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Abstract

How does saving behavior of immigrants respond to changes in purchasing power parity between the source and host countries? We examine this question by building a theoretical model of joint return-migration and saving decisions of temporary migrants and then test its implications by using data from the German Socioeconomic Panel on immigrants from 92 source countries. As implied by our theoretical model, we find that the saving rate increases in the nominal exchange rate but decreases in the source-country price level and that the absolute magnitude of both relationships increases as the time to retirement becomes shorter. At the median level of years to retirement, the absolute values of the elasticity of savings with respect to the nominal exchange rate and with respect to the source-country price level are both close to unity. Moreover, as we gradually restrict the sample to individuals with stronger return intentions, the estimated magnitudes become larger and their statistical significance higher.

Key Words : Migrants' Savings, Return Migration, Exchange Rates, Prices, PPP

JEL Classification : F22, J61

1 Introduction

How much to save while working abroad is an important decision facing a temporary migrant. Savings repatriated to the home country are key to an immigrant household's long-term welfare improvement: they have a direct impact on the household's capacity to accumulate human capital, undertake entrepreneurship, acquire land and upgrade the efficiency of its agricultural activities, improve the quality of its housing and the stock of durables, as well as to support consumption over an extended period of time after return.[1] At the macro level, the World Bank (2014) estimates that diaspora savings in 2012 amounted to a total of $511 billion for the developing countries or 2.3 percent of their GDP. In the case of low-income countries, the share of migrants' savings in GDP in 2012 is around 9.3 percent and it is even higher for Fragile and Conflict Affected States. The estimated diaspora savings in developing countries tend to be in the range of .3 to .7 times as large as domestic savings (Ratha and Mohapatra, 2011). Thus savings repatriated by migrants and channeled through financial institutions in their local communities can serve as an important source of funding for other, liquidity-constrained households and enterprizes, lowering a major obstacle to growth and development.

Given the significant role of repatriated savings in contributing to an improvement of household welfare at the micro level and development prospects of the source country at the macro level, it is important to understand the various factors that shape the saving decisions of temporary migrants. In this study we examine theoretically and empirically how unanticipated shocks to purchasing power parity (PPP) relationship between the host and the source country affect migrants' saving behavior. PPP is a key element influencing decisions of individuals whose consumption spans two very different economies over a planning horizon. It is also a variable that often exhibits large fluctuations over relatively short periods of time. For instance, PPP between the US and Mexico increased by 52 percent from 1981 to 1982, by 41 percent

[1] See, for example, McCormick and Wahba (2001), Dustmann and Kirchkamp (2002), Mesnard (2004), Osili (2005), Djajić (2010), Demurger and Xu (2011), Wahba and Zenou (2012), Djajić and Vinogradova (2015), and Qian et al. (2016). See also Jones and Pardthaisong (1999) and Sobieszczyk (2000) for the consumption and investment behavior of temporary Thai migrants after return to their villages. In the case of Philippines, Go *et al* (1983) report that migrant households possessed many more household conveniences and consumer durables, such that they enjoyed a standard of living, as measured by the composite index of socioeconomic status, that was 2.5 times higher than that of non-migrant households.

from 1994 to 1995, and by 22 percent from 2008 to 2009, while PPP between Germany and Turkey increased by 41 percent from 1979 to 1980, by 36 percent from 1993 to 1994 and by 27 percent from 2000 to 2001.

The focus of our theoretical model is on the responsiveness of a temporary migrant's saving rate to changes in the exchange rate and the price level back home. More specifically, we consider the impact of an unanticipated shock in these price variables, as well as its timing, on a migrant's saving behavior in two distinct cases. In one case a migrant finds it optimal to return to the home country *before* the age of retirement and to continue working at home, while also consuming the savings accumulated abroad. We refer to this as an interior solution from the perspective of a temporary migrant's optimal timing of return. The other case is the corner solution, where a migrant returns to the home country *only for the purpose of retiring* and enjoying consumption at a relatively lower cost than abroad.

When an interior solution is optimal, we find that a migrant's saving rate abroad declines with an increase in the source-country price level, but is ambiguously affected by an increase in the exchange rate. If source-country inflation drives prices and the exchange rate up in the same proportion, the net effect on the saving rate is negative, while the magnitude of this decline is unaffected by the timing of the price shock within a migrant's period of residence abroad. These results are somewhat different from the ones we obtain when a migrant finds it optimal to choose the corner solution for the timing of return. We find once again that her saving rate decreases with a rise in the price level of the source country, but now her saving rate unambiguously increases in response to a nominal depreciation of domestic currency under the realistic assumption that the degree of concavity of her utility function is less than unity. Interestingly, unlike in the case of an interior solution, this increase in the saving rate is found to be larger, the shorter the period of time between the realization of the price shock and the migrant's retirement date (which in this case coincides with her return date). Moreover, when the price level and the exchange rate increase in the same proportion, the saving rate decreases. For a given increase in the nominal exchange rate, the decrease in the saving rate is larger the stronger is the *real* appreciation of domestic currency. Such real currency appreciation – i.e., decline in purchasing power parity (PPP) – has indeed been experienced over time by the principal source countries of migration in our data set.

We test the implications of our theoretical model using data from the German Socioeconomic Panel (GSOEP) for 2013.[2] This includes annual data on immigrants' monthly savings in the host country from 1992 to 2013, as well as a rich set of information on immigrants' individual-level characteristics. We combine this information on immigrants from 92 different source countries with their source-country-level characteristics. A particularly helpful feature of the GSOEP, from the perspective of this study, is that it also includes annual data on immigrants' return intentions. This allows us to test how the intensity of return intentions influences the way changes in the exchange rate and the price levels affect migrants' saving decisions.

The data on return intentions indicate that the majority of immigrants do in fact intend to return at or around the age of retirement. The theoretical framework that is most relevant for testing is therefore the one focusing on the corner solution. The empirical evidence is strongly supportive of the implications of this model. We find that saving increases in the nominal exchange rate but decreases in the source-country price level. A 10-percent increase in the nominal exchange rate (appreciation of the Euro against the source-country currency) brings about an 8.3-percent increase in saving, whereas a 10-percent increase in the source-country price level causes a 7.9-percent decrease in saving. Moreover, in line with the predictions of our theoretical model, the absolute magnitude of both relationships increases as the amount of time left until a migrant's retirement becomes shorter. For instance, just before retirement, a 10-percent increase in the nominal exchange rate brings about a 17.6-percent increase in saving. Furthermore, as we gradually restrict the sample to individuals with stronger return intentions, the estimated magnitudes and their statistical significance also become gradually higher. Thus, for example, if we restrict the sample to individuals who report a return intention more than 60 percent of the time, a 10-percent increase in the nominal exchange rate leads to a 27-percent increase in saving. This is in contrast with the 8.3-percent increase that we observe for the entire sample.

