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Labor Market Outcomes, Capital Accumulation, and Return Migration: Evidence from Immigrants in Germany

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Abstract

In this paper I test the capital accumulation conjecture that is used to rationalize return migration decisions in the context of immigrants in Germany and examine how labor market outcomes influence return migration decisions, with particular attention to selection in these outcomes in return migration. I characterize the level and timing of return migration as well as the selection in it and derive a number of implications of these on the impact of immigrants on the host as well as source countries. Using a rich longitudinal dataset that has an over-sampled group of immigrants (German Socioeconomic Panel), I conduct a Cox proportional hazard analysis with alternative waiting-time concepts. That the sample contains immigrants from four different source countries allows me to utilize the variation in the source country characteristics as well as the time variation in them to identify the parameters of interest. I find evidence for the savings accumulation conjecture, in which return is motivated by higher purchasing power of accumulated savings in the home country. On the other hand, human capital accumulation conjecture is rejected. In the framework of savings accumulation, I examine the impact of an increase in German earnings whose theoretical impact on the return migration decision is ambiguous. In terms of labor market outcomes, both retirement and unemployment emerge as important determinants of return migration choices. Unemployment spell length determines the direction of selection with respect to unemployment in return migration. The data also reveal that the level of return migration is high and varies considerably across the source countries. The hazard function of Turkish immigrants displays a hump-shaped profile that peaks between the ages of 45 and 54 whereas EU immigrants are more likely to return at earlier ages and after retirement.

JEL Classification Codes: C41, F22, J61

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1 Introduction

Immigration has become one of the most significant economic issues, particularly in North America and Europe. Borjas (2000), referring to a United Nations estimate, reports that 200 million people, around 2%

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of the world's population, now live in a country where they were not born.[1] As a result, the impact of immigration on the host as well as the source country economies has received increased attention in the literature.

From the host countries' perspective, an important impact of immigration is that it changes the relative abundance of factors of production. Most of the immigration to the developed countries has been in the form of unskilled immigration, and this has risen concerns about the impact of immigrants on the wages and employment prospects of natives with similar characteristics. Immigrants could potentially make an important contribution to the social security system of the host countries as well. It has been a policy debate in many immigration countries whether immigrants could be part of the solution to the social security crisis arising from aging native populations and low fertility rates of these countries. Storesletten (2000) in fact shows that the current U.S. fiscal policy could be sustained through immigration policies despite the changing demographics of the natives. The participation of immigrants to the host country welfare system is another policy issue that has drawn a lot of attention. Hansen and Lofstrom (2003) and Riphahn (1998) report that immigrants are more likely to be receiving welfare than natives in Sweden and Germany, respectively.

Immigration has important implications for the source country as well. Remittances from workers abroad constitute a significant source of foreign currency for many source countries. In addition, migrants who return home often bring significant amounts of savings with them. Kirdar (2005) estimates that the annual flow of accumulated savings of returning migrants from Germany to Turkey averaged around 1.25 percent of total Turkish domestic savings in the mid 1990's. Moreover, many of these return migrants invest their savings in small businesses. Based on a survey of Turkish return migrants from Germany, Dustmann and Kirchkamp (2002) report that 51 percent of the returners operated small businesses. Furthermore, return of immigrants who acquire significant amount of human capital in the host country could be a very valuable asset to the source country.

It is not only the inflow of immigrants but also their outflow that determine the stock of immigrants, their characteristics and, therefore, their impact on the host as well as source countries. For that reason, return migration is an important economic phenomenon for the very same reasons that immigration is.

The level of return migration has been high both in North America and in Europe. Jasso and Rosenzweig (1982) report that of the 1971 cohort of immigrants in the U.S., the fraction that returned by 1979 could be as high as fifty percent. For working-age male immigrants in Canada, Aydemir and Robinson (2006) report an out-migration rate of 35 percent by 20 years of residence. The German Ministry of Interior reports that between 1993 and 1997 around forty-five thousand Turks returned from Germany on average per year. This roughly amounts to a two percent annual hazard rate. This number declined somewhat in the early 2000's; however, the number of Turkish return migrants was still above thirty-five thousand in 2002.

Return migration – through its level, timing, and selection– has important implications on the above issues from both the host and source countries' perspectives. For instance, a high rate of return migration implies higher returned wealth from the source countries' perspective. The timing of return migration influences the impact of immigrants on the host country social security system. If many immigrants return before reaching older ages, it would mean that they would be less of a burden on the health insurance system of the host country. Moreover, returning before older ages would also imply receiving less unemployment

[1] In Germany, foreign workers constitute almost 9 percent of the labor force.

benefits when there is a positive association between age and unemployment probability, which for instance is the case in Germany. Finally, selection in return migration is an important factor influencing all of the above policy issues. If the returners are selected out of less successful immigrants, we would observe a faster assimilation of immigrants to the host country economy. For instance, the burden they impose on the host country welfare system would be less heavy and their net contributions to the social security system would be higher. On the other hand, it would mean the return of physical or human capital to the home country would be limited. One goal of this paper is to characterize the level and timing of return migration as well as the selection in it, in particular with respect to labor market outcomes, and derive policy implications of these on the impact of immigrants on the host and source countries.

The literature has identified a number of causes of return migration. Borjas and Bratsberg (1996) argue that return migration may be part of an optimal life-cycle location decision. At the time they immigrate, migrants realize that after they acquire physical or human capital in the host country, it may be optimal for them to return because the return to that type of capital is higher in their home country. Return migration may also be the result of unexpected events, either in the host country or in the home country (Berninghaus and Siefer-Vogt, 1992; Tunalı, 2000). Even though it is optimal to immigrate ex ante, after realizations of shocks in the labor market or to preferences, it may be optimal to return.

Another goal of this paper is to empirically test the capital accumulation conjecture in the context of foreign workers in Germany. In this optimal location decisions over the life-cycle interpretation of migration decisions, there are two separate hypotheses. Initial immigration and the return decisions can be rationalized in a framework where the return to the human capital acquired in the host country has a higher return in the home country after return due to the relative scarcity of that factor there. Similarly, the fact that the return to the physical capital acquired in the host country has a higher return in the home country when the prices in the home country are lower could also rationalize migration decisions. At the time workers make their immigration decision, they expect that it will be optimal for them to return once they accumulate a sufficient level of capital in the host country. Yet, the studies that postulate this capital accumulation motive in rationalizing migration decisions use it as a guiding tool in the interpretation of their findings and empirical verification of this conjecture remains an open challenge.[2] This study provides a robust empirical verification of the physical capital accumulation hypothesis in explaining migration decisions.

Both micro and macro data are used in the estimation. The micro level data I use come from the German Socioeconomic Panel which contains rich information on demographic as well as labor market outcomes of immigrants in Germany from four different source countries. The sample is restricted to first-generation male immigrants. In addition, I employ macro data pertaining to immigrants' return decision. These macro data display variation both at the country level and over time.

The micro data reveal several interesting features as to the level and timing of return migration. The level of return migration is high and exhibits significant variation according to country of origin. Of all the 30 year-old Turkish immigrants, 65.8 percent return to their home country at some point in their lifetime. This percentage increases to 78.3 for Italian 30 year-olds, 89.9 for Spanish 30 year-olds and 92.3 for Greek 30 year-olds. The timing of the return behavior of Turkish immigrants is quite different from that of EU immigrants. The hazard function of Turkish immigrants over age displays a hump-shaped profile that reaches

[2] In an earlier attempt, Klinthall (1999) finds no evidence for the savings accumulation motive for Greek migrants in Sweden.

its peak between the ages of 45 and 54. On the other hand, EU immigrants are more likely to return at earlier ages and especially after retirement. In fact, their lowest return rates are between ages of 45 and 54 where it is the highest for Turkish immigrants.

The timing of the return migration of immigrants has important implications for the German fiscal system. Increased probability of return with retirement implies that many immigrants spend the period of their lifetime at which their health costs are the highest in their home country.[3] Moreover, that Turkish immigrants have very high unemployment rates toward the end of their worklives and that their return rates between the ages of 45 and 54 are very high imply that instead of spending a period at which their contributions to the unemployment insurance system would be negative in Germany[4], a considerable amount of them return back to their home country.

In terms of estimation method, I use Cox proportional hazard estimation with alternative concepts of waiting time. In applications of duration analysis, researches generally use one concept of waiting time, which is age most of the time. I take both duration of residence and age as waiting time concepts and find consistent results under the two different specifications.[5]

I find strong evidence for physical capital accumulation motive in the migration decisions of foreign workers in Germany; however, there is no evidence for human capital accumulation motive. In fact, Spanish and Italian immigrants with higher levels of labor market experience are more likely to stay. This supports the hypothesis that the major motivation in these foreign workers' emigration to Germany was to accumulate wealth and that return migration can be viewed as part of the optimal life-cycle migration decision in which return is motivated by lower prices in the source country.

In a setting where workers are in the host country to accumulate wealth, the theoretical impact of an increase in the host country wages on return migration is ambiguous. While the increased wage differential makes the immigrants less likely to return, the ability to accumulate wealth faster makes them more likely to return. From my estimates, I find that the former effect dominates the latter and immigrants become less likely to return.

Labor market outcomes are also important determinants of return migration. Bellemare (2003) as well as Constant and Massey (2003) report negative selection in terms of employment outcomes in return migration from Germany. However, I find that selection in return migration in terms of employment outcomes can not be characterized independent of the length of unemployment spells. For immigrants who have been unemployed for less than a year, unemployment is associated with a higher return rate. On the other hand, immigrants with longer unemployment spells, especially older immigrants in this group, are more likely to stay in Germany. Moreover, analyzing the distribution of unemployment spells, I find that the former group is significantly larger than the latter, which explains the findings of Bellemare and Constant and Massey. That long-term unemployed immigrants are more likely to stay suggests that return policies targeting this

[3] Even when the German government has to pay the health expenses of an immigrant after return, it will be relatively less costly as health-care expenses are cheaper in the source countries than in Germany.

[4] The unemployment rates of Turkish immigrants between the ages of 50 and 59 average over 20 percent over the 17 years of data. Given that the replacement rate of benefits is 60 percent and the contribution rate to the unemployment insurance system is 2.15 percent, net contributions of the Turkish immigrants at these ages are clearly negative. With a conservative unemployment rate of 20 percent, the contribution rate to the unemployment insurance system would have to be 12.5 percent to break even.

