining individuals can be considered as the unique group of immigrants based and living in Germany. They are modeled from this perspective ignoring the initial move from the home to the host country.

TABLE 1
Yearly Observations by Gender

Wave	Year	Males (1)	Females (2)	Total (3)
1	1984	1,592	1,418	3,010
2	1985	1,375	1,226	2,601
3	1986	1,349	1,180	2,529
4	1987	1,345	1,197	2,542
5	1988	1,275	1,160	2,435
6	1989	1,237	1,167	2,404
7	1990	1,242	1,145	2,387
8	1991	1,241	1,148	2,389
9	1992	1,224	1,148	2,372
10	1993	1,220	1,139	2,359
11	1994	1,158	1,110	2,268
12	1995	1,089	1,053	2,142
13	1996	1,043	1,018	2,061
14	1997	1,015	979	1,994
All 14 waves (individuals)		2,382	2,231	4,613
Repeat migrants				2,857 (62%)
Person-year observations		17,405	16,088	33,493

Source: Own calculations from German Socio-Economic Panel 1984–1997.

standard set of human capital and socioeconomic status measures. Our main interest is in how these characteristics influence individual migrants to make the transition from one state to the other, given that they are in a current state. Human capital is captured by education, language, and exposure to Germany. The education variable includes both pre- and post-migration education. For education in Germany, we consider three levels of education: (1) primary–secondary education, (2) higher education, and (3) no schooling in Germany, which is the omitted category. These levels denote terminal degrees. To capture the specificity of the German educational system, we include vocational training as a separate variable, measuring whether the respondent has an apprenticeship training or a university degree. Apprenticeship training is a unique feature of Germany's educational system and an important part of formal education for non-university goers who want to access skilled jobs. This is a better measure of human capital because in addition to formal education, it includes the effect of training on occupational attainment. Vocational training defines the potentiality of a job.

In principle, according to human capital theory, we expect the better educated individuals to be more mobile and have a higher probability to migrate. However, this applies mostly to general education. Human capital specific to Germany may not be easily portable outside of Germany.

Speaking the German language fluently not only facilitates every day transactions, but also increases one's chances of finding a job and being integrated and accepted. We expect that immigrants who are fluent in German will be more likely to stay in Germany. However, speaking German can also be a valuable skill that is rewarded in the guestworker countries, especially countries that depend on tourism. Regarding the repeat migration decision, we expect that those immigrants who have been schooled and trained in Germany and who speak German fluently will be more likely to come back to Germany after they have emigrated to the home country.

Education in the home country is a continuous variable for the years of schooling and includes vocational training. We expect that those migrants who have been schooled and trained in their home country will have a higher probability to go back to their home country because they possess the necessary country-specific skills and will go through a smoother adjustment upon return. Years since first arrival, the chief variable in all immigrant studies is a continuous variable that captures the exposure to the German way of living and working. This variable encompasses cumulative knowledge about the host labor market, culture, social conduct, and institutions. In principle, the more years one spends in Germany, the more likely one is to assimilate and integrate in Germany, and subsequently to want to stay in Germany. At the same time, the more years one accumulates in the host country, the more likely it is that one's memory and perceptions about the realities in the home country fade. Accordingly, one would be less eager to return to the home country. Moreover, longer years since migration render one more complacent with Germany. Lastly, the longer one stays in one place, the more likely it is that one loses the migration momentum and the less likely it is that one can readily "pack and move." We, thus, expect that longer years since first arrival will deter an immigrant from return migration. Once back in the home country, the already achieved integration in Germany may induce incentives to move back, which will lead to repeat migration.

Having a job in Germany and the socioeconomic prestige of that job are two other determinants of repeat migration. They indicate attachment, integration, and success in the German labor market. To measure the socioeconomic prestige of the job we use Treiman's international prestige scale that defines the actuality of the job. We expect that those immigrants who have a secured job in Germany will be less likely to repeat migrate. However, for those immigrants who have managed to move up

the socioeconomic ladder, as indicated by a higher Treiman score, we expect a higher likelihood of repeat migration. Higher ranking jobs render individuals more mobile because the dynamics of transferability are higher.