The remainder of the paper is organized as follows. Section 2 reviews the literature related to our study, Section 3 develops and analyzes our theoretical model, while Section 4 describes the data used in our empirical investigation, explains our estimation strategy and presents the

[2]Data on savings of immigrants are typically available in household surveys, but the fraction of immigrants, unless oversampled, is quite low. One survey that does in fact oversample immigrant households is the German Socioeconomic Panel.

findings. Finally, Section 5 offers concluding remarks.

2 Contribution to the Literature

Our study builds on the theoretical and empirical literature which considers the role of price variables in influencing the behavior of temporary migrants. On the theoretical side, Djajić (1989) examines how wages and prices at home and abroad affect a migrant's pattern of consumption and labor supply in the two economies. Those prices, however, are assumed to remain unchanged throughout a migrant's stay abroad, an assumption used in practically all subsequent theoretical contributions to the literature on the saving behavior and return decisions of temporary immigrants.[3] By contrast, our focus in the present study is on the implications of unanticipated changes in the exchange rate or the price level at a point in time within a migrant's planning horizon when she is already in the foreign country and is in the process of accumulating savings for the purpose of financing consumption expenditures after return.

To the best of our knowledge, the existing literature, both theoretical and empirical, has not established a causal relationship between unanticipated exchange-rate or price-level shocks experienced by migrants and their *saving behavior*. There are, nonetheless, a number of studies that address other dimensions of migrants' behavior in response to unanticipated changes in the exchange rate. Two influential papers by Yang (2006, 2008) are prominent examples. His work examines the extent to which increased valuation of foreign-currency holdings experienced by Filipino migrants during the Asian financial crisis can affect remittance flows and potentially trigger investment in entrepreneurial activity back home, by enabling migrant households to overcome liquidity constraints they might face in meeting the minimum investment requirement on a project. Using the 1997 Asian financial crisis as a source of exogenous variation in the exchange rate faced by Filipino migrants in dozens of destination countries, he shows that immigrants' timing of return migration, remitting behavior, and investments in the source country are significantly affected by unanticipated changes in the exchange rate.[4]

As Yang does for the case of Filipino migrants, Kırdar (2009) finds that the real exchange rate affects return migration hazard rates of immigrants in Germany. The direction of the effect

[3] See, for example, Dustmann (2001), Djajić (2014), Djajić and Vinogradova (2015), and Vinogradova (2016).
[4] Faini (1994) is an earlier study on the relationship between exchange rate shocks and remittance flows.

in the two studies, however, is not the same, presumably due to the marked difference between the two datasets in terms of immigrants' average duration of residence in the host country. In a follow-up paper, Kırdar (2013) shows that immigrants' return intentions also respond to changes in the real exchange rate. Abarcar (2017) examines the relationship between exchange-rate shocks and return migration in the case of migrants residing in Australia. He finds that a favorable shock leads to a decline in the probability of return, providing evidence for rejecting the target-earning hypothesis and in favor of the life-cycle considerations.[5]

Two more recent papers, Nekoei (2013) and Nguyen and Duncan (2017), investigate a causal link between migrants' labor-market outcomes and real-exchange-rate shocks. As is the case with other contributions to this literature, they do not examine the implications for a migrant's saving behavior. In fact the simple income-sharing model of Nekoei (2013) is based on the assumption that migrant households consume all of their current income.[6]

Thus a key distinction between the present study and these earlier contributions is that the latter lack data on migrants' saving rates abroad. This prevents them from testing directly the relationship between unanticipated exchange-rate shocks and migrants' saving. Instead, they focus on establishing causal relationships between exchange-rate shocks and certain other dimensions of immigrants' behavior. It is also important to note that while migrants in Yang's studies are mostly short-term guest workers residing in dozens of host countries, our data set contains information on immigrants from numerous source countries with a wide range of residence durations in a single host country, Germany. Moreover, Yang's data is on remittance receipts and expenditure patterns of households left behind, while we observe actual earnings

[5] Using a structural model of return migration and saving behavior of immigrants in Germany, Kirdar (2012) also uses the variation in PPP across countries to identify the structural parameters of that model—which he uses to examine the fiscal impact of immigrants.

[6] Ngyuyen and Duncan (2017) follow Nekoei (2013) in examining the causal link between migrants' labor-market outcomes and the exchange rate in the Australian context. While the dataset in Nekoei (2013) is cross sectional, Ngyuyen and Duncan (2017) exploit the panel structure of their data, which allows them to account for time-invariant unobserved heterogeneity by using fixed-effects methods. When they do not account for time-invariant unobserved heterogeneity, they find, as Nekoei does, that immigrants reduce their labor supply in response to an appreciation of the host country's currency. Once they account for time-invariant unobserved heterogeneity, however, the evidence for the negative supply response disappears in the analysis by gender (Table 3 in their text). Moreover, economic significance is also lower for several outcomes. This result highlights the importance of accounting for unobserved heterogeneity.

outcomes and saving behavior of migrants at the destination. This allows us to examine *directly* the impact of unanticipated exchange-rate changes on their saving rates.

Within our theoretical framework, migrants make optimal saving and return-migration decisions in a dynamic setting. This enables us to derive theoretical predictions on how the saving rate can be affected under various conditions by unanticipated movements in the price variables. As our data set contains information on each migrant's age, duration of stay abroad, and intentions to return to the source country, we are able to test empirically our model's predictions on how such factors interact with changes in the exchange and/or the price level in influencing a migrant's saving rate. Our theoretical analysis also helps facilitate the choice of the most appropriate empirical specification and allows us to interpret the estimation findings in the context of the model's predictions. Moreover, the panel structure of our data allows us to account for a high degree of heterogeneity and our unique data on return intentions allow us to test some more subtle, novel implications of the theoretical model.[7]

3 Theoretical Framework

The focus of our paper is on the effects of unanticipated changes in the exchange rate and the price level back home on the saving behavior of temporary immigrant workers. Concerning the setting, one should think of immigrants who were recruited to meet labor shortages in Germany during its post-war economic boom. Although their migration was expected to be only temporary, many of these workers chose to stay for decades and even permanently as they were able to renew their residence permits and establish (or reunite with) families in the host country.