[5] Tunalı and Pritchett (1997) use this idea in their study of yellow fever epidemic in New Orleans.

group of immigrants such as financial bonuses conditional on return could be less of a burden on the German unemployment insurance system than the unemployment benefits that will be paid for many coming years in the generous German benefit system with relatively high replacement rates and long durations of entitlement. In fact, the estimation results indicate that a similar return policy implemented by the German government in 1984 brought about a major increase in the return rates of Turkish immigrants at that year.

Among the demographic characteristics, marriage status at arrival emerges as a critical determinant of return migration. Return migration behavior is substantially different according to this characteristic. For instance, return rates of immigrants who are not married at arrival are much higher in the first five years of residence. Yet, conditional on age, immigrants who are married at entry are more likely to return. These two seemingly contradictory facts take place as a result of the different age compositions by marriage status at arrival. However, this characteristic is largely ignored in the return migration literature.[6] Yet, it becomes critical in disentangling other determinants of return migration.

Next section provides the conceptual framework for the two capital accumulation conjectures. The data are described in section 3 and the estimation method in section 4. Section 5 presents the results and section 6 concludes.

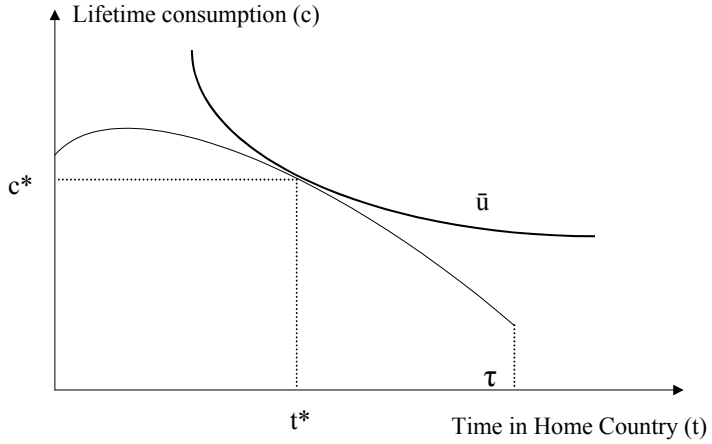
2 Conceptual Framework

In this section, I elaborate on the conceptual framework of both savings and human capital accumulation conjectures and a number of implications of these conjectures. I use simple models to illustrate the key variables influencing immigrants' decisions in each conjecture and to motivate the empirical specifications.

The conceptual framework of savings accumulation conjecture has been developed in a number of theoretical papers. (Hill, 1987; Djajic, 1988). The below figure provides a graphical illustration of immigrants' problem according to this conjecture.[7]

[6] Some studies control for marriage status rather than marriage status at arrival. However, obviously marriage is a choice variable for immigrants who are not married at arrival that is jointly made with the return migration decision. (Part of the reason to return back home could be marriage.)

[7] Hill (1987) studies a similar graphical framework in which immigrants' preferences depend on net lifetime income and time spent in the home country.



Savings Accumulation Model

I assume that immigrants' preferences depend on the time spent in their home country and on their lifetime consumption level. τ represents the time left until the end of life. If an immigrant chooses to return immediately (at τ), his lifetime consumption level would depend on the purchasing power of his accumulated savings in Germany as well as his earnings after return. As he stays longer in Germany, the lifetime consumption level he can attain varies according to the real wage difference between Germany and his home country. Whether he can increase his lifetime consumption by staying one more year depends on two competing effects. On one hand, he receives higher earnings by staying one more year. On the other hand, he gives up the higher purchasing power in the home country. For an immigrant who has recently arrived in Germany and, therefore, has not had the chance to accumulate much savings, the former effect would dominate whereas for an immigrant with a significant amount of accumulated savings, the higher purchasing power of these savings after return would likely dominate the foregone earnings. Consequently, the budget line, as drawn above, will point downward after some time.[8]

There are three critical variables in this framework: The first one is the purchasing power of the accumulated savings in Germany after return to the home country which determines –along with earnings after return – where the budget line starts when the time left until the end of life is τ. The other key variable is the real wage difference between the two countries which determines the slope of the budget line. Finally, τ, the time left until the end of life – i.e. age –, is a critical variable here. With the same amount of accumulated savings, immigrants of different ages could make different decisions because the horizon at which these savings will be decumulated are different. Moreover, the opportunity cost of returning is higher for a younger immigrant due to higher foregone lifetime earnings.

In terms of comparative statics, the impact of an increase in accumulated savings in unambiguous. An increase in the purchasing power of accumulated savings shifts the budget line upwards which brings about an income effect that increases the time in the home country. In other words, immigrants become more

[8] In this framework, we could explain a permanent stay decision only when immigrants in fact prefer to live in Germany. If the objective function were to depend only on lifetime consumption, it would be optimal for all immigrants (with positive savings) to return after some time as a result of lower prices in the home country. This is especially obvious after retirement because the opportunity cost of returning, the wage differential, is nil as the immigrants can receive their pension benefits in their home country.

likely to return as a result of an increase in savings. However, the impact of an increase in German wages is not so clear cut. An increase in German wages increases the slope of the budget line in the above figure. Therefore, it has both income and substitution effects. The higher opportunity cost of returning, as a result of the increased wage differential, decreases the demand for time in the home country. On the other hand, the higher lifetime income implied by higher earnings in Germany increases the demand for time spent in the home country.

According to the human capital accumulation conjecture, it becomes optimal for immigrants to return after they acquire a certain level of human capital in the host country because the return to host country specific human capital is higher in the home country. The following is a simple illustration of this idea.[9] Let y^G denote the earnings in Germany and y^H the earnings in the home country.

$$\begin{aligned} y^G &= g_0 + g_1 X + \epsilon \\ y^H &= h_0 + h_1 X \end{aligned}$$

Here g_0 stands for earnings in Germany at arrival and h_0 for the earnings the immigrant would receive in his home country at the time of immigration were he to stay. X is years of German labor market experience, g_1 is the return to this German labor market experience in Germany and h_1 is the return to German experience in the home country after return. ϵ is a stochastic shock to earnings in Germany. According to the human capital accumulation conjecture, $h_1 > g_1$ is the reason that it becomes optimal for these immigrants to return after acquiring a certain level of German labor market experience. Even when g_0 is larger than h_0, y^H exceeds y^G once experience reaches a certain level. (It is not required that $g_0 > h_0$ holds in order to rationalize the initial immigration decision, though, when $h_1 > g_1$. Migrants could accept lower earnings in the short run if higher earnings in the long run (because $h_1 > g_1$) make up for more than that.) The return decision rule is that

$$\text{return} \qquad \text{if } \epsilon < (h_0 - g_0) + (h_1 - g_1)X$$

There are three key variables in this decision rule. One is $h_0 - g_0$, which stands for the earnings difference at arrival. The others are the level of German labor market experience and the difference between the rate of return to this experience in the source countries and in Germany $(h_1 - g_1)$. An implication of this decision rule is that return probability increases in the level of accumulated German labor market experience, X, because $h_1 > g_1$.[10] Another implication is that as the earnings differential between Germany and the host country at the time of arrival increases, immigrants become less likely to return.

Note that there is an important difference between the earnings difference in this model and that in the savings accumulation model. Here, I have earnings differential at arrival in order to be able to purge the impact of German labor market experience whereas in the savings accumulation framework, earnings differential is the difference at any point of residence in Germany and, therefore, includes the labor market experience acquired in Germany. Because of this difference in what earnings differential stands for, it is not possible to test both conjectures at the same time.

[9] I could also assume that immigrants' preferences depend on time spent in the home country as I did in the savings accumulation framework; however, this would not change the comparative statics.

[10] This result would not change even if immigrants have a preference for living in their home country. In that case, return can take place even before $y^{\text{hom}\,e}$ overtakes y^G.

Another important difference between the two models is with regard to the role of the age of an immigrant. In the human capital accumulation framework, age does not influence when earnings in the home country overtakes that in Germany. Given that they have the same level of German labor market experience, a 40 year-old and a 60 year-old immigrant would return at the same time.[11] On the other hand, even when they have the same level accumulated savings, the return propensity of a 40 year-old and 60 year-old could be very different.

2.1 Empirical Specification

As explained above, different specifications are used in testing the two conjectures. Both specifications include a number of demographic controls like marriage status at entry, age at entry, country of origin and schooling level as well as controls for labor market outcomes like unemployment and qualification for retirement.[12] In the test of human capital accumulation motive, in addition to these demographic and labor market outcome controls, there are controls for the earnings difference at arrival as well as German labor market experience. In the test of savings accumulation conjecture, the control variables also include earnings difference –which an immigrant gives up if he returns – as well as the purchasing power of accumulated savings. Both of these variables have age interaction terms due to the reasons explained above. Earnings differential has a first order age interaction term and accumulated savings control has both first and second order age interactions. (A number of sensitivity tests with regard to these age interactions are conducted.). Labor market outcomes also have time interactions: unemployment status is interacted with age and qualification for retirement is interacted with years since qualification.

In both capital accumulation conjectures, as the amount of capital increases, the return probability of immigrants increases. For savings accumulation, this capital is the purchasing power of accumulated savings and for human capital accumulation it is German labor market experience. While it is possible to unify the impact of accumulated savings for immigrants from different source countries by using purchasing power parities, there is no such unifying variable that can be used to adjust for different rates of return to German labor market experience in different source countries. Therefore, the specifications for the human capital accumulation conjecture are written separately for each country of origin.

Below are illustrated the specifications for human capital accumulation and savings accumulation conjectures, respectively. $\mathbf{x}_{3i}$ denote the time-invariant individual characteristics and $\mathbf{x}_{4it}$ the time varying characteristics. The z subscript stands for country z.

$$r_{it} = f(\ \exp_{it},\ \text{earnings difference at arrival}_{zt},\ \mathbf{x}_{3i},\ \mathbf{x}_{4it})$$

$$r_{it} = f(\ g(age_{it}) * ppp_{zt} * savings_{it},\ \ g(age_{it}) * \text{earnings difference}_{it};\ \mathbf{x}_{3i},\ \mathbf{x}_{4it})$$

[11] This holds under the assumption that $h_0 - g_0$ is age independent.