Remittances are a driving force of migration, especially, of the guest-worker type. The underlying motive of the individual migrant is to work in Germany to earn money and to send money back home for one's own future consumption, to support a family left behind, or to fulfill promises to compatriots. Immigrants who remit money to their home country express a strong will to keep the bond with the home country alive and to go back to the home country 1 day. We expect to find that remittances will increase the likelihood of return migration from Germany, as they will also increase the likelihood of returning back to Germany from the home country once the need to remit arises. Remittances will, thus, make immigrants more prone to repeat migrate. Home ownership and German citizenship reflect a determination and commitment to settle in Germany and put down roots. For these two variables, we expect a negative correlation with the probability to go back to the home country from Germany and a positive correlation with the probability to go back to Germany from the home country.

We employ marital status as another determinant of repeat migration. Here, we model being married or not (in Germany) and being married or not with the spouse living in the home country. Similarly, we distinguish between having young children in the household in Germany and having children in the home country. We conjecture that immigrants who have left their spouses and children in the home country will be more likely to be repeat migrants. This suggests that these individuals are economic migrants, who go abroad to work and earn money to take care of their household in their home country.

We lastly consider the country of origin impact. We hypothesize that immigrants from different countries of origin will exhibit different repeat migration patterns. We classify immigrants from Greece, Italy, and Spain as European Union nationals, and we separate them from Turks and ex-Yugoslavs. Specifically, we expect that immigrants from European Union countries will have a higher likelihood to repeatedly migrate between Germany and the home country because of the free labor movement within the European Union countries. European Union nationals can choose a country of residence and can find a job more easily. In contrast, Turks and nationals from the former Yugoslavia should have a lower

probability to repeat migration because their re-entry into Germany is not always guaranteed.

For those outside of Germany, we use pre-migration characteristics besides years since first arrival in Germany and age, which are updated with time. For the given set of variables, this is not critical. Given the data we have, this is the best we can do.

EMPIRICAL FINDINGS

Characteristics of the Sample Population

Table 2 presents selected sample characteristics from the year before the immigrants undertook their first repeat move. These summary statistics are based on the panel dataset, and are calculated separately for the immigrants who did not leave Germany to go back to their home countries, the stayers, and for the immigrants who left Germany at least once throughout the panel, the repeats. Note that, starting with immigrants who are already in Germany, a repeat move is defined as a move from Germany to the home country and back into Germany.

The average repeat migrant in our sample has at least one repeat move and has been in the panel for half as much time as the average stayer. Comparing the repeats to the stayers, we see that there are differences with respect to age, education, labor market attachment, remittances, home ownership, marital and citizenship status. We find that the average repeat migrant is older than the average stayer. When we look into specific age groups, we find that a much higher percentage of the repeats are in the 25–64 and above 65 age groups. Regarding their education acquired in Germany, a larger percentage of the repeat migrants never went to school in Germany and a smaller percentage of them have invested in higher education, compared with the stayers. In fact, repeat migrants are by 53 percent less in the higher education category, and are less fluent in German by 18 percent.

These raw statistics also point to a difference in labor market attachment. It is interesting that repeat migrants exhibit a stronger commitment to the labor market, that is, they are more likely to be labor migrants. A larger percentage of the repeat migrants are working full time in Germany (49% as opposed to 44% among the stayers), and a lower percentage of them are unemployed. However, they rank at the same level on the occupational prestige scale as the stayers. Almost a quarter of