It is clear that for immigrants who intend to remain permanently in the host country, the exchange rate and the price level of the source country do not play an important role, unless they are supporting family members back home by sending remittances or plan to return periodically for the purpose of consumption on short visits. By contrast, if migration is intended to be temporary, changes in the exchange rate and the price level can have a significant impact on a migrant's saving behavior as these price variables affect the purchasing power of accumulated

[7] These data on return intentions are also used in Dustmann and Mestres (2010), which analyze the association between return intentions and migrants' savings and asset holdings.

assets as well as the optimal time profile of consumption while abroad and after return to the source country.

We see saving behavior of immigrants and the timing of return to the source country as elements of a solution to their problem of maximizing utility over a planning horizon (Djajić and Milbourne, 1988). In an environment where they are subjected to unanticipated shocks, a stay abroad that is intended to be temporary may well turn out to be permanent and vice versa. In our theoretical analysis below, we refer to temporary (resp. permanent) migrants as those who *intend* to return to their country of origin (resp. remain in the host country).[8]

3.1 A Temporary Migrant

As in the case of post-war migration to Germany, let us suppose that a migrant's work/residence permit is renewable, enabling her to choose how long to remain in the host country. A migrant's planning horizon is assumed to be from the time of arrival in the host country, defined as $t = 0$, until $t = T + R$, where T is the number of years until retirement and R is the duration of the retirement phase. There are two activities: (i) work and (ii) consumption of a standard basket of commodities and services. After retirement, consumption is assumed to be the only activity.

While working abroad, a migrant receives at time t the wage w_t^*, at home she receives the home-country wage, w_t, and faces the price level p_t^* abroad and p_t at home when consuming goods. The exchange rate, or the price of one unit of foreign in terms of domestic currency at time t, is denoted by e_t. We shall assume that the cost of consumption in the host country is

[8]The GSOEP dataset shows that 61 percent of immigrant households in Germany in 1992 indicated that they intend to return to their country of origin. Examining various studies on the return of immigrants to their home countries, Dustmann and Gorlach (2016) estimate that 10 years after arrival, about half of the original arriving cohort of immigrants in European countries return to their home country whereas about 20 percent in the group of English-speaking countries of Australia, Cananda, New Zealand, and the US return. Using rich administrative data, Bijward et al. (2014) show that more than 60% of the immigrants in the Netherlands return to their home country within 100 months since their arrival. Also using administrative data, Aydemir and Robinson (2006) calculate a return-migration rate of 35% by 20 years of residence for working-age male immigrants in Canada. Using Census and administrative data, Borjas and Bratsberg (1996) find that of the 2.6 million legal immigrants who arrived in the US between January 1, 1975 and April 1, 1980, 2.1 million were enumerated by the 1980 Census—implying a return migration rate of 17.5% within this period.

higher than it is at home (i.e., $e_t p_t^* > p_t$), that the foreign money wage is higher than the home wage (i.e., $e_t w_t^* > w_t$), and that the real wage is higher in the host country (i.e., $w_t^*/p_t^* > w_t/p_t$).

Our migrant is assumed to be a single individual, whose problem is to maximize V^M, the lifetime utility from consumption abroad and at home, by choosing the optimal consumption rate at each point in time from time 0 to $T + R$ and the optimal return date, τ. The focus of our analysis is on the problem of a migrant who intends to stay temporarily in the host country. There are two possible solutions to a *temporary* migration problem: an interior solution, in the sense that $T > \tau > 0$ and the corner solution, $\tau = T$, whereby a migrant returns to the source country only for the purpose of retiring in that location. Let us begin by considering an interior solution, leaving the analysis of the corner solution for Section 3.2.

To simplify the analysis and the algebra, we assume that the rate of time preference and the rates of interest at home and abroad are equal to zero.[9] Thus the objective is to maximize

$$V^M = \int_0^{\tau} u(c_t^*)dt + \int_{\tau}^{T+R} u(c_t)dt, \tag{1}$$

where c_t^* and c_t are the time-t rates of consumption abroad and after return to the source country, respectively.

While abroad, a migrant saves in order to accumulate assets that later serve to support her consumption in the home country after return at time τ. Assuming that the wage rates at home and abroad are constant, the stock of assets held abroad evolves over time according to the following differential equation: $\dot{A}_t^* = w^* - p_t^* c_t^*$, where a dot over a variable indicates a time derivative. The stock of savings accumulated by the migrant in the form of foreign currency until the time of return is given by

$$A_{\tau}^* = A_0^* + \int_0^{\tau} (w^* - p_t^* c_t^*)dt, \tag{2}$$

where A_0^* is the initial stock of assets, net of migration costs, assumed to be held in the form of foreign currency.[10]

[9] The role of interest differentials across countries and discrepancies between the rates of interest and the rate of time preference in influencing saving decisions of temporary migrants and the optimal timing of their return to the source country is examined by Djajić (2010). See also Djajić (2014a, 2014b), Djajić and Vinogradova (2016) and Vinogradova (2016).

[10] The case in which savings are continuously remitted to the source country and held in the form of domestic

Let us suppose that the exchange rate and the price levels in both countries are constant over time, unless a shock occurs causing a change in one or more of these variables. The initial values of variables are denoted by the subscript 0, while the post-disturbance values have the subscript 1. We assume that a shock to the exchange rate or a price level is unanticipated by a migrant and that she has static expectations (i.e. any given change in the exchange rate or either of the price levels is expected to be permanent).

Objective function (1) is maximized subject to the constraint that the value of savings accumulated abroad in the form of foreign currency until time τ is equal to the excess of consumption over wage earnings and retirement benefits after return.

$$e_0 A^*_\tau = -\int_\tau^T (w - p_0 c_t)dt - \int_T^{T+R} (e_0 b - p_0 c_t)dt, \tag{3}$$

where b is the foreign-currency-denominated flow of retirement benefits enjoyed by a migrant in the source country on the basis of her pension plan abroad.[11] Let us suppose that, as in the case of a migrant who worked in Germany, b is a fraction of the foreign wage and is increasing in the number of years spent working abroad. For simplicity, we assume that $b = \alpha\tau w^*$, where α is a constant and $\alpha\tau < 1$. The budget constraint on the basis of which a migrant makes her decisions at $t = 0$ concerning the optimal consumption path and the return date, τ, can then be written as follows:

$$e_0 \left[A^*_0 + \int_0^\tau (w^* - p^*_0 c^*_t)dt \right] = -\int_\tau^T (w - p_0 c_t)dt - \int_T^{T+R} [e_0 \alpha\tau w^* - p_0 c_t]dt, \tag{4}$$

currency is examined in the Appendix, where we show that the results regarding a migrant's saving behavior are qualitatively the same as under the assumption that the savings are held in the form of foreign currency. Our GSOEP data set shows that the average immigrant household in Germany in 1992 remitted 2,313 Euros, whereas it saved 4,880 Euros. Given that 61 percent of these households signaled an intention to return to their home country, these figures suggest that migrants' savings repatriated at the point of return to the source country may well exceed the total amount of remittances that was sent home. In fact, of the 2,313 Euros that were remitted on average by a migrant household in 1992, only 325 Euros were remitted under the category of "savings". This indicates that, for the most part, migrants in Germany hold their savings in Germany.