[12] I use qualification for retirement instead of actual retirement because retirement is a choice variable that may be jointly decided on along with the return migration decision.

3 Data and Descriptive Statistics

The dataset I use is the German Socio-Economic Panel (GSOEP). This is a longitudinal dataset of households in Germany that contains an oversampled group of immigrants from five Mediterranean countries, of which three are members of the European Union (Greece, Italy and Spain) and two are not (Turkey and Ex-Yugoslavia). This is a stock sample of immigrants in Germany in 1984. Most of these immigrants are guestworkers who entered Germany in the 1960's and 70's. I use the 2000 version of the GSOEP, which contains annual information from 1984 to 2000 on return migration choices as well as demographic characteristics and labor market outcomes.

I restrict the sample to males who entered Germany after the age of 18. I want to analyze the behavior of immigrants who made the choice to immigrate to Germany. That is why I drop the immigrants who were younger than 18 at the time of entry to Germany, who presumably could not have made the decision to migrate themselves but were tied-movers along with their family. In addition, I drop ex-Yugoslavian immigrants because it is quite hard to find reliable macro data for the corresponding time period.

The pieces of information I use include demographic characteristics like marriage status and age at arrival, age, schooling status, country of origin and labor market information like household income, employment status, experience, and whether the immigrant is qualified to retire as well as return migration outcomes. Return migration information is directly available in the dataset; it is not inferred from attrition. This information is gathered from the neighbors and family members of the returning household and is classified as "moved out of country" in the dataset.

The first panel in Table 1 presents the mean values of the micro data used in the estimation by country of origin. This panel is in turn separated into two panels: The first one presents the demographic characteristics in the initial sample (in 1984) and the second one demographic as well as labor market characteristics in the full sample (over 17 years). The initial sample contains 824 immigrants, of which 310 are Turkish, 156 are Greek, 210 are Italian and 148 are Spanish. As can be seen in the table, while 55.7 percent of the Turkish immigrants are married at entry, this percentage is much lower for EU immigrants. For instance, only 26.1 percent of Italian immigrants are married at entry. This could be partly explained by the lower age at entry of Italian immigrants, which is 25.4. On the other hand, the average age at entry of Turkish is immigrants is 28.8. With regard to schooling, there is no significant variation according to country of origin. High school graduation rates are low for all nationalities at around twenty percent. College graduation rates for all nationalities are very low.

The second panel of Table 1 presents the mean values of the time-varying variables in the full sample. While the average duration of residence of Turkish immigrants is 19.3 years, it is longer for EU immigrants at 21.9 years for Greek, 21.7 years for Italian and 23.3 years for Spanish immigrants. The average age of Turkish and Italian immigrants is more than 2 years lower, at just above 47 years, than that of Spanish or Greek immigrants. Turkish immigrants are younger on average because of their shorter duration of residence, the Italian ones because of their earlier age of arrival.

There is significant variation in unemployment rates by nationality. Turkish immigrants have higher unemployment rates. The average unemployment rate of Turkish immigrants over the 17 years in the sample is 13.2 percent while it is just above 4 percent for Spanish immigrants. The highest unemployment rate

among the EU groups is for Italian immigrants at 6.8 percent.

The variation in average experience is higher than that for duration of residence as higher unemployment rate of Turkish immigrants increases the gap between their labor market experience and that of EU immigrants. While the difference between the average duration of residence of Greek and Turkish immigrants is 2.6 years, the difference between their German labor market experiences increases to 3.3 years. The mean unemployment spell length of all immigrants is 1.4 years.

There are different potential paths into retirement in Germany. (See Borsch-Supan and Schnabel, 1999)[13] According to these, 8.4 percent of Greek, 7.5 percent of Italian and 5.5 percent of Spanish and 3.9 percent of Turkish immigrants are qualified to retire. For immigrants that are qualified to retire, the average duration since qualification is 3.1 years.

Macro data pertaining to immigrants' return decision are also a key part of this investigation. Having four different source countries allows the use cross-country variation in identifying the influence of these macro variables. Moreover, these macro data provide exogenous time variation in the environment. The two pieces of macro data that are utilized are purchasing power parity and the ratio of expected wages in the home country to that in Germany at purchasing power parity. Figure 1 displays the purchasing power parity of the four source countries with Germany from 1984 to 1999. For Italy and Spain, ppp values lie between 1 and 1.5 for all years and they average around 1.2 for Italy and 1.3 for Spain. For Greece there is a downward trend over time from 1.8 to 1.4 and it averages around 1.6. For Turkey, it is the most volatile and ppp averages at a much higher level at around 2.4. Relative expected wages at purchasing power parity in the manufacturing sector are shown in Figure 2. In calculating the expected wages, variation in the unemployment rates and replacement rates of the unemployment insurance systems across countries are also accounted for. Relative wages in all source countries but Spain exhibit a declining trend over time. There is significant variation in the levels of relative expected wages at ppp. While in Italy they average at around 84 percent of the German level over the 17 years, this average drops to 48 percent for Turkey.

3.1 Generation of Compound Variables

3.1.1 Savings Potential at PPP

The data do not contain information on immigrants' asset holdings. Even if asset holdings were observed, using that piece of information as a control variable would not be appropriate as saving is a choice variable that is jointly determined with the return migration decision. For instance, a strong preference for living in the home country would imply high asset holdings as well as a high likelihood of return migration. There are a set of characteristics that determine immigrants' saving behavior along with their return behavior and my goal is to control for these set of characteristics in the econometric analysis. Therefore, I generate a control variable for immigrants' savings potential which is the maximum amount of savings that an immigrant household could accumulate given its history of labor market earnings and minimum consumption needs.

The pieces of information utilized in the generation of this variable are income realizations and duration of residence in Germany, longitudinal family composition information –including those in the home country–,

[13] Retirement is possible i) after age 65, ii) after age 63 conditional on a long service period (35 years) iii) after age 60 conditional on an unemployment spell of at least 52 weeks and a service period of at least 15 years.

and purchasing power parity.

Generation of Minimum Consumption Level Information on family size and the rules of the German subsistence income program are used in calculating the minimum consumption level. According to the subsistence income program, there is a minimum income level that each household needs to attain in order to be able to afford the basic necessities of daily life. Otherwise, German Federal governments make up for the difference. I assume that immigrants in fact consume at least this amount. The average level of the subsistence income determined by the German Federal States is taken as 6000DM per year (in 1998 prices). This is the amount that a household head receives. In addition, the spouse of the household head receives 80 percent of this amount and each child receives a percentage that is between 50 and 90 percent of this amount according to his/her age. Accordingly, the minimum consumption level for family members living in Germany is calculated in the following way.

$$
\begin{aligned}
c^G_{\min} &= 6000 && \text{if household size=1} \\
c^G_{\min} &= 1.8 * 6000 && \text{if household size=2} \\
c^G_{\min} &= (1.8 + 0.5 * (hhsize - 2)) * 6000^{14} && \text{if household size} > 2
\end{aligned}
$$

There may be some family members who are not in Germany and therefore not registered as part of the household size. The last panel in Table 1 lists the percentage of spouses and average number of children residing in the home country. Both numbers are relatively small: Less than seven percent of the spouses live in the home country and the average number of children is less than 0.21 for all immigrants. However, I include the minimum consumption needs of these family members as well. In doing so, I account for the difference in subsistence needs due to the difference in prices.

$$c^{source}_{\min} = 6000 \ / \ ppp \ * 0.5 \ * (\text{spouse abroad} + \#\ \text{children abroad})$$

The minimum consumption need is the sum of these two items.

$$c_{\min} = c^G_{\min} + c^{source}_{\min}$$

Note that minimum consumption level is a time-varying variable because household size and the number of family members residing abroad are time-varying variables. As can be seen from Table 1, the minimum consumption level of immigrants from EU countries ranges from 13,963 DM for Spanish immigrants to 14,398 DM for Greek immigrants whereas it is much higher for Turkish immigrants at 16,410 DM. The main reason for this is that Turkish immigrant households are on average larger. While the mean household size of immigrants from the three EU countries lies between 3.05 and 3.19, it is 3.79 for Turkish immigrant households.

Generation of Savings Potential at PPP Savings potential at ppp stands for what the maximum amount of savings that an immigrant household could have accumulated in Germany buys in the home country after return. This is calculated according to the following algorithm:

[14] Taking a conservative approach, I take the percentage applied to all children as 50 percent regardless of their age.

1) The maximum amount that each household can save each year is found by subtracting the minimum consumption level at that year from household income.

2) At each time period, the maximum saving levels for all preceding years (outcome of step 1) are averaged to find the average saving potential until that year.[15]

3) This average saving potential is multiplied by the duration of residence to find the cumulative saving potential (accumulated savings potential)

4) This is interacted with purchasing power parity to find the value of the savings potential in the home country after return.

Table 1 lists the mean values of savings potential at ppp for the four source countries. Turkish and Greek households have higher values of savings potential at ppp. Greek immigrants have the highest saving potential per each year of residence due to their higher average household income and lower minimum consumption needs. In addition, they have on average longer duration of residence in Germany. Moreover, the purchasing power values are higher compared to the other EU countries. Despite the facts that Turkish immigrants have the lowest saving ability per year of residence due to their higher minimum consumption levels and that their average duration of residence is the lowest, their savings potential at ppp is the highest because the purchasing power parity between Turkey and Germany is so much higher than it is for the EU countries in the sample.

3.1.2 Earnings Differential and Earnings Differential at Arrival

Earnings differential accounts for the change in household labor market earnings in the case of return to the home country in the savings accumulation framework. Both micro level data on realized household labor market earnings and macro level data on the ratio of expected wages at purchasing power parity in the manufacturing sector are used. Using the last household earnings realization in Germany and the relative wage ratio at ppp, I calculate the expected earnings in the home country for each immigrant. The difference between this and the earnings in Germany is the earnings differential. (Obviously, this assumes that the return to human capital in the home country is proportional to that in Germany and ignores the differences in the relative human capital levels of the source countries compared to Germany.)