TABLE 2
Selected Sample Characteristics Before the First Repeat Move

Characteristics	Repeat migrants		Stayers	
	Mean	SD	Mean	SD
Number of repeated moves	1.13	0.37		
Time in the panel (in years)	5.69	4.19	10.23	4.60
Male	52.30	0.500	50.50	0.500
Age in years	32.89	13.58	29.35	12.03
Age (16–18)	20.30	0.403	28.50	0.452
Age (19–24)	16.80	0.374	18.20	0.386
Age (25–64)	62.20	0.485	53.10	0.499
Age (65+)	0.60	0.077	0.20	0.041
Years since first arrival	14.47	7.47	14.52	8.30
No school degree in Germany	74.70	0.435	68.30	0.466
Primary–secondary education in Germany	18.10	0.385	16.50	0.371
Higher education in Germany	7.20	0.259	15.20	0.359
Vocational training in Germany	16.80	0.374	16.20	0.369
Speaking German fluently	19.30	0.395	23.60	0.425
Years of education in native country	4.70	3.49	4.10	3.74
Employed in Germany	59.70	0.491	54.60	0.498
Employed full-time	49.20	0.500	44.00	0.497
Not employed	34.30	0.475	40.20	0.490
Prestige of job in Germany (Treiman Scale)	31.89	11.16	31.37	11.53
Remit to native country	23.90	0.427	18.00	0.384
Home ownership in Germany	5.90	0.235	8.80	0.284
German citizen	13.10	0.337	21.60	0.412
Turk	32.10	0.467	33.00	0.470
Ex-Yugoslav	14.00	0.347	18.20	0.386
European Union citizen	40.80	0.492	27.20	0.445
Married	63.00	0.483	58.10	0.493
Married spouse not in Germany	3.50	0.183	1.80	0.134
Children <16 years old in the household	60.80	0.488	60.10	0.490
Children in native country	7.80	0.268	5.80	0.234
Feel mostly German	3.50	0.183	3.40	0.180
Number of observations	2,857		1,756	

Source: Own calculations from German Socio-Economic Panel 1984–1997.
Note: Means of dummy variables are in %.

repeat migrants remit money to their home country, a much larger percentage than the stayers. This shows that repeat migrants keep strong ties to the country of origin. Repeat migrants also exhibit a lower interest in acquiring German citizenship and in accumulating wealth in Germany as indicated by home ownership.

Further, not only a higher percentage of the repeats are married, but a higher percentage of them have a spouse in the home country. Naturally, a higher percentage of the repeat migrants also have children in the home country. This further suggests that repeat migrants have managed to maintain a strong kinship link throughout their immigrant career in Germany. These migrants tend to treat Germany as the country of

employment and their home country as the country of "home" and family. However, it is unclear and open to study how this family component evolves over time. Does Germany also become the "home" country after time passes and the family follows the migrant in Germany, or does the migrant finally return to the country of origin from Germany? The key question in the repeat migration research is whether the absorbing state is the host country or the country of origin.

Lastly, the overwhelming majority of repeat migrants are from the European Union, namely Italy, Greece, and Spain. In contrast, nationals from the former Yugoslavia are less likely to be in the repeats category (14% versus 18% among the stayers). Among Turks, there is not much of a difference between repeat migrants and stayers.

In general, these characteristics show that although the immigrants who repeatedly cross the border are more likely to be employed and, indeed full-time employed, they do not feel attached to German society, and they maintain strong ties with the countries of origin.

In Table 3, we present the transition probabilities calculated experimentally from the raw data. This table shows that the transition probabilities are $P_1 = 0.096$ and $P_2 = 0.844$. Clearly, the probability to make the transition from Germany to the home country, P_1, is at a low 10 percent while the probability to make the transition from the home country to Germany, P_2, is at a high 80 percent in the sample average. Further, from the raw data, we calculated the average initial state distribution vector as $\pi = \begin{bmatrix}\pi_0 & \pi_1\end{bmatrix} = [0.979 \quad 0.021]$. Applying the Markov chain equation, the calculated estimates of the steady-state probabilities after the transition are: $\pi^* = [0.902 \quad 0.098]$; this is nothing else than the average state probabilities from the raw data after the transition. These numbers are sufficiently close to π to make us believe that the Markov chain specification is an appropriate representation for our repeat migration setting.