[11] We assume here that the pension benefits earned on the basis of employment in the source country are negligible in relation to the retirement benefits earned abroad, so they can be neglected in the analysis that follows.

Defining the Lagrangian associated with a migrant's maximization problem as

$$L = \int_0^{\tau} u(c_t^*)dt + \int_{\tau}^{T+R} u(c_t)dt + \\ +\lambda\left\{e_0 A_0^* + e_0\int_0^{\tau}(w^* - p_0^* c_t^*)dt + \int_{\tau}^{T}(w - p_0 c_t)dt + \int_T^{T+R}\left[e_0\alpha\tau w^* - p_0 c_t\right]dt\right\},$$

the first order conditions are

$$\frac{\partial L}{\partial c_t^*} = u'(c_t^*) - \lambda e_0 p_0^* = 0, \tag{5}$$

$$\frac{\partial L}{\partial c_t} = u'(c_t) - \lambda p_0 = 0, \tag{6}$$

$$\frac{\partial L}{\partial \tau} = u(c_\tau^*) - u(c_\tau) + \lambda[e_0(w^* - p_0^* c_\tau^*) - (w - p_0 c_\tau) + Re_0\alpha w^*] = 0 \tag{7}$$

and the budget constraint (4). These four equations enable us to solve for c_t, c_t^*, τ and the Lagrange multiplier, λ, as functions of the the exogenous variables affecting a migrant's behavior.

Since $u'(c_t^*)$ and $u'(c_t)$ are constant in eqs. (5) and (6), the corresponding rates of consumption are also constant at c_0^* and c_0, respectively. Having assumed that the price of the standard consumption basket is relatively higher abroad, eqs. (5) and (6) imply that when a migrant returns to the source country at $t = \tau$, her consumption jumps to a higher rate, while $u'(c_0)/p_0 = u'(c_0^*)/e_0 p_0^*$, so that the marginal utility per unit of a given currency spent on consumption is the same over the two phases of the planning horizon. To be able to derive explicit solutions in what follows, let us assume that the utility function takes the CRRA form $u(x) = \frac{x^{1-\theta}}{1-\theta}$, where θ is a measure of the degree of concavity of the utility function. In line with the available empirical evidence, our focus in what follows will be on the case of $0 < \theta < 1$.[12] Using (5) and (6), we can write

$$c_0 = c_0^*\left(\frac{e_0 p_0^*}{p_0}\right)^{1/\theta} = c_0^*\Pi_0^{1/\theta} > c_0^*, \tag{8}$$

where $\Pi_0 = \frac{e_0 p_0^*}{p_0}$ defines the PPP relationship at the beginning of the planning horizon.

[12]Estimates of θ vary significantly, depending on the data used and the empirical strategy. Chetty (2006) examines some of the factors that explain this wide range of estimates. He reports that the mean estimate in the literature is $\theta = 0.71$, while noting that studies which combine the benefits of exogenous variation with the structural lifecycle approach, such as Blundell, Duncan, and Meghir (1998), with its estimate of $\theta = 0.93$, provide perhaps the most credible microeconomic estimates. Rendon and Cuecuecha (2010) provide an estimate of $\theta = 0.56$ in the context of temporary migration from Mexico to the US.

With the aid of (8), eq. (7) can be solved for c_0^* as a function of wages and prices that a migrant faces in the two economies and the degree of concavity of her utility function.

$$c_0^* = \left(\frac{1-\theta}{\theta}\right) \frac{e_0 w^*(1+\alpha R) - w}{p_0 \left(\Pi_0^{1/\theta} - \Pi_0\right)}. \tag{9}$$

Note that when a migrant's pension is increasing in the number of years of employment in the foreign country (i.e., $\alpha > 0$), the benefit of staying for an additional unit of time abroad also increases, as can be seen in eq. (7). This implies a higher optimal consumption rate abroad in eq. (9) and a correspondingly lower saving rate in comparison with the case where the relationship between the duration of stay abroad and the magnitude of retirement benefits is not taken into account (see Djajić and Milbourne, 1988). Also note that in the case where an interior solution is optimal (i.e., $\tau < T$), initial asset holdings do not affect a migrant's optimal consumption rates in the two economies. As we shall see just below, asset holdings influence only the optimal duration of stay abroad.

Using (8), we can also write the budget constraint (4) as

$$e_0 A_0^* + \tau e_0 (w^* - p_0^* c_0^*) + (T-\tau)\left(w - p_0 c_0^* \Pi_0^{1/\theta}\right) + R\left[e_0 \alpha \tau w^* - p_0 c_0^* \Pi_0^{1/\theta}\right] = 0, \tag{10}$$

which yields the solution for τ as a function of the consumption rate abroad and the parameters of the model, including the initial stock of assets, A_0:

$$\tau = \frac{p_0 c_0^* \Pi_0^{1/\theta}(T+R) - Tw - e_0 A_0^*}{e_0(w^* - p_0^* c_0^*) - \left(w - p_0 c_0^* \Pi_0^{1/\theta}\right) + R e_0 \alpha w^*}. \tag{11}$$

We restrict the parameters to the range which ensures that $\tau \in (0, T)$. It then simply remains to introduce the optimal c_0^* from eq. (9) into (11) to determine the value of τ that is just sufficient to enable the migrant to cover the cost of her optimal consumption program.