As can be seen in Table 1, earnings differential is higher for Turkish and Greek immigrants. The expected fall in the household earnings of Turkish and Greek immigrants is more than three times that of Italian immigrants. The primary reason is that expected wages in these countries are much lower. Moreover, Greek immigrants have the highest household earnings; therefore, the level of the fall in their earnings after return is high as well.

In the human capital accumulation framework, I need to control for earnings differential at arrival which is independent of labor market experience acquired in Germany. However, I do not observe the earnings at arrival for most immigrants because they entered Germany before 1984. Therefore, the micro level data I have on earnings are not independent of German labor market experience.[16] For this reason, I use only

[15] Information on some of the preceding years may be missing as earnings data are available only after 1984 and many immigrants enter Germany long before. In that case, only available information is used.

[16] Any attempt to net out the impact of experience using separate regressions on labor market earnings would have to take care of selection through return migration.

macro level data which is the real wage ratio to account for earnings differential at arrival.

3.2 Level and Timing of Return Migration Behavior

Table 2 shows the time at risk and incidence rates for return migration according to country of origin. The incidence rate is 0.0293 for Turkish and 0.024 for Italian immigrants. The values are higher for Greek and Spanish immigrants at 0.0365 and 0.046, respectively. Table 3 lists the survivor rates after certain ages. Of all the 30 year-old Turkish immigrants, 34.2 percent stay in Germany throughout their lives whereas this percentage drops to 21.7 percent for Italian immigrants. Only 7.7 percent of the Greek 30 year-olds and 10.1 percent of the Spanish 30 year-olds stay in Germany until the end of their lives.

An interesting feature of immigrants' return behavior is illustrated in Table 4 which reports the variation in the timing of return according to country of origin by listing the cumulative hazard rates for 5-year age intervals. While the cumulative hazard rates display a U-shaped pattern over age for EU immigrants, for Turkish immigrants it is just the opposite. The five-year cumulative hazard rate for Turkish immigrants before the age of 45 is always below 7.3 percent. It increases to 19.7 percent in the 45-49 age interval and to 18.5 percent in the 50-54 age interval before falling again to 9.0 percent in the 55-59 age interval. In other words, it displays a hump-shaped profile before the retirement age. Even in the retirement transition age interval of 60 to 69, the cumulative hazard rate is not as high as that in the 45-54 age interval.

On the other hand, for EU immigrants, the cumulative hazard rates for the five-year age intervals before the age of 45 and after age 60 are much higher than those between the ages of 45 and 59, just the opposite of the case for Turkish immigrants. The five-year cumulative hazard rates for EU immigrants before the age of 45 are always above 9.4 percent and many times above 20 percent which is in stark contrast to the case for Turkish immigrants in which they are always less than 7.3 percent. However, between the ages of 45 and 54, EU immigrants have much lower hazard rates. For instance, the cumulative hazard rates of Greek and Italian immigrants average less than 2 and 5 percent, respectively, compared to more than 18 percent for Turkish immigrants as reported above.[17] There is a reversal after retirement again; hazard rates of EU immigrants are much higher after retirement, especially for Greek and Spanish immigrants.

4 Estimation

Duration analysis is used in the estimation as return migration outcomes fit well into the framework of modeling time-to-event data. In particular, Cox proportional hazard estimation is chosen because it does not impose any assumptions on the shape of the baseline hazard unlike the parametric models.[18] (I also used discrete time models – complementary log-log and conditional logit – and found very similar results.) In the Cox proportional hazard model, the hazard at time t, $h(t)$, is specified as:

$$h(t) = h_0(t) \exp(\beta_1 x_1 + ... + \beta_k x_k)$$

[17] The notable exception is Spanish immigrants. Even though the cumulative hazard function also displays a U-shaped profile over age, it starts the rise before retirement, in fact after the age of 50.

[18] This is a continuous time model. Since the length of a typical spell is long relative to the length of an interval used for grouping (one year), continuity assumption is found appropriate.

Above, $h_0(t)$ is the baseline hazard, t is duration of residence in Germany, and $x = (x_1, ..., x_k)$ are the control variables. The Cox proportional hazard model provides estimates of $\beta_1, \beta_2, .., \beta_k$, but not a direct estimate of the baseline hazard.

The key assumption of the proportional hazard models, as the name suggests, is that hazard ratio (the impact of a control variable on the baseline hazard) is proportional over time. In the case that this assumption fails in Cox estimation, stratification based on the variable that fails the proportionality assumption would be a potential solution. In the stratified proportional hazard model, the coefficients are assumed to be the same; however, the baseline hazard function is allowed to vary for each group of the strata variable. Below i denotes the stratum.

$$h(t) = h_{0i}(t) \exp(\beta_1 x_1 + ... + \beta_k x_k)$$

In all of the specifications that I use and that involve stratification, the proportionality tests indicate that the proportionality assumption holds for all variables.[19]

The baseline hazard function could be defined as a function of duration of residence, as shown above, or as a function of age. I use both waiting time concepts in the estimation.[20] When the waiting time is age, the hazard function can be written in the following way.

$$h(age) = h_{0i}(age) \exp(\beta_1 x_1 + ... + \beta_k x_k)$$

I get consistent results with the two different waiting time concepts. The consistency of the results with the alternative waiting time specifications yields more credibility to my model specification and estimates. When the waiting time is age, duration of residence enters the hazard rate parametrically and vice versa.

The sample is a random sample of the immigrants in Germany in 1984. Since some immigrants already returned to their home country by 1984, this is not a random sample of the initial cohorts of immigrants but rather a stock sample of immigrants in 1984 that is followed up. For this reason, I use the standard techniques in duration analysis to handle stock sampling with follow-up. For instance, when the waiting time concept is duration of residence, the information that is used in the first ten years comes only from immigrants who entered Germany after 1974; for the first 20 years only immigrants who entered after 1964 are used and so forth. One key assumption that is made in handling the data in this way is that baseline hazard functions of different year of entry cohorts are identical. Similarly, when the waiting time concept is age, the assumption is that baseline hazard functions of different birth cohorts are identical.

5 Results

5.1 Human Capital Accumulation Conjecture

Table 5 presents the results of the test of human capital accumulation conjecture with alternative concepts of waiting time. The first panel presents the results when duration of residence is taken as the waiting time and the second panel presents the results with age as the waiting time. Moreover, for each waiting time concept, two different specifications that differ according to the functional form of experience are taken. The

[19] The p-value of the proportionality test of each variable is always above 0.05.

[20] This was suggested by Tunalı and Pritchett (1997) in their study of yellow fever epidemic in New Orleans.

regressions are done separately for each country of origin as it is not possible to find a unifying framework for returns to German labor market experience in each source country. A positive sign for the experience terms would be consistent with the human capital accumulation motivation. The only positive sign for the experience terms is for Turkish immigrants when duration of residence is the waiting time concept. Yet, these estimates are not statistically significant and in fact the coefficients estimates are very close to zero. (I also find a positive term for Greek immigrants when age is the waiting time concept and experience enter the specification in logarithmic form. However, in this specification, the experience terms fails the proportionality assumption at 5 percent level; therefore, the results are not valid.). In all other specifications, experience has a negative coefficient. For Spanish immigrants, under both waiting time concepts and under both functional forms, experience has a negative coefficient that is statistically significant. (This significance is at 1 percent level except for the case with age as the waiting time and experience in logarithmic form, in which case the significance is at 10 percent level.) For Italian immigrants, the negative coefficient of experience becomes significant when experience enters in the logarithmic form under both waiting time concepts. (The significance is at 5 percent level when duration is the waiting time and at 1 percent level when age is the waiting time.) In essence, for Turkish and Greek immigrants there is no evidence for German labor market experience influencing return migration decisions. For Italian and Spanish immigrants, I find that German labor market experience decreases return migration probability. Therefore, human capital acquisition as a motivation for immigration and the higher returns to human capital acquired in Germany after return as an explanation to return migration behavior are rejected. Moreover, that stayers are selected out of immigrants with higher accumulated German labor market experience for Italian and Spanish immigrants indicates a negative-selection in return migration for these source countries.

5.2 Savings Accumulation Conjecture

Table 6 displays the results of the stratified Cox proportional hazard estimation of the savings accumulation framework with the same two alternative concepts of waiting time. Moreover, in this case I apply this statistical model to two different samples. The difference between the samples comes from age restrictions. In the first sample, I use the full sample (all person-year observations at which immigrants are older than 18). In the second sample, I restrict the sample to observations at which immigrants are between the ages of 18 and 59 because in this case the focus is on the impact of employment status on return migration and workers in Germany can enter retirement after the age of 60.

I first examine the second panel in Table 6 because it presents the estimates for time-varying variables and savings potential is one of them. For time-varying variables, most of which have age interactions, not much can be inferred from looking at these estimates alone. Instead, Table 7 displays the joint significance of accumulated savings terms as well as that of earnings difference terms and retirement terms at selected age values. (Table 7 is based on the first two columns of Table 6 in which the full sample is used. The results hold in the smaller sample as well.) As can be seen from Table 7, a higher purchasing power of savings potential is associated with a higher hazard rate except for the very old immigrants. The positive impact of the savings potential at ppp is significant at 5 percent level between the ages of 37 and 53 when the waiting time is duration of residence and between the ages of 41 and 53 when the waiting time is age. For significance at 10 percent level, this age range widens to 32 to 54 and 38 to 56 with the alternative waiting

time concepts of duration of residence and age, respectively. That a higher savings potential at ppp does not increase the hazard rate of a 70 year-old immigrant is not a surprise either as we would not expect somebody who is willing to return to his home country to decumulate his savings to wait until he turns 70 years old. However, for the prime working-age people, there is clear evidence that a higher purchasing power of savings potential increases return probability. This finding that a higher purchasing power of accumulated savings increases migrants' return propensity supports the hypothesis that savings accumulation is an integral part of these migrants' residence in Germany and that return migration is in fact part of an optimal life-cycle consumption smoothing problem in which return is motivated by lower prices in the home country.[21]

The other key variable in the savings accumulation framework was the earnings difference between the source and host countries, which determines the opportunity cost of returning. As can be seen from Table 7, earnings difference is in fact a significant actor that shapes the return migration decision. A higher earnings difference decreases hazard rates. (The significance is at 1 percent level until toward the end of working life.) Moreover, as expected, the magnitude of the fall in hazard rates is larger at younger ages. The potential loss in labor market earnings with return is more important for a 25 year-old immigrant than a 45 year-old immigrant. For a 65 year-old immigrant, who reaches retirement age, earnings difference loses its significance. All of these findings regarding earnings difference hold under both waiting time concepts.