Estimation Results

In Table 4, we present the results on the transition probabilities conditioned on the current state. In the first column (P_1), we present the log-odds of choosing to go to the home country as opposed to choosing to stay in Germany and the odds ratios of that choice. The second column (P_2) pertains to the current state being in the home country. Here, we present the log-odds of choosing to go back to Germany as opposed to choosing to stay in the home country and the odds ratios of that choice.

TABLE 3
CALCULATED TRANSITION PROBABILITIES MATRIX

State (t)	State ($t+1$)	
	In Germany	In home country
In Germany	0.904	0.096
In home country	0.844	0.156

Note: Probabilities calculated from raw data, German Socio-Economic Panel 1984–1997, for any t.

TABLE 4
REPEAT MIGRATION: LOGIT RESULTS

	Probability to return to home country (P_1)		Probability to return back to Germany (P_2)	
Theoretical Variables	Coefficient	Odds ratio	Coefficient	Odds ratio
Absorption factors				
Years since first arrival	−0.037[a] (0.007)	0.964	−0.019 (0.052)	0.981
Years since first arrival^2	0.0004[a] (0.0001)	1.000	0.0004 (0.001)	1.000
Speaking German fluently	−0.115[a] (0.054)	0.892	−0.304 (0.283)	0.738
Employed in Germany	−0.227[a] (0.044)	0.797	0.217 (0.270)	1.242
Prestige of job in Germany	−0.001 (0.002)	0.999	0.014 (0.011)	1.014
Home ownership in Germany	−0.053 (0.065)	0.948	−0.133 (0.355)	0.875
German citizen	−0.002 (0.071)	0.998	−0.653[a] (0.375)	0.520
Turk	−0.322[a] (0.047)	0.724	−0.423 (0.356)	0.655
Ex-Yugoslav	−0.447[a] (0.059)	0.640	−1.025[a] (0.378)	0.359
Married	−0.322[a] (0.055)	0.724	1.286[a] (0.359)	3.619
Married spouse not in Germany	0.542[a] (0.109)	1.719	−1.813[a] (0.752)	0.163
Push/pull factors				
Male	0.086[a] (0.041)	1.090	0.415 (0.256)	1.514
Remit to home country	0.052 (0.051)	1.054	0.908[a] (0.505)	2.479
Kids <16 year old in household	0.011 (0.042)	1.011	0.505[a] (0.259)	1.658
Kids in native country	0.372[a] (0.078)	1.450	1.574 (1.100)	4.824
Circular factors				
Age	−0.011 (0.010)	0.989	−0.147 (0.090)	0.863
Age^2	0.0002[a] (0.0001)	1.000	0.002[a] (0.001)	1.002
Education in home country	−0.006 (0.007)	0.994	−0.004 (0.052)	0.996
Primary–secondary education in Germany	0.073 (0.063)	1.076	−0.567[a] (0.311)	0.567
Higher education in Germany	−0.005 (0.076)	0.996	−0.429 (0.437)	0.651
Vocational training in Germany	0.102[a] (0.058)	1.108	0.551[a] (0.316)	1.735
Constant	−1.113[a] (0.183)		3.089[a] (1.395)	
Log-likelihood	−10,463.33		−251.31	
χ^2 (df = 21)	306.89		119.80	
Veall–Zimmermann pseudo-R^2	0.023		0.308	
Number of observations	33,493		720	

Note: [a]Significant at 5 percent, one-sided test; standard errors in parentheses.

Standard errors are reported underneath the coefficients, and the asterisk denotes a 5 percent significance from a one-sided test. In the following, we concentrate our analysis around the statistically significant coefficients.