3.1.1 An Unanticipated Change in PPP

Our objective is to study the impact of an unanticipated change in the purchasing-power-parity relationship between the two countries on a migrant's pattern of consumption and asset accumulation.[13] In conducting our investigation, we assume that at $t = \phi < \tau$, (i.e., while the

[13] As Yang (2006) is the first to analyze the impact of an unanticipated exchange-rate shock on a migrant's behavior, it may be useful to some readers if we compare at this point the purpose of our model and that of the

migrant is still working abroad), there is an unanticipated change in the exchange rate and/or one of the price levels that alters the PPP relationship. We then examine how this affects the migrant's optimal consumption profile and the implied rate of asset accumulation.

Not expecting any change in the exchange rate or price levels, a migrant follows her optimal consumption path characterized by eq. (9) and plans to return to the source country at $t = \tau$, as given in eq. (11). By the time an unanticipated change in the PPP relationship occurs at time ϕ, a migrant will have accumulated $\phi(w^* - p_0^* c_0^*)$ units of foreign currency. The problem at $t = \phi$, when the shock to PPP is realized, is to recalculate the optimal consumption program from time ϕ to $T + R$ and the optimal return date, given her asset holdings at that moment.

As can be seen in eq. (9), the stock of assets held by a migrant and the amount of time remaining within the planning horizon do not affect the optimal consumption rate c_0^*.[14] We can then determine the impact of an unanticipated change in e, p, or p^* on saving and consumption rates abroad by simply differentiating (9) with respect to the relevant price variable. We also consider the implications of an unanticipated change in w, as the wage in the source country

one presented in the Theory Appendix of Yang (2006). While we are concerned with a migrant's time profile of consumption and saving in the host country, Yang's focus is on the implications of exchange-rate shocks for the timing of return and propensity to invest in entrepreneurial activity at home. He does not analyze the consumption behavior of migrant workers or the implied saving behavior as his data set does not contain direct information on these variables, but rather on the flow of remittances and the expenditure pattern of the households left behind. In fact Yang assumes "that consumption overseas yields zero household utility: overseas work is a pure hardship and is done exclusively for the benefit of future raised consumption in the home country" (p.2 of the Theory Appendix). While this is a plausible assumption when modeling the behavior of Filipino guest workers on relatively short-term contracts, our framework pertains to foreign workers in Germany, most of whom returned to their source country only after decades of work abroad. Moreover, as we have data on their saving rates, it is essential for us to consider explicitly their optimal time profile of consumption. Another important difference is that Yang has prices of consumption goods normalized to unity while we consider explicitly the effects of changes in p and p^*. Moreover, in contrast with Yang (2006), the effects of an exchange-rate shock on the optimal migration duration is not our main focus and we therefore relegate derivations and discussion of that behavior to the appendix.

[14]Note that our focus is on an environment in which the migrant chooses an interior solution for τ. In that case initial asset holdings affect the optimal return date, but not the optimal rates of consumption, which are determined by conditions (5)-(7). By contrast, asset holdings will clearly have an effect on c^* when we consider parameters of the model for which the migrant chooses to return to the source country for the purpose of retirement (i.e., $\tau = T$). We examine that case in the next section.

may change along with the price level and the exchange rate if the economy is experiencing inflation that puts upward pressure on both prices and wages. Thus the proportional change in consumption expenditures abroad for a given percentage change in each of the relevant price variables can be written as follows:

$$\frac{d(p_0^* c_0^*)}{de_0}\frac{e_0}{p_0^* c_0^*} = \frac{w}{ew^*(1+R\alpha)-w} - \left(\frac{1-\theta}{\theta}\right)\frac{\Pi_0^{1/\theta-1}}{\Pi_0^{1/\theta-1}-1}, \tag{12}$$

$$\frac{d(p_0^* c_0^*)}{dp_0^*}\frac{p_0^*}{p_0^* c_0^*} = 1 - \frac{\frac{1}{\theta}\Pi_0^{1/\theta-1}-1}{\Pi_0^{1/\theta-1}-1} \gtrless 0 \Leftrightarrow \theta \gtrless 1, \tag{13}$$

$$\frac{d(p_0^* c_0^*)}{dp_0}\frac{p_0}{p_0^* c_0^*} = \left(\frac{1-\theta}{\theta}\right)\frac{\Pi_0^{1/\theta-1}}{\Pi_0^{1/\theta-1}-1} \gtrless 0 \Leftrightarrow \theta \lesseqgtr 1, \tag{14}$$

$$\frac{d(p_0^* c_0^*)}{dw}\frac{w}{p_0^* c_0^*} = -\frac{w}{ew^*(1+R\alpha)-w} < 0, \tag{15}$$

These results concerning a migrant's nominal consumption spending abroad imply that her saving rate declines with an increase in p, but increases with an increase in p^* in the empirically relevant range of $\theta < 1$. In addition, it is ambiguously affected by an increase in the exchange rate and increases with an increase in w. In the special case where source-country inflation drives p and e up in the same proportion, it can be ascertained by adding the results from eqs. (12) and (14) that the net effect on $p^* c^*$ is positive (on the saving rate negative) and even more so if the increase in p is greater than a given increase in e. As we shall see in the empirical part of the paper, this in fact corresponds to the behavior of the exchange rate and the price level in the principal source countries of migration in our data set. We should therefore expect that in such cases of real appreciation of source-country currency the saving rate of migrants who intend to return to their home country before retirement will tend to decline. Note, in addition, that if the increase in p, e, and w is in the same proportion, leaving the PPP relationship and the real wage at home unaffected, this has no impact on a migrant's saving rate (i.e., the sum of expressions in eqs. (12), (14), and (15) is zero).

3.2 Return for Retirement Only

Conditions in the labor and goods markets at home and abroad may be such that it pays to return to the source country only at time T. This can well be the case if a worker migrates late in the planning horizon (small T) and/or if the international wage differential in favor of

the host country is sufficiently large, while the price-level differential makes it attractive for a migrant to consume at home rather than abroad over the retirement phase of the planning horizon. More specifically, a temporary migrant chooses the corner solution when the value of c^* that satisfies condition (9) and the corresponding rate of consumption after return to the source country (as given by condition (8)) are not attainable within the migrant's budget even if she decides to spend her entire working life abroad. Then she must choose a lower time profile of consumption, as dictated by conditions (5) and (6) and the budget constraint (4) (with the duration of stay abroad set at $\tau = T$).