Yet, I have not quantified the impact of a change in the savings potential at ppp or income differential on the hazard rate. Since these are continuous variables, interpretation of their marginal effects is a bit harder. In Table 7, the hazard ratios for savings potential at ppp shows the impact of a 100,000 increase in the savings potential at ppp.[22] However, the mean value of savings potential at ppp changes drastically over duration of residence and age. Therefore, it is not appropriate to compare the impact of same amount of level changes in this variable at different waiting times. A similar argument applies to income differential as immigrants' average income changes over age and duration of residence as well. (This change is not as drastic as the change in savings potential at ppp, though.) For these reasons, I measure the quantitative impact of these variables on return migration in a counterfactual experiment in which I increase wages in Germany by 10 percent. This leads to the same percentage change at all waiting times for both savings potential at ppp and earnings difference. This exactly corresponds to asking the following question: If immigrants' earnings were 10 percent higher from the time of their entry to Germany, how would their return migration propensities change at different ages?

Apart from this practical goal of measuring the impact of savings potential at ppp and earnings difference, there is a more fundamental economic question that I want to address. The theoretical impact of an increase in host country wages on immigrants' return decision is ambiguous. While it decreases the likelihood of return migration by increasing the wage differential between the two countries (substitution effect), it also makes immigrants more likely to return by allowing them to save at a faster pace (income effect).

Table 8 presents the results of this counterfactual for different age-at-entry and country of origin groups.[23]

[21] If these immigrants are in Germany to accumulate savings, we would expect them to save a significant fraction of their income. In fact, Kumcu (1986), in his study of the saving behavior of Turkish immigrants in Germany, find very high saving rates.

[22] This is slightly less than 8 percent of the mean value.

[23] Turkish and Italian immigrants are chosen because these are the immigrants for whom income effect is the strongest and the weakest, respectively.

For a Turkish immigrant that enters Germany at age 20, a 10 percent increase in German earnings increases his hazard rate at age 45 by 10.4 percent due to the increase in his savings potential at ppp. On the other hand, the increased earnings differential decreases his hazard rate by 34.6 percent at that age. This domination of substitution effect holds at all ages. For an Italian immigrant that enters at the same age, the magnitude of the income effect is smaller. The increase in the hazard rate at age 45 as a result of increased savings potential at ppp is 5 percent compared to 10.4 percent for Turkish immigrants. Income effect is much stronger for Turkish immigrants due to relatively lower prices in their home country. Table 7 also displays the results for immigrants that enter Germany at age 40 for both nationalities. For these immigrants, income effect is weaker as they have had less time in Germany to accumulate savings and therefore the impact of the increased savings ability is smaller. Therefore, for all age-at-entry and country of origin groups, we can assert that if German wages were higher, immigrants would be less likely to return at all ages.

5.2.1 Impact of Labor Market Outcomes

The impact of retirement on hazard rates is reported in Table 7. In the estimation of savings accumulation conjecture with age as the waiting time concept (whose results are given in Table 6), the specification includes an interaction term of qualification for retirement with the Greek dummy (in order to not to fail the proportionality assumption for the Greek dummy). The results given in Table 7 regarding the impact of retirement when age is the waiting time concept are limited to non-Greek immigrant groups. Therefore, I concentrate on the results when duration of residence is the waiting time concept. As can be seen from Table 7, qualification for retirement increases the hazard rate by 136 percent. The significance is at 1 percent level. However, as years pass after qualification, the impact of qualification for retirement diminishes. One year after qualification, retirement qualification increases hazard rates by 105 percent and two years after by 78 percent. (The precision of the qualification for retirement estimate increases remarkably when some of the age interacted terms are excluded from the regression in the sensitivity analysis tests discussed at the end of this section because of the high correlation between these variables.)

Employment status is a very important factor in immigrants' return decision. Table 9 reports the impact of unemployment on return decision based on the estimates from the smaller sample. The direction of the impact of unemployment changes by the length of the unemployment spell. Immigrants who have been recently unemployed are in fact more likely to return whereas immigrants with longer unemployment spells, especially older ones, are more likely to stay. Moreover, the magnitude of the impact is remarkable in most cases. (These hold true under both waiting time concepts.) For instance, according to the estimates with age as the waiting time concept, a 20 year-old immigrant who became unemployed within the last year is more than 10 times more likely to return compared to an employed immigrant of the same age. For immigrants with a spell length that is less than a year, a 30 year-old immigrant is 6.5 times more likely to return, a 40 year-old one more than 4 times more likely to return and a 50 year-old one is 2.6 times more likely to return. This picture is reversed for longer unemployment spells. For instance, a 55 year-old immigrant with an unemployment spell that is longer than 4 years has an 83.5 percent lower hazard rate. As the length of the unemployment spells increases, the fall in the hazard rates becomes especially large. For a 45 year-old unemployed immigrant, unemployment is associated with a 92.7 percent lower hazard rate when the spell length is six years, 98 percent lower hazard rate when the spell length is eight years and more than 99

percent lower hazard rate when it is ten years. (These estimates are based on the specification with age as the waiting time concept.)

A comparison of the fraction of immigrants whose hazard rates increase with unemployment to the fraction of immigrants whose hazard rates decrease with unemployment would depend on the distribution of unemployment spell lengths. Table 10 presents this distribution. 42.5 percent of the unemployed have a spell length that is less than a year. As shown in Table 9, for almost all of these unemployed with a spell length that is less than a year that unemployment is associated with a higher hazard rate is statistically significant. The groups for which there is statistically significant evidence that unemployment is associated with a lower hazard rate include those with an unemployment spell that is at least three years and younger immigrants of these groups are not included in this. Even with the inclusion of younger ones, the percentage of immigrants with an unemployment spell that is at least 3 years is less than 14 percent. Therefore, we can conclude that the percentage of unemployed immigrants for whom unemployment is associated with a higher return rate is much higher.

5.2.2 Impact of Demographic Characteristics

The estimates for the time-invariant variables are given in the first panel of Table 6. The country of origin effects can only be seen for the larger sample as the small sample is stratified according to country of origin. According to the larger sample, even after controlling for a number of individual as well as country level characteristics, Greek immigrants are 82 percent and Spanish immigrants are 165 percent more likely to return compared to Turkish immigrants when duration of residence is the waiting time concept. (Significance is at 1 percent level.)[24] This may partly be a result of country level characteristics that are missing like social networks. Greek and Spanish communities in Germany are smaller compared to those of Turkish and Italian immigrants.

In 1984, the German government implemented a return policy in which financial bonuses were given conditional on return, particularly geared toward Turkish immigrants. The interaction of Turkish dummy with the 1984 dummy is meant to capture the effect of this policy. (All specifications include calendar year dummies.) Under both waiting time concepts in the full sample, this variable has a positive impact on the hazard rate that is significant at 1 percent level. Moreover, the magnitude of the increase was remarkable: 236 percent when the waiting time is duration of residence, 204 percent when it is duration of residence.

The coefficient estimates also indicate that a higher age-at-entry is associated with a higher hazard rate. This is statistically significant at 1 percent level in the full sample; however, in the smaller sample the coefficient becomes smaller and loses its significance. This implies that age-at-entry becomes especially important in the return decision after age 60 as immigrants reach retirement.

Indicators of educational attainment of immigrants turn out to be insignificant. The only exception is for college graduates in the full sample when duration of residence is taken as the waiting time concept. There is evidence that is statistically significant only at 10 percent level that college graduates are more likely to return. As it was shown in Table 1, the variation in the educational attainment of immigrants is small. A

[24] When age is taken as the waiting time, the significance of Greek dummy decreases to 10 percent level because this specification also includes Greek dummy interacted with qualification for retirement. Otherwise, Greek dummy fails the proportionality test.

small fraction of immigrants are high school or college graduates. This could partly explain the low precision in the estimates of these variables.

5.2.3 Baseline Hazard Function

Figures 3 and 4 display the baseline hazard functions according to marriage status at entry when the waiting time concept is duration of residence and age, respectively.[25][26] The baseline hazard function over duration of residence is initially downward-sloping for both marriage-at-entry groups; however, there are marked differences. The level of baseline hazard rates in the first five years for immigrants who are not married at entry are substantially higher. Moreover, the slope of the downward-trending profile is very high in the first ten years for these immigrants. There is a kink at 10 years of residence after which the baseline hazard function still has a downward trend, albeit at a much slower pace. After 25 years of residence, the baseline hazard function gains a gently increasing slope as immigrants reach retirement age. For immigrants who are married at entry, the downward slope in the first 10 years is not as strong, and the period between 10 and 25 years of residence is flat giving the hazard function a saucer-shaped look compared to the still downward-sloping profile of the other marriage-at-entry group. Moreover, the rise after 25 years of residence is more pronounced.

When we compare the baseline hazard functions in Figure 4 according to age, we see that both functions are similar in the sense that they are both initially downward-sloping at younger ages, then relatively constant until around age 50 after which they gain positive slopes toward the end of immigrants' lifespans. Moreover, the levels of two baseline hazard functions after age 40 are quite similar. However, there are substantial differences in the levels before this age. First, the baseline hazard rates for immigrants that are married at entry are much higher at all ages before 40. Second, the baseline hazard function for immigrants not married at entry has a downward slope until age 30 but becomes flat between ages 30 and 40 whereas the downward-sloping trend of the baseline function of immigrants married at entry continues until age 40. These differences highlight the importance of allowing a specification that can account for the differences in the timing of return behavior according to the marriage status at arrival.

An interesting feature of the baseline hazard functions is that even though conditional on age hazard rates of immigrants that are married at entry are higher until age 40, the baseline hazard rates within the first five years of residence in Germany are higher for immigrants who are not married at entry. These two facts can be reconciled examining the age composition of these two groups. Since immigrants who are not married at entry are much younger on average and baseline hazard rates are higher for younger immigrants, their hazard rates within the first five years in Germany are higher despite their lower hazard rates conditional on age.