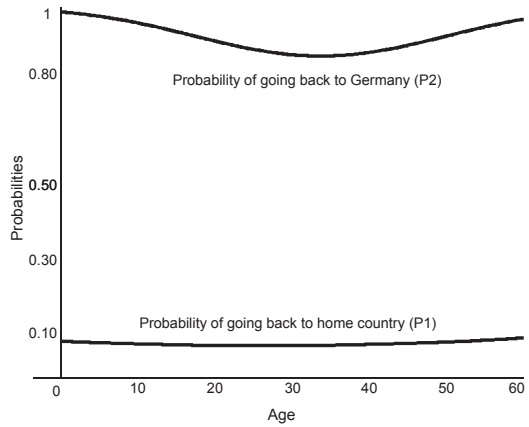
Before we discuss the estimates and their implications in more detail, we examine their consistency and relevance for our dynamic micro-theory

of repeat migration presented above. We find that all variables with significant coefficients can be consistently classified into the three groups: absorption, pull/push, and circular factors. Most variables are in the *absorption factor* category. Married individuals with a spouse in Germany are less likely to return to the home country and more likely to return when they are there; and the opposite holds consistently, when the partner is in the home country. Years since first arrival in Germany, speaking German fluently, being employed in Germany, and being Turkish all exhibit a larger probability to remain in Germany. Ex-Yugoslavs are absorbed where they are: they stay more likely both in the country of origin and in Germany. Note that while the parameter in the return migration to Germany equation is also negative for Turks, as it is for the ex-Yugoslavs, it is not significant. The findings confirm the expectations: Turks and ex-Yugoslavs are less freely mobile than EU nationals, the reference group. Returnees to the home country are absorbed there if they have a primary education from Germany and/or a German citizenship. The former finding seems to stem from an investment decision paying off at home. The latter result may reflect the option value of waiting, that is, there are lower risks to delay returning to Germany.

Estimates on one-way *pull/push factors* are as follows: Small children pull the migrant to the country where they are. Individuals who have remitted in the past are more likely to return to Germany. Males are more likely pushed home than females, maybe by the incentive to create a family with a co-ethnic (as opposed to inter-marry). In the *circular migration* category, the prominent member variable is vocational training in Germany, with positive effects in both the return and the re-return equation. Obviously, training provides a value usable in both countries. In both equations (P_1 and P_2), age has an insignificant but negative linear coefficient signaling absorption in the short term and a positive quadratic effect parameter indicating the potential of circular migration in the long term.

We now explicate the findings in Table 4 in more detail: With regards to returning to the home country from Germany (P_1), we find that the constant term is negative and significant, suggesting that this probability is very low. Male immigrants are 9 percent more likely to return than female immigrants. The age coefficients indicate that the odds of returning are a negative, albeit increasing, function of age in the empirically relevant range. Figure I portrays the probability of returning to the home country from Germany (P_1) as a function of age. This probability is evaluated at the average level of all other characteristics. The curve P_1 is almost flat hovering around a level of less than 10 percent.

Figure I. Transition Probabilities by Age



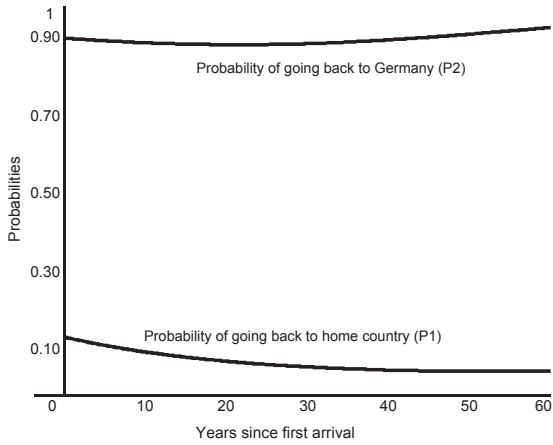
Note: P_1 and P_2 are conditional probabilities from different states and do not add up to one.

Similarly, we find that the odds of returning decrease with additional years since first arrival, but at an increasing rate. In Figure II, we plot the probability of returning to the home country from Germany as a function of years since first arrival. These probabilities are evaluated at the means of all the other variables. Clearly, the probability to return to the home country from Germany (P_1) is very low. The probability to return is the highest in the beginning of the immigrants' arrival in Germany, and then it decreases until about 40 years since first arrival. Afterward, it stabilizes and remains constant.