The GSOEP dataset that we use to test the implications of our model contains annual information on intentions to return. Slightly more than one half of the migrants in our sample state at least once that they intend to return, while 31.5% do so more then 50% of the time. The dataset also includes information on the intended duration of residence in the host country. This allows us to calculate each migrant's age at the intended point of return. The distribution of the intended return age, given in Figure A1 in the Appendix, indicates that more than 77.7% of these migrants intend to return after the age of 55. This suggests that for most of the migrants in the sample, the planned return is simply for the purpose of retiring back home.[15]

When a migrant plans to return to the source country simply for the purpose of retiring at $t = T$, the optimization problem is as follows:

$$\max_{c_t, c_t^*} \int_0^T u(c_t^*)dt + \int_T^{T+R} u(c_t)dt, \tag{16}$$

subject to the budget constraint

$$e_0 \left[A_0^* + \int_0^T (w^* - p_0^* c_t^*)dt \right] = - \int_T^{T+R} (e_0 \alpha T w^* - p_t c_t)dt, \tag{17}$$

where αT is the fraction of the foreign wage that a migrant expects to receive in the form of pension benefits after having worked abroad for T years. The solution to this problem yields the constant optimal consumption rate abroad prior to any shock to the PPP relationship between the two countries:

$$c_0^* = \frac{e_0 A_0^* + T(1 + R\alpha)e_0 w^*}{T e_0 p_0^* + R p_0 \Pi_0^{1/\theta}}, \tag{18}$$

[15] Using the GSOEP dataset on actual return realizations, Kırdar (2009) and Kuhlenkasper and Steinhardt (2017) report substantially higher return-migration hazard rates around the age of retirement.

The solution for the constant consumption rate at home over the retirement phase of the planning horizon is, as in the previous section, $c_0 = c_0^* \Pi_0^{1/\theta} > c_0^*$.

If there is an unanticipated change in PPP at $t = \phi < T$, a migrant will adjust her optimal consumption rates at home and abroad in response to this change in the environment. Denoting once again the pre-disturbance values of variables by the subscript 0 and the post-disturbance values by the subscript 1, a migrant's optimal consumption rate after return to the home country is $c_1 = c_1^* \Pi_1^{1/\theta} > c_1^*$, while the optimal consumption rate abroad is the solution for c_1^* that satisfies the following budget constraint.

$$e_1[A_0^* + \phi(w^* - p_0^* c_0^*)] + (T - \phi)e_1(w^* - p_1^* c_1^*) + R[\alpha T e_1 w^* - \Pi_1^{1/\theta} p_1 c_1^*] = 0. \tag{19}$$

We thus have

$$p_1^* c_1^* = \frac{A_0^* + \phi(w^* - p_0^* c_0^*) + [T - \phi + R\alpha T]w^*}{\left(T - \phi + R\Pi_1^{1/\theta - 1}\right)}. \tag{20}$$

To examine the sensitivity of a migrant's nominal consumption expenditures abroad to unanticipated changes in the exchange rate and the price levels at time ϕ, we differentiate eq. (20) with respect to e_1, p_1^* and p_1:

$$\frac{d(p_1^* c_1^*)}{de_1}\frac{e_1}{p_1^* c_1^*} = -\frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}}{T - \phi + R\Pi_1^{1/\theta - 1}} \gtreqless 0 \Leftrightarrow \theta \gtreqless 1 \tag{21}$$

$$\frac{d(p_1^* c_1^*)}{dp_1^*}\frac{p_1^*}{p_1^* c_1^*} = -\frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}}{T - \phi + R\Pi_1^{1/\theta - 1}} \gtreqless 0 \Leftrightarrow \theta \gtreqless 1, \tag{22}$$

$$\frac{d(p_1^* c_1^*)}{dp_1}\frac{p_1}{p_1^* c_1^*} = \frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}}{T - \phi + R\Pi_1^{1/\theta - 1}} \gtreqless 0 \Leftrightarrow \theta \lesseqgtr 1. \tag{23}$$

where Π_1 refers to the PPP relationship following a shock to the corresponding variables. With the empirically relevant value of θ being less than unity, these expressions indicate that a migrant's nominal rate of consumption spending abroad, $p^* c^*$, decreases (saving rate increases) if the home currency depreciates or the foreign price level rises and increases (saving rate decreases) with an increase in the price level of the source country.

Proposition 1: *Suppose that $\theta < 1$. A migrant's saving rate abroad (i) increases in response to home-currency depreciation and to an increase in the foreign price level;(ii) decreases in response to an increase in the domestic price level.*

When e and p rise in the same proportion, the effect on p^*c^* is:

$$\frac{d(p_1^*c_1^*)}{de_1}\frac{e_1}{p_1^*c_1^*} + \frac{d(p_1^*c_1^*)}{dp_1}\frac{p_1}{p_1^*c_1^*} = 0,$$

indicating that consumption and saving remain unchanged, with the effects of proportionately equal changes in e and p completely offsetting each other. In the majority of source countries in our sample over the time period under consideration, however, $dp/p > de/e$. In such cases of real appreciation of domestic currency (i.e., decline in PPP), our model implies that it is optimal for a migrant to reduce her saving rate while abroad. Thus, given Proposition 1, we have the following corollary:

Corollary: *Suppose that $\theta < 1$. An increase in PPP has a positive impact on a migrant's saving rate abroad.*

Moreover, with all the expressions on the right of eqs. (21)-(23) being identical, except for the sign, it follows that the impact on the saving rate of a given percentage change in e, p, p^* or PPP is identical when measured in absolute value. Note, in addition, that movements in the source-country wage have no impact on p^*c^* when a migrant chooses the corner solution.

As may be seen in eqs. (21), (22), and (23), the impact on p^*c^* of any given unanticipated change in e, p or p^* depends on ϕ, the point in time along a migrant's planning horizon at which the unanticipated shock occurs. This is in contrast with our findings in the previous subsection, where the change in c^* is found to be independent of the timing of the unanticipated shock to PPP. The role of ϕ in the relationship between consumption and PPP is of particular interest if we seek to understand differences in the saving behavior among various cohorts of immigrants. To examine this relationship, we differentiate eqs. (21), (22), and (23) with respect to ϕ, which

yields:

$$\frac{d}{d\phi}\left(\frac{d(p_1^*c_1^*)}{de_1}\frac{e_1}{p_1^*c_1^*}\right) = \frac{R\left(\frac{\theta-1}{\theta}\right)\Pi_1^{1/\theta-1}}{\left[T-\phi+R\Pi_1^{1/\theta-1}\right]^2} \gtreqless 0 \Leftrightarrow \theta \gtreqless 1, \tag{24}$$

$$\frac{d}{d\phi}\left(\frac{d(p_1^*c_1^*)}{dp_1^*}\frac{p_1^*}{p_1^*c_1^*}\right) = \frac{R\left(\frac{\theta-1}{\theta}\right)\Pi_1^{1/\theta-1}}{\left[T-\phi+R\Pi_1^{1/\theta-1}\right]^2} \gtreqless 0 \Leftrightarrow \theta \gtreqless 1, \tag{25}$$

$$\frac{d}{d\phi}\left(\frac{d(p_1^*c_1^*)}{dp_1}\frac{p_1}{p_1^*c_1^*}\right) = \frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta-1}}{\left[T-\phi+R\Pi_1^{1/\theta-1}\right]^2} \gtreqless 0 \Leftrightarrow \theta \lesseqgtr 1. \tag{26}$$