5.2.4 Sensitivity Checks

I conduct a number of sensitivity tests of the above findings using variations in the sample size, in the interaction terms with age as well as in the assumptions on immigrants' expectations on macro variables. The above results already listed findings from two different sample sizes distinguished by the age intervals they

[25] Due to the stratification by marriage status at entry, there are two baseline hazard functions.

[26] All of the variables are set at their mean values. Time-variant variables are set at their mean for that time period.

cover. The estimates from the smaller sample were primarily used to examine the impact of unemployment. However, the estimates from this sample also indicate that the findings regarding the impact of accumulated savings and earnings differential are preserved under both waiting time concepts.

Another specification test is with regard to the interaction terms of accumulated savings controls with age. In the savings accumulation framework, the specifications included both first and second order interaction terms of age with the purchasing power of savings potential. I test the robustness of the results using only a first-order interaction term and no interaction term at all. With only a first-degree interaction term, that savings potential at ppp is associated with a higher hazard rate still holds. However, the age band at which statistical significance is at 5 percent now widens to cover all the ages up to and including 52 (under both waiting time concepts.) When the same only first-order interaction term restriction is imposed in the smaller sample, that savings potential at ppp increases hazard rates is statistically significant at 5 percent level for all ages up to and including 51 (under both waiting time concepts). Even when there are no interaction terms of savings potential at ppp with age, that savings potential at ppp increases hazard rates still holds in the small sample – which covers a narrower age interval – and this is significant at 5 percent level. This result also holds under both waiting time concepts. In summary, that savings potential at ppp increases hazard rates is robust to the age interaction terms.

The time variation in the macro variables as well as the cross-section variation across the source countries were utilized in the above analysis. However, this makes the assumption that immigrants perceive the changes in ppp and real wage ratios every year as permanent. Another approach would be to take just one smoothed value of these macro variables over time for each source country assuming that consumers take annual changes as completely transitory (making the other extreme assumption). In this case, there is cross-country variation in the macro variables but no time variation. In the savings accumulation framework, a higher savings potential at ppp still implies a higher hazard rate. Moreover, the age range for which there is statistical significance at 5 percent level widens to cover all ages between 26 and 56 when the waiting time is duration of residence and ages between 38 and 58 when the waiting time is age.

6 Conclusions

A number of conjectures have been proposed in order to rationalize return migration decisions. One of the most prominent ones is the capital accumulation hypothesis which states that return migration is part of optimal life-cycle migration decisions in which the return decision is motivated by either higher purchasing power of accumulated savings in the host country after return or higher returns to human capital acquired in the host country after return. In this paper, I test this conjecture in the context of immigrants in Germany. In addition, I examine how labor market outcomes like unemployment and retirement influence return migration decision. Finally, I characterize the level, timing, and selection of the return migration behavior and derive a number of policy implications of these.

The empirical analysis uses a rich micro level dataset (German Socioeconomic Panel) as well as macro level data that displays both cross-country and time variation. In the estimation, I use a flexible duration analysis method with alternative concepts of waiting time. Moreover, I conduct a battery of diagnostic tests and show that the results are robust.

The test of the capital accumulation hypothesis reveals firm evidence for savings accumulation motive for immigrants in Germany whereas human capital accumulation motive is rejected. Therefore, return migration, in this context, can be seen part of the optimal life-cycle problem in which the reason to immigrate was to accumulate savings. Moreover, that immigrants with a higher savings potential are more likely to return imply that the return of the accumulated physical capital in Germany could make an important contribution to the source country economies.

In this framework of immigrants residing in the host country to accumulate wealth, the theoretical impact of an increase in wages in Germany is ambiguous. Using the estimates of my statistical model, I examine the impact of a 10 percent increase in German earnings and find that immigrants become less likely to return at all ages. This holds for all country of origin and age-at-entry groups.

This paper also examines how unemployment status influences immigrants' return decision. The literature so far has uncovered negative selection in terms of employment status in return migration from Germany. However, what I find is that the answer to this question depends on the length of the unemployment spell. Immigrants whose unemployment spells are shorter than a year are in fact more likely to return. On the other hand, those with longer unemployment spells, especially older immigrants in this group, are more likely to stay. Given the generosity of the German unemployment insurance system in terms of the duration of the benefits, it is no surprise that older long-term unemployed immigrants with a small chance of finding employment in either country prefer to stay in Germany whereas younger short-term unemployed immigrants are more likely to return once they realize that they will not be able to attain their savings accumulation goal due to poor employment prospects. Examining the distribution of unemployment spells of immigrants in Germany, I find that the proportion of unemployed immigrants for whom unemployment decreases return migration probability is higher. That long-term unemployed immigrants are more likely to stay and that there is very strong state dependence in unemployment suggest that return policies targeted toward this group, such as financial bonuses conditional on return, could be beneficial for the German unemployment insurance system. The amount of financial bonuses which would encourage these immigrants to return could be less than the total amount of unemployment benefits that are going to be paid in many years. In fact, the results of this study also indicate that a similar policy that was implemented in 1984 to encourage immigrants return home increased the return rates of Turkish immigrants significantly at that year.

In addition to the selection in return migration, this paper also characterizes the level and timing of return behavior. The level of return migration is quite high and exhibits significant variation according to country of origin. Immigrants from EU countries are more likely to return. The probability that a 30 year-old Greek immigrant will stay in Germany all throughout his life is less than 8 percent. This probability rises to 34 percent for a Turkish immigrant.

The timing of return exhibits interesting differences by country of origin. The hazard function over age for Turkish immigrants has a hump-shaped profile that reaches its peak between the ages of 45 and 54. On the other hand, the hazard function of immigrants from EU countries are parabolic. Their hazard rates are higher at early ages and after retirement. Unemployment rates of Turkish immigrants in their fifties are very high. That many choose to return between the ages of 45 and 54 implies that return migration behavior brings about a much less take-up of unemployment benefits. Return migration at these ages also increases the net contributions to the pension insurance system for Turkish immigrants as periods of unemployment

count toward the pension qualifying period while immigrants make no contributions at these periods. In addition, that immigrants become much more likely to return after retirement implies that return migration alleviates the potential burden an aging immigrant population would exert on the health insurance system of the host country. The hazard functions also indicate very high hazard rates in the first five years in Germany. This implies that many immigrants return before they qualify to the German pension insurance system.

Finally, marriage status at arrival emerges as a key element in disentangling the impact of different variables because the shape of the hazard functions are quite different by this status. Immigrants who are not married at arrival are more likely to return within the first five years of residence. Yet, conditional on age, immigrants who are married at entry are more likely to return.

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Table 1: Descriptive Statistics by Country of Origin (Mean Values)

Variables Used in Estimation					
	Turkish	*Greek*	*Italian*	*Spanish*	*Total*
Initial Sample					
# Observations	310	156	210	148	824
Age At Entry	28.79	28.50	25.38	27.87	27.809
Married At Entry	55.7%	42.0%	26.1%	39.4%	45.3%
High School	20.0%	20.3%	20.3%	16.1%	19.8%
College	3.3%	11.9%	1.3%	6.2%	4.0%
Full Sample					
# Observations	2,892	1,423	1,902	1,062	7,279
Years of Residence	19.3	21.9	21.7	23.3	20.5
Age	47.4	49.6	47.2	49.9	47.8
Qualifed to Retire	3.9%	8.4%	5.5%	7.5%	5.1%
# Years Qualified	3.6	2.0	3.2	2.8	3.1
Unemployed	13.2%	6.1%	6.8%	4.1%	10.1%
Unemployment Spell Length	1.4	1.8	1.4	1.0	1.4
Experience	17.4	20.7	20.5	22.6	18.9
Earnings Difference	23,856	26,465	7,905	20,805	19,888
Savings Potential at PPP	1,450,686	1,361,471	891,353	1,117,930	1,275,318

Variables Used in Generating Savings Potential					
	Turkish	*Greek*	*Italian*	*Spanish*	*Total*
# Observations	2,892	1,423	1,902	1,062	7,279
Household Income	51,195	57,477	52,531	54,969	52,535
Minimum Consumption Level	16,410	14,398	14,351	13,963	15,483

Variables Used in Generating Minumum Consumption Level					
	Turkish	*Greek*	*Italian*	*Spanish*	*Total*
# Observations	2,892	1,423	1,902	1,062	7,279
Household Size	3.79	3.19	3.14	3.05	3.50
Spouse Abroad	9.0%	3.1%	5.2%	2.9%	6.9%
# Children Abroad	0.27	0.12	0.13	0.10	0.21

Table 2: Incidence Rates of Return Migration

	Turkish	*Greek*	*Italian*	*Spanish*	*Total*
Time At Risk	2,892	1,423	1,902	1,062	7,279
Incidence Rate	0.0293	0.0365	0.0240	0.0460	0.0299

Table 3: Lifetime Survivor Rates After Certain Ages

	Turkish	*Greek*	*Italian*	*Spanish*	*Total*
Age					
30	34.2%	7.7%	21.7%	10.1%	19.8%
40	37.6%	10.5%	31.0%	13.4%	24.6%
50	53.0%	13.0%	35.5%	17.6%	32.7%

Table 4: Cumulative Hazard Rates by Age Intervals[27][28]

	Turkish	*Greek*	*Italian*	*Spanish*	*Total*
Age-Interval					
25-29					15.7%
30-34	2.2%		10.1%		4.9%
35-39	7.0%	18.8%	22.8%	17.7%	15.8%
40-44	7.3%	27.0%	9.4%	19.6%	10.5%
45-49	19.7%	0.0%	4.2%	4.6%	14.4%
50-54	18.5%	1.5%	2.3%	12.1%	12.6%
55-59	9.0%	5.0%	4.1%	29.9%	9.3%
60-64	17.0%	41.2%	14.5%	43.6%	25.8%
65-69	18.0%	76.4%	47.4%	50.1%	41.0%
70-74					8.7%

[27] Values are missing in some cells because the sample size becomes too small.

[28] All values in Tables 1 to 4 are weighted according to the probability weights in 1984. Since the sampling probabilities of different nationalities are different, "total" values would not be representative of the immigrant population from these four countries without weighting. General features of the data like the level and timing characteristics and differences in these according to country of origin do not change if weights are not used.