Table 4 further shows that human capital acquired in Germany has only limited explanatory power. The various school levels that we considered are no significant predictors of the odds of returning. The coefficient estimate of vocational training is significant, and shows that those who have acquired vocational training in Germany have an 11 percent higher tendency to return, compared with those who do not have any vocational training in Germany. This finding suggests that vocational training is a valuable asset for immigrants that renders them more marketable. It is also more portable and more likely to be rewarded in both countries. German language fluency is significant and negative, indicating that those immigrants who speak it fluently are less likely to return to their home country.

A strong determinant of the odds of returning home is whether immigrants are employed in Germany or not. We find that the odds of returning, for those who have a job in Germany, are 20 percent lower

Figure II. Transition Probabilities by Years Since First Arrival



Note: P_1 and P_2 are conditional probabilities from different states and do not add up to one.

than for those who do not have a job. Ethnicity also has a differential effect, with Turks and ex-Yugoslavs exhibiting lower tendencies to leave, compared with European Union nationals. Next, we find that married immigrants are less likely to leave Germany. However, when their spouse is left in the home country immigrants have a 72 percent higher probability to return. Likewise, when they have children in the home country they have a 45 percent higher probability to return.

Overall, repeat migrants are more likely to leave Germany in the beginning of their immigrant career, when they have acquired vocational training in Germany, and when they have close social and familial bonds in the home country. On the other hand, they are less likely to leave Germany when they have a job in Germany, they speak the language well, and they are married. Among all immigrant groups, Turks and ex-Yugoslavs are less likely to undertake a repeat move.

The last column of Table 4 (P_2) shows a significantly high intercept term. The quadratic specification of the age variable is significant and denotes a convex shape. Immigrants who are in their home country are less likely to go back to Germany with each additional year when they are younger. However, P_2 increases as they get older. This U-shape of the immigrants' probability to return back to Germany from home – evaluated at the average level of the rest of the variables – is plotted against age again in Figure I. Considering the relevant range of age between 16 and 60, this

figure shows that the probability P_2 is quite high when the immigrants are young (around 20 years of age), but it first decreases at a decreasing rate as they get older. The probability to return to Germany from home reaches a minimum around 35 years of age, and then, it increases steadily. This suggests that repeat migration occurs mostly after 35 years of age. The evolvement of the transition probabilities with increasing age suggests that the absorbing state is Germany rather than the sending country.

In Figure II, we also plot the probability of returning back to Germany (P_2) from the home country as a function of years since first arrival.[3] This probability is evaluated at the means of all the other variables. This graph is almost a mirror image of the probability of going back to the home country (P_1) also included in Figure II. The probability to go back to Germany with additional years since first arrival is very high but has a rather flat curvature. The evolvement of the transition probabilities with increasing years since first arrival is further evidence that the absorbing state is Germany rather than the sending country.[4]

The rest of the results in Table 4 show that immigrants who have finished primary or secondary education in Germany are less likely to move back to Germany, compared with those who have no degree in Germany. Our explanation is that because this is a very low level of education, it does not substantially help them in faring well in Germany. However, the odds of going back to Germany from the home country for those who have acquired vocational training in Germany are 74 percent higher, compared with those immigrants who have not had vocational training in Germany. From this estimate and the respective estimate in P_1, we conclude that vocational training in Germany is useful and functional in both the host and home countries. Vocational training is a rather practical but valuable education that is highly associated with labor market skills in demand. It is readily transferable and goes to the heart of the accessibility to jobs. We find that this training is positively correlated with repeat migration.

As expected, we find that immigrants who remit are significantly more likely to go back to Germany from their home country. Compared

[3]Whereas the years since first arrival variable is not statistically significant, we find that this variable has economic significance, and it enlightens the repeat migration behavior of immigrants.

[4]Note that while Germany becomes the steady state, there could still be a very small transition probability to move out.

with those who do not remit, the odds of going back to Germany are two and a half times higher. This finding suggests that repeat migrants may be using Germany as a country where they can work, earn money, and remit. Among all immigrants, the ex-Yugoslavs are less likely than the European Union nationals to return back to Germany once they have been in their home country from the initial move to Germany.