The condition $\theta < 1$ is both necessary and sufficient for (24) and (25) to be negative. In that case, the decrease in the consumption spending abroad (and hence the increase in the saving rate) in response to an unanticipated increase in the exchange rate or the foreign price level is larger, the greater the value of ϕ relative to T, where T is the number of years from the time of migration to retirement. Thus the shorter the period of time between the realization of the PPP shock and a migrant's retirement date, the greater the proportional change in the consumption rate abroad and the corresponding change in the saving rate. To see the intuition behind this result, let us turn to eq. (24), which relates to the interaction between the effect on p^*c^* of a change in the exchange rate and ϕ. Note that when $\theta < 1$, reflecting a relatively high degree of intertemporal substitutability between consumption abroad and consumption at home, the increase in nominal spending at home is proportionately greater than the increase in e, for any given c^*, as indicated by eq. (8). This implies that more foreign currency is needed to cover the optimal rate of consumption over the R years of retirement after return. To support that higher rate of spending at home, the saving rate abroad has to increase and increase more, the shorter the remaining period of time before retirement (i.e., the greater is ϕ for a given T). In sum, for the empirically relevant case of $\theta < 1$, the *reduction* in a migrant's foreign consumption rate is larger, the closer is the date of the shock to the retirement (and hence return) date. Accordingly, as a result of an unanticipated increase in the exchange rate, we should expect to see a larger increase in the saving rate of those migrants who have been abroad for a relatively longer period of time, other things being equal, including a worker's age at the time of migration. The same line of reasoning can be invoked to explain eqs. (25) and (26), which state that the response of a migrant's consumption spending abroad to a change in the foreign (resp. home) price level is more negative (resp. positive), the larger is ϕ relative to T. We summarize the results in

Proposition 2: *Suppose that $\theta < 1$. The response of a migrant's saving rate to changes in the exchange rate or the price levels at home and abroad is stronger as the number of years until retirement and return migration becomes smaller.*

These findings are in sharp contrast with the presumption that an appreciation of foreign currency makes a migrant "wealthier" in the sense of increasing the purchasing power at home of the savings accumulated in the form of foreign currency, so that she can reduce her saving rate for the remainder of her stay abroad and still meet her expenditures during the retirement phase in the source country. Reasoning along these lines neglects the fact that an increase in e also creates a larger wedge between the optimal values of c and c^*, which entails an increase in the *foreign-currency value* of the savings needed to support the optimal consumption rate for the R years of retirement after return. Hence the shorter the time period $T - \phi$ over which these additional savings can possibly be accumulated abroad, the larger must be the drop in c^*.

A change in PPP can come about as a result of a change in e, p^*, p or some combination thereof. In relation to Proposition 2, we should point out that eqs. (24) - (26) imply that regardless of what combination of changes in e, p^*, and p brings about a change in PPP, the impact on a migrant's saving rate is stronger, the shorter the period of time between the realization of the shock and the expected date of return migration.

4 The Evidence

4.1 Data

The micro-level data in our empirical analysis come from the German Socio-Economic Panel (GSOEP). It is a large and nationally representative panel data of households in Germany, which includes foreigners as well as Germans. The initial wave of GSOEP in 1984 started with an oversample of foreigners in Germany from five main source countries (Turkey, ex-Yugoslavia, Greece, Italy, and Spain). Although immigrants from these countries still constitute a major part of the immigrant sample in GSOEP, there is also a large group of immigrants from about a hundred different countries of origin. We use the 2013 version of GSOEP, which includes annual data from 1984 to 2013. The dataset is very rich with respect to the socio-demographic

and economic characteristics of individuals. An important advantage of the GSOEP is that it also has low attrition (Knies and Spiess, 2007).

Since our dependent variable, monthly savings (or simply savings, hereafter), is measured at the household level, we conduct our analysis also at the household level. We proceed by extracting from all subsamples of the GSOEP those households whose head is an immigrant.[16] Our definition of an immigrant is restricted to people with migration background who arrived in Germany after age 18. We place this age restriction because, as we interpret return migration as part of optimal life-cycle decisions, the individual must have made the decision to migrate himself/herself. We include in our sample ethnic Germans who immigrated to Germany after age 18. However, we exclude households headed by Germans who lived temporarily abroad and arrived in Germany after age 18.

We also restrict the sample of source countries in line with the assumptions of our theoretical model. First, we drop immigrants from countries where PPP averages below one over the period of time covered by our data, because the principal motive for immigration of these individuals is unlikely to have been the accumulation of savings.[17] Second, since the model assumes that wages in the host country are higher than those in the source country, we drop countries where GDP per capita averages are higher than that of Germany over the same period of time. This assumes that GDP per capita is a good proxy for wages in these developed countries.[18]

In addition, we lose some households due to the missing information on the country of origin or the lack of availability of macro-level data for the country of origin. First, there are some individuals in GSOEP whose reported country of origin does not comply with UN definitions of country names (making it impossible to obtain macro-level data) or whose country of origin is unspecified.[19] Moreover, for two countries, we do not have data on macro variables for any

[16] The immigrant samples in the GSEOP are refreshed over time to sustain representability of immigrant groups. We use all immigrant households in these subsamples. See www.diw.se for further information about the sampling frame of GSOEP.

[17] These countries are Norway, Denmark, Japan, Switzerland, New Zealand, Sweden, Australia, Finland, Ireland, Great Britain, Luxembourg, France, and the Netherlands.

[18] The countries that are dropped with this restriction include Austria, USA, Australia, Canada, Ireland, Belgium, the Netherlands, and Kuwait.

[19] The former group of reported country-of-origin names include Benelux, No Nationality, Kurdistan, Palestine, Taiwan, Africa, and Eastern Europe.

year in the data window: ex-Yugoslavia and Somalia. Most of the missing observations due to the lack of information on the country of origin or missing macro-level data for the country of origin come from ex-Yugoslavian immigrants.