Table 5: Estimation Results I: Human Capital Accumulation Framework

Waiting Time Concept = Duration of Residence				
Specification 1				
	Turkish *a*	Greek	Italian	Spanish *b*
Wage Ratio	1.1958	-7.1260	2.6991	16.3465
	1.9074	5.5043	5.7658	7.3848 **
Experience	0.0059	-0.0383	-0.1300	-0.2539
	0.0697	0.0913	0.0964	0.0729 ***
Specification 2				
	Turkish *a*	Greek	Italian	Spanish *b*
Wage Ratio	1.1953	-7.0625	3.2303	16.0038
	1.9032	5.5794	5.9006	7.4014 **
Log Experience	0.0928	-0.4814	-2.4626	-4.0083
	0.9710	1.9350	1.1164 **	1.4731 ***
Waiting Time Concept = Age				
Specification 1				
	Turkish	Greek	Italian	Spanish *b*
Wage Ratio	0.6071	-10.3640	2.8246	15.0152
	1.6478	6.2825 *	5.0112	6.9514 **
Experience	-0.0343	-0.0254	-0.1157	-0.2621
	0.0743	0.0899	0.0788	0.0792 ***
Specification 2				
	Turkish	Greek *c*	Italian	Spanish *b*
Wage Ratio	0.6120	-7.4748	2.9622	13.6595
	1.6448	4.7727	4.7680	6.9567 **
Log Experience	-0.2690	4.5016	-2.4567	-3.6292
	0.9747	2.3363 *	0.7555 ***	1.9580 *

a : Stratified according to marriage status at entry.
b : Stratified according to high school completion.
c : Log of experience fails the proportionality assumption at 5 percent level.
* Significance level at 10 percent ; ** at 5 percent, *** at 1 percent.
All specifications also include controls for age at entry (only when waiting time is duration of residence), duration of residence (only when waiting time is age), marriage status at entry, schooling level, unemployment status as well as its age interaction, unemployment spell length and 1984 dummy only for Turkish immigrants.

Table 6: Estimation Results II: Savings Accumulation Framework

	AGES 18+		***AGES 18-59***	
	Baseline Hazard Specification		***Baseline Hazard Specification***	
	Duration	*Age*	*Duration*	*Age*
Time-Invariant Variables				
Age at Entry	0.0705		0.0334	
	0.0149***		0.0260	
High School	-0.0398	-0.0966	-0.1081	-0.1124
	0.1938	0.1953	0.2479	0.2447
College	0.6217	0.5212	-0.1488	0.2660
	0.3770*	0.3641	0.6659	0.4678
Greek	0.6023	0.4449		
	0.2111***	0.2431*		
Italian	-0.2674	-0.3664		
	0.2375	0.2488		
Spanish	0.9737	0.9551		
	0.2054***	0.2129***		
1984 * Turkish	1.2115	1.1104	0.5411	0.8518
	0.3428***	0.3345***	0.4053	0.3541**
Time-Varying Variables				
Income Difference	-2.0994	-2.0040	-3.2501	-1.5997
	0.4977***	0.5543***	0.9936***	1.2543
Age * Income Difference	0.0293	0.0271	0.0524	0.0186
	0.0083***	0.0094***	0.0194***	0.0255
Savings Potential	0.0947	0.0138	-0.4642	-0.3140
	0.2342	0.2965	0.3895	0.7939
Age * Savings Potential	0.0012	0.0039	0.0286	0.0186
	0.0083	0.0108	0.0153*	0.0337
Age Squared * Savings Potential	0.0000	-0.0001	-0.0004	-0.0002
	0.0001	0.0001	0.0002**	0.0004
Qualified to Retire	0.8600	0.1911		
	0.2694***	0.3539		
Greek * Qualified to Retire		0.4394		
		0.3371		
Years Qualified	-0.1406	-0.0426		
	0.0775*	0.1053		
Years of Residence		-0.2378		-0.1354
		0.0514***		0.0801*
Years of Residence Squared		0.0038		0.0011
		0.0011***		0.0022
Unemployed			1.4687	3.2363
			1.4120	1.6332**
Age * Unemployed			-0.0085	-0.0454
			0.0300	0.0341
Unemployment Spell Length			-0.5300	-0.6353
			0.2133**	0.2654**
Log likelihood				
w/ year dummies	-996.6	-931.9	-461.5	-442.5
w/ all covariates	-929.8	-895.0	-432.6	-418.9
LR Statistic	133.6	73.9	57.8	47.2
Number of Covariates	14	16	12	13
Number of Subjects	824		794	
Number of Failures	215		140	
Time at Risk	7279		6226	

Time dummies are included in all regressions. Ages 18+ sample is stratified according to marriage status at entry; ages 18-59 sample is stratified according to both marriage status at entry and country of origin. "Qualified to Retire" is interacted with Greek dummy in the second column because otherwise the proportionality assumption for Greek fails at 5 percent level. Significance at 10 percent level (*), at 5 percent level (**), at 1 percent level (***).

Table 7: Joint Significance of Time-Varying Variables

	Baseline Hazard Specification			Baseline Hazard Specification		
	Duration of Residence			*Age*		
	Hazard Ratio	*Coeff*	*SE*	*Hazard Ratio*	*Coeff*	*SE*
Savings Potential at PPP						
Age=20	1.106	0.1008	0.1020	1.068	0.0662	0.1242
Age=30	1.094	0.0903	0.0591	1.075	0.0726	0.0685
Age=32	1.091	0.0871	0.0524 *	1.075	0.0722	0.0599
Age=37	1.081	0.0775	0.0384 **	1.072	0.0691	0.0423
Age=38	1.078	0.0753	0.0361 **	1.070	0.0681	0.0395 *
Age=41	1.071	0.0681	0.0300 **	1.066	0.0643	0.0322 **
Age=45	1.059	0.0574	0.0238 **	1.059	0.0573	0.0254 **
Age=50	1.043	0.0419	0.0184 **	1.047	0.0456	0.0204 **
Age=53	1.032	0.0315	0.0161 **	1.038	0.0370	0.0182 **
Age=54	1.028	0.0279	0.0154 *	1.034	0.0338	0.0176 *
Age=56	1.020	0.0203	0.0143	1.028	0.0272	0.0163 *
Age=60	1.004	0.0041	0.0131	1.012	0.0122	0.0144
Age=70	0.958	-0.0428	0.0241	0.966	-0.0343	0.0261
Earnings Difference						
Age=25	0.255	-1.3679	0.2987 ***	0.265	-1.3266	0.3297 ***
Age=35	0.341	-1.0753	0.2239 ***	0.348	-1.0557	0.2449 ***
Age=45	0.457	-0.7827	0.1578 ***	0.456	-0.7847	0.1697 ***
Age=55	0.613	-0.4901	0.1163 ***	0.598	-0.5137	0.1231 ***
Age=65	0.821	-0.1975	0.1266	0.784	-0.2428	0.1231 *
Qualifed to Retire						
Years Qualified=0	2.363	0.8600	0.2694 ***	1.211	0.1911	0.3539
Years Qualified=1	2.053	0.7194	0.2802 ***	1.160	0.1484	0.3552
Years Qualified=2	1.784	0.5788	0.3105 *	1.112	0.1058	0.3863
Years Qualified=3	1.550	0.4382	0.3555	1.065	0.0632	0.4410
Years Qualified=5	1.170	0.1570	0.4714	0.978	-0.0221	0.5930
Years Qualified=10	0.579	-0.5460	0.8197	0.790	-0.2353	1.0643

* Significance at 10 percent; ** Significance at 5 percent, *** Significance at 1 percent
Savings Potential at ppp is divided by 100,000 and income difference is divided by 10,000.
When the baseline hazard specification is age, the above numbers for qualification for retirement is for non-Greek immigrants only.

Table 8: Impact of a 10 Percent Increase in German Wages on Hazard Rates

	Age at Entry = 20, Turkish		
	Income Effect	Substitution Eff.	Total Effect
Age=30	1.050	0.521	0.547
Age=35	1.072	0.560	0.601
Age=40	1.092	0.605	0.660
Age=45	1.104	0.654	0.722
Age=50	1.095	0.709	0.776
Age=55	1.066	0.775	0.826
Age=60	1.013	0.854	0.865

	Age at Entry = 20, Italian		
	Income Effect	Substitution Eff.	Total Effect
Age=30	1.024	0.521	0.533
Age=35	1.035	0.560	0.580
Age=40	1.044	0.605	0.632
Age=45	1.050	0.654	0.687
Age=50	1.046	0.709	0.741
Age=55	1.032	0.775	0.800
Age=60	1.006	0.854	0.860

.	*Age at Entry = 40, Turkish*		
	Income Effect	Substitution Eff.	Total Effect
Age=45	1.020	0.657	0.670
Age=50	1.031	0.714	0.736
Age=55	1.028	0.785	0.807
Age=60	1.006	0.865	0.871

.	*Age at Entry = 40, Italian*		
	Income Effect	Substitution Eff.	Total Effect
Age=45	1.010	0.641	0.647
Age=50	1.016	0.699	0.711
Age=55	1.015	0.775	0.787
Age=60	1.003	0.854	0.857