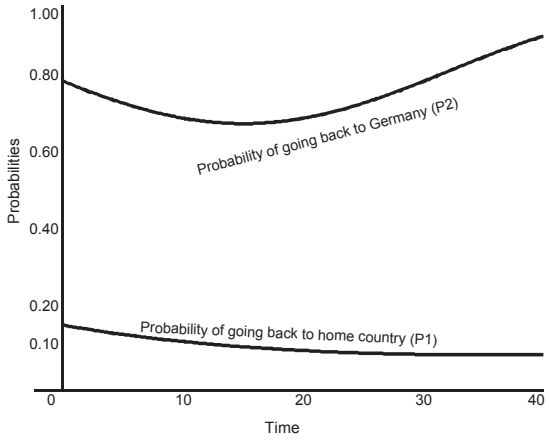
A puzzle remains at first sight with the German passport variable. We find that, among all immigrants, those who have the German passport are less likely to go back to Germany once they are in their home country. Note that becoming a German citizen is not based on merit or special talents directly related to the labor market. As we saw from the results on P_1, the German passport is not a significant determinant of the transition probability to the home country. We conjecture that because (1) repeat migrants are labor migrants and (2) German citizenship is not necessarily linked to the labor market, it can be a deterrent from going back to Germany. Knowing that they have the right to return back to Germany whenever they want, can suppress their desire to emigrate again.

Understandably, we find that the immigrants who are married and whose spouses live in the home country are less likely to repeat the move and come back to Germany in a particular period. However, the odds of returning to Germany from the home country are 3.6 times higher for those immigrants who are married with a spouse in Germany. Likewise, those with under-age children in the household are 66 percent more likely to return back to Germany. These results suggest strong familial dynamics. In sum, the immigrants who choose to come back to Germany and repeat their migration pattern are guided by the motive to remit, by strong familial considerations, and the move is facilitated by investment in German vocational training.

Our analysis so far suggests that for the current stock of migrants from the sending countries of the guestworker generation, the final absorbing state is very likely to be Germany and not the country of origin. We examine this by simulating a hypothetical life cycle of a sample average unmarried and a married individual, who immigrated to Germany for the first time at the age of 20 and has no children. The simulated return and repeat probabilities P_1 and P_2 for both types of individuals are graphed against time for non-married migrants in Figure III and for married migrants in Figure IV.

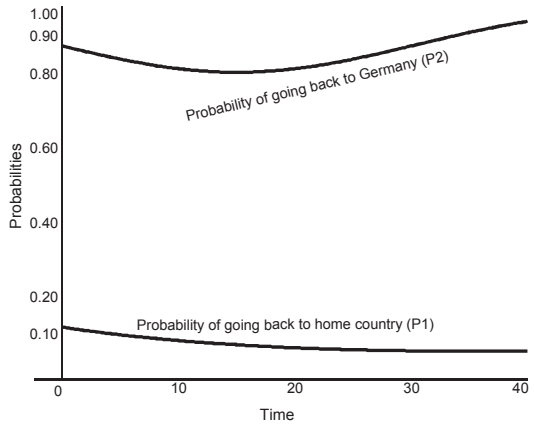
In Figure III, we first trace the transition probability of going back to the home country as a function of time for a non-married individual.

Figure III. Simulated Transition Probabilities for Single Individuals Over Time



Notes: P_1 and P_2 are conditional probabilities from different states and do not add up to one. The singles are sample average individuals, who immigrated to Germany for the first time at age 20 and have no children.

Figure IV. Simulated Transition Probabilities for Married Individuals Over Time



Notes: P_1 and P_2 are conditional probabilites from different states and do not add up to one. The married individuals are sample averages who immigrated to Germany for the first time at age 20 and have no children.

Overall, the probability to move out of Germany (P_1) is low. However, this probability is the highest at the beginning of time and decreases up to 30 years, where it stabilizes and stays below 10 percent. This graph is very similar to the return probability (P_1) in Figure II, indicating that

years since first arrival has the strongest effect in the transition probability of going out of Germany.