Table 9: Effect of Unemployment on Return Migration

	Baseline Hazard Specification			Baseline Hazard Specification		
	Duration of Residence			Age		
	Hazard Ratio	*Coeff*	*SE*	*Hazard Ratio*	*Coeff*	*SE*
Spell Length=0						
Age=20	3.667	1.2993	0.8253	10.261	2.3283	0.9618 **
Age=25	3.515	1.2570	0.6821 *	8.177	2.1013	0.7968 ***
Age=30	3.369	1.2146	0.5426 **	6.517	1.8743	0.6347 ***
Age=40	3.096	1.1300	0.2959 ***	4.139	1.4204	0.3367 ***
Age=50	2.844	1.0453	0.2459 ***	2.628	0.9664	0.2374 ***
Age=55	2.726	1.0030	0.3382 ***	2.095	0.7394	0.3393 **
Age=60	2.613	0.9606	0.4617 **	1.669	0.5124	0.4817
Spell Length=1						
Age=20	2.158	0.7693	0.9105	5.436	1.6930	1.0266 *
Age=30	1.983	0.6847	0.6274	3.452	1.2390	0.7058 *
Age=40	1.822	0.6000	0.3714	2.193	0.7851	0.4183 *
Age=45	1.747	0.5576	0.2784 **	1.747	0.5581	0.3172 *
Age=50	1.674	0.5153	0.2490 **	1.392	0.3311	0.2905
Age=55	1.605	0.4730	0.3024	1.110	0.1041	0.3555
Age=60	1.538	0.4306	0.4073	0.884	-0.1229	0.4759
Spell Length=2						
Age=20	1.270	0.2394	1.0335	2.880	1.0577	1.1504
Age=30	1.167	0.1547	0.7641	1.829	0.6037	0.8568
Age=40	1.073	0.0700	0.5285	1.162	0.1498	0.6144
Age=50	0.985	-0.0147	0.3931	0.738	-0.3042	0.5033
Age=60	0.905	-0.0993	0.4578	0.469	-0.7582	0.6015
Spell Length=3						
Age=30	0.687	-0.3753	0.9301	0.969	-0.0316	1.0541
Age=40	0.631	-0.4600	0.7153	0.615	-0.4855	0.8491
Age=50	0.580	-0.5447	0.5815	0.391	-0.9395	0.7505
Age=55	0.556	-0.5870	0.5646	0.311	-1.1665	0.7560
Age=60	0.533	-0.6293	0.5868	0.248	-1.3935	0.7988 *
Spell Length=4						
Age=30	0.404	-0.9053	1.1124	0.513	-0.6669	1.2764
Age=40	0.372	-0.9900	0.9139	0.326	-1.1208	1.0978
Age=50	0.341	-1.0746	0.7828	0.207	-1.5748	1.0070
Age=55	0.327	-1.1170	0.7543	0.165	-1.8018	1.0028 *
Age=60	0.314	-1.1593	0.7551	0.131	-2.0288	1.0273 **
Spell Length=6						
Age=30	0.140	-1.9653	1.5017	0.144	-1.9375	1.7572
Age=40	0.129	-2.0499	1.3248	0.091	-2.3914	1.6114
Age=45	0.123	-2.0923	1.2541 *	0.073	-2.6184	1.5615 *
Age=50	0.118	-2.1346	1.1980 *	0.058	-2.8454	1.5291 *
Age=55	0.113	-2.1769	1.1587 *	0.046	-3.0724	1.5153 **
Age=60	0.109	-2.2193	1.1379 *	0.037	-3.2994	1.5206 **
Spell Length=8						
Age=30	0.049	-3.0252	1.9071	0.040	-3.2081	2.2605
Age=40	0.045	-3.1099	1.7434 *	0.026	-3.6620	2.1335 *
Age=45	0.043	-3.1522	1.6757 *	0.020	-3.8890	2.0880 *
Age=50	0.041	-3.1946	1.6191 **	0.016	-4.1160	2.0557 **
Age=55	0.039	-3.2369	1.5748 **	0.013	-4.3430	2.0373 **
Age=60	0.038	-3.2793	1.5439 **	0.010	-4.5700	2.0330 **
Spell Length=10						
Age=30	0.017	-4.0852	2.3201 *	0.011	-4.4787	2.7741
Age=40	0.015	-4.1699	2.1651 *	0.007	-4.9327	2.6590 *
Age=45	0.015	-4.2122	2.0994 **	0.006	-5.1596	2.6163 **
Age=50	0.014	-4.2545	2.0426 **	0.005	-5.3866	2.5841 **
Age=55	0.014	-4.2969	1.9955 **	0.004	-5.6136	2.5629 **
Age=60	0.013	-4.3392	1.9587 **	0.003	-5.8406	2.5529 **

Table 10: Distribution of the Length of Unemployment Spells

Length of Unemployment Spell (Years)	*Percent*	*Cumulative*
0	42.49	42.49
1	21.68	64.16
2	14.31	78.47
3	8.38	86.85
4	5.78	92.63
5	3.18	95.81
6	1.73	97.54
7	1.16	98.70
8	0.29	98.99
9	0.14	99.13
10	0.14	99.28
11	0.14	99.42
12	0.14	99.57
13	0.14	99.71
14	0.14	99.86
15	0.14	100.00

Figure 1: Purchasing Power Parity with Germany

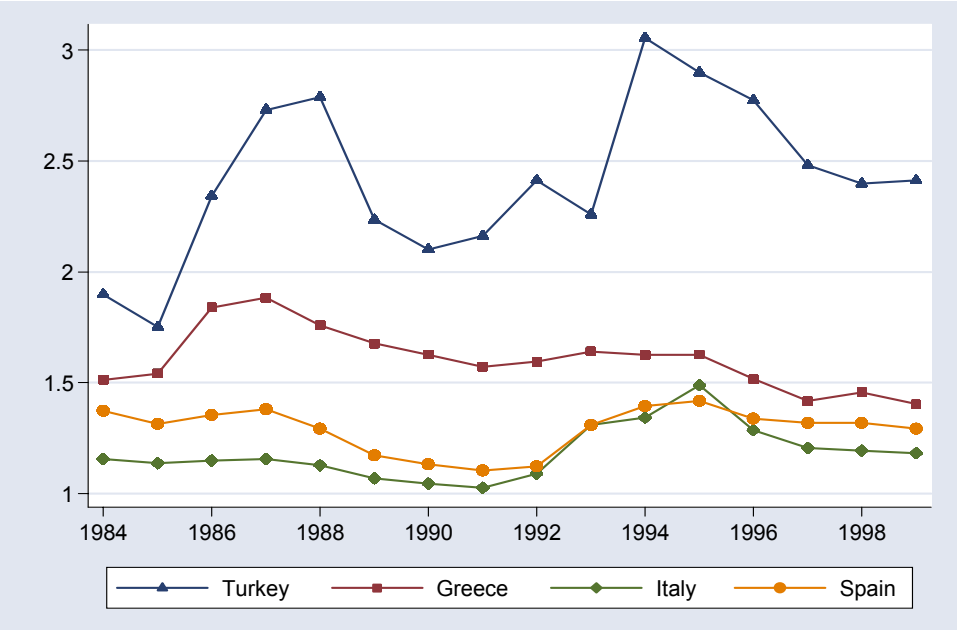

Figure 2: Expected Wage in Manufacturing as a Fraction of German Expected Wage (at PPP)

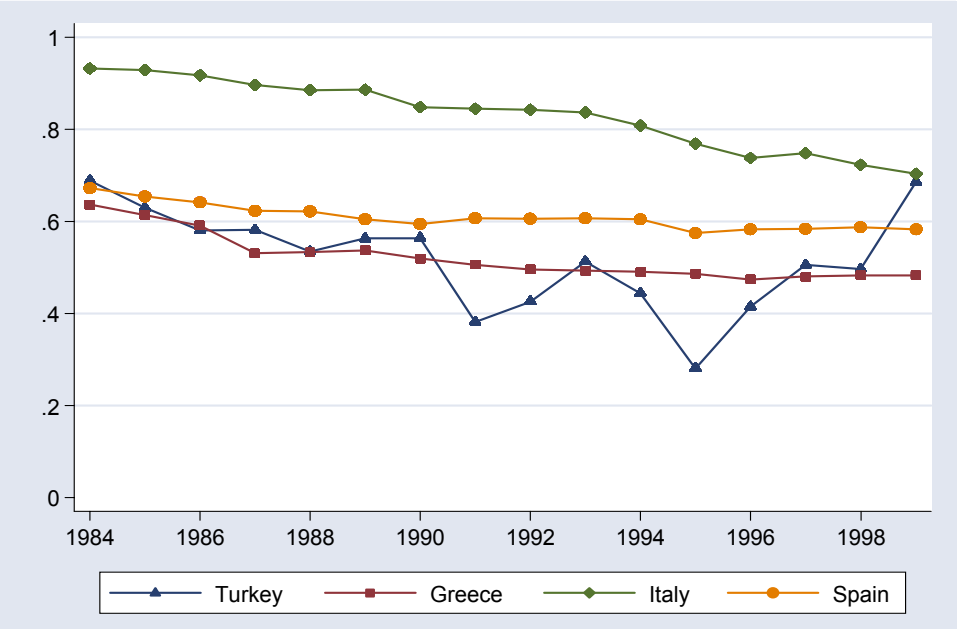

Figure 3: Baseline Hazard Function (Waiting Time: Duration of Residence)

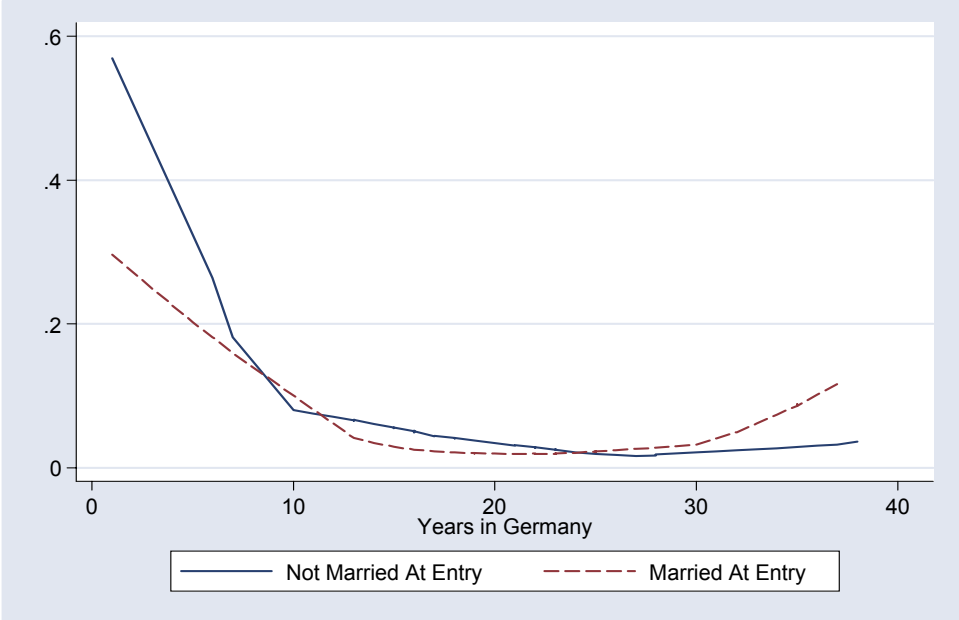

Figure 4: Baseline Hazard Function (Waiting Time: Age)