Figure III also depicts the transition probability of going back to Germany from the home country (P_2) as a function of time. It shows a pronounced convex curvature. It is high, compared with P_1 in the same figure, starting at 80 percent and decreases steadily as time passes during the first 15 years to reach its minimum. It then increases steeply approaching 1. This figure is very similar to P_2 in Figure I. It shows that when one is in one's home country, the transition probability of going back to Germany is largely determined by the age variable.

Figure IV replicates the simulation exercise of Figure III for a married average individual. The basic pattern is the same, but with some marked differences. Non-married immigrants are more likely to go home and stay longer (their repeat migration probability is much lower) than married individuals at lower ages. This suggests that the move home of non-married individuals serves the purpose of finding a spouse in the home country. However, with time passing, the repeat probabilities P_2 strongly grow and approach 1 for both married and non-married individuals. Hence, while some low constant outflow of about 10 percent per period takes place, there is a strong return probability to Germany as the absorbing state. Hence, contrary to general belief, the migrant population in Germany as studied here does not seem to finally move back to the home country.

SUMMARY AND CONCLUSIONS

In this article, we study the behavior of immigrants who repeat their migration moves between the host and home countries. Assuming a discrete-time and discrete-space process, where the status of a person is a random process in time, a Markov chain is an appropriate representation of the structure of the behavioral process of repeat migrants. Empirically, we estimate the transition probabilities through two binomial logits, conditioned on whether one is in Germany or in the home country, and explained through various characteristics that identify the factors generating single moves, circular migration, and absorption to a particular state.

Based on longitudinal data from the GSOEP, we estimate migration transition probabilities from and to the host country for guestworkers by implementing a person-year structure that can best analyze multi-state migration behavior. Family characteristics, integration indicators and

political constraints establish the absorption factors that lead to a fast attachment to the host or home country. Return or repeat migration is generated and fostered by the remittance motive, marriage plans by returning single men, or the location of young children. Circular migration is induced by vocational training in Germany and takes place at older ages.

Our study shows that the Markov model fits the data well and confirms the importance of the repeat migration issue: More than 60 percent of migrants in Germany from the guestworker countries are indeed repeat migrants. Whereas male migrants are 9 percent more likely to return to their home country than female migrants, gender is not significant for predicting the return move back to Germany. The probability of repeating the migration move is high and decreases when one is young up to 35 years of age; it becomes an increasing function of age thereafter. Overall, repeat migrants are more likely to leave Germany in the beginning of their immigrant career, when they have acquired vocational training in Germany, and when they have social and familial bonds in their home country. On the other hand, they are less likely to leave Germany when they have a job in Germany, they speak the language well, and they are married.

Among all migrant groups, Turks and ex-Yugoslavs are less likely to undertake a return or repeat move, compared with European Union nationals caused by flexibility constraints on those nationals imposed by political restrictions. The immigrants who choose to come back to Germany after they return to the home country and repeat their migration pattern are, however, mainly guided by remittances and family considerations. Vocational training, a special feature of Germany's educational system, is highly and positively correlated to the odds of repeating the migration move. This valuable training is more portable to the migrants' own countries and makes them more marketable in both locations. The odds of returning to the home country from Germany and the odds of going back to Germany from the home country as a function of vocational training are 11 percent and 74 percent.

In sum, only a small portion of the original guestworker generation has remained in Germany. Among those who have stayed, about 60 percent have left the host country at least once. Nowadays, immigrants' annual probability to leave Germany is low, about 10 percent, but once they are in their home country the probabilities of undertaking a repeat move – by returning back to Germany – are high, about 80 percent on the average of the observed transition situations. Simulations with our

estimated models have shown that while the probability to return to the home country remains low as time elapses, the probability to return back to Germany from the home country approaches 1, the older the immigrants are and the earlier they have migrated for the first time to Germany. Our results point to the fact that the remaining repeat migrants are indeed labor migrants, who go to Germany to work and earn money, but that there is no evidence that they finally attempt to return to the home country. To the contrary, Germany remains the magnet for these migrants and will eventually become their new home.

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