We put this sample of immigrant household heads into person-year format and follow them from the time they enter the data to the time they drop from the sample or until 2013. We drop person-year observations in which the household head is aged 65 or over (in accordance with the retirement age in Germany) because the theoretical model whose implications we are testing is about the saving behavior of immigrants until retirement. In addition, since the question on household savings was introduced to the survey in 1992, the sample in our analysis is restricted to the 1992-2013 period. In the question on savings, households are asked about the amount of their monthly savings, on average, for larger purchases, emergency expenses or to accumulate wealth.[20] This variable, however, is censored below at zero because households are not asked about dissaving. The other variables that come from the GSOEP include years since migration, annual household post-government income, household size, number of employed individuals in the household, and dummies for the following outcomes of household heads: employed, married, spouse abroad, child abroad, and German spouse. All values (monthly savings, household income) are normalized in 2010 Euros. Values of household income variable that are in the top 1 and bottom 1 percentiles are dropped.

While we use monthly savings as the dependent variable in our main analysis, we also use the saving rate as the dependent variable in certain robustness checks. However, there are some challenges in defining the saving rate because monthly savings divided by monthly income has in some instances values greater than one due to noise in the data. In fact, of the 11,080 observations in which saving rate is available, 60 have a saving rate greater than one. A common approach to handle this kind of outliers is to trim the lower and upper outliers as we do with household income; however, in this setting, since savings are censored below at zero, it is not possible to trim the bottom outliers. Therefore, we take the following approach to deal with the outliers in the saving rate variable. First, we generate a variable for the minimum consumption needs of households using the social assistance welfare scheme in Germany, which calculates the

[20] The exact wording of the question is as follows: "Do you usually have an amount of money left over at the end of the month that you can save for larger purchases, emergency expenses or to acquire wealth? If yes, how much?"

minimum consumption needs of households according to the household composition based on a formula.[21] Then, using the reported household income and generated minimum consumption needs, we calculate potential savings (i.e., the maximum amount of savings that each household can accumulate in a month). When the reported monthly savings are higher than the potential savings, we replace the reported savings with the potential savings. We call this final savings variable adjusted savings. The saving rate is calculated as the ratio of adjusted savings to household income.

GSOEP also includes a unique question on immigrants' willingness to return to their home countries. If an immigrant indicates an intention to return, he/she is also asked about the number of years of intended duration of residence in Germany. We utilize this information in our empirical analysis in distinguishing between immigrants who intend to return and those who do not. Using this unique information on the intention to return, we generate four subsamples of which the first one includes immigrants who report at least once an intention to return across the surveys (sample B) and the other three samples include immigrants who report an intention to return at least 20 percent of the time (sample C), at least 40 percent of the time (sample D), and at least 60 percent of the time (sample E) across the surveys.

We combine our micro-level dataset with a number of auxiliary datasets. Annual data on PPP and exchange rates for source-countries and on the consumer price index in Germany come from the World Development Indicators (WDI) database of the World Bank. We combine these three pieces of information to calculate the annual consumer price index in each source country. The last piece of data from the WDI is GDP per capita (in constant 2010 US dollars) for all source countries in the sample.

Finally, we obtain data on political violence at the country level from the MEPV dataset. This dataset includes information on both interstate conflict and societal conflict. Interstate

[21] If household income falls below this minimum consumption level, the German state makes up for the difference. In calculating this minimum consumption level, the following formula is used by the German government. A single household head receives 409 Euros per month, whereas adult couples receive 368 Euros per month each. Additionally, an amount is given per each child, depending on the age of the child, where the minimum amount is 237 Euros per month (all in 2017 prices). In order to be on the conservative side, we use the following formula in our data: 407 + (household size - 1) * 237. In accordance with the other prices in our data, we convert this value to 2010 prices.

conflict covers international violence and international warfare, whereas societal conflict covers civil violence, civil warfare, ethnic violence and ethnic warfare. Each item is given a score from 1 (lowest) to 10 (highest). We use the aggregate political violence score, which is the sum of these six items.

4.1.1 Descriptive Statistics

Table 1 provides descriptive statistics on individual-level characteristics in panel (A) and on country-level characteristics in panel (B) for the household heads in our sample. Individual-level characteristics are further divided into two panels; panel (A1) gives descriptive statistics for the 2,966 individuals in the sample whereas panel (A2) gives descriptive statistics for the 11,080 person-year observations across the panel. According to panel (A1), the mean age at arrival is about 30, and 65 percent of the household heads are male. Panel (A2) shows that positive savings are reported in 44 percent of the person-year observations, and the mean amount of the reported monthly non-negative savings is about 245 Euros. The saving rate we generate using the minimum consumption approach has a mean value of 0.084 and a maximum value of 0.886. An intention to return home is reported in only 29 percent of the person-year observations. In the panel, both the average time since migration and the average time to retirement are almost 18 years and the average age is 47. While the fraction of observations in which individuals are married is 0.8, the majority of spouses and underage children reside in Germany. In terms of country-level characteristics, panel (B) shows that the average PPP is 2.42. Before we further describe the country-level key variables of interest using graphical analysis, we examine how descriptive statistics vary across the five samples defined by immigrants' return intentions.

Table 1 about here

Table A1 in the Appendix shows how the descriptive statistics vary by return intentions using the five samples described above. Male household heads have stronger return intentions than female household heads. Whether or not immigrants make positive savings does not change with their return intentions, although the *level* of savings increases considerably with return intentions. While the average monthly savings is about 245 Euros in the full sample, it gradually increases as we place stronger restrictions on return intentions and reaches 332 Euros in sample E, which includes immigrants who report a return intention at least 60 percent of

the time. Similarly, the saving rate increases from 8 percent to 11 percent from the full sample to sample E. While the mean years to retirement is almost 18 years for sample A, it is between 15 and 16 years for all other samples. Neither household income nor the employment status of the household head depends much on return intentions; however, the total number of employed individuals in the household increases by about 10 percent from sample A to sample B. The probability of the spouse or the child being abroad also increases with return intentions.

Next, we examine how our macro-level key variables of interest evolve over time for the 10 source countries in our sample with the highest fraction of immigrants. In the Appendix, the PPP between these countries and Germany, the log exchange rate of these countries with Germany, and the log price level in these source countries are shown in Figures A2, A3, and A4, respectively. Figure A2 shows substantial shocks to PPP for some countries in certain years. For instance, the PPP between the German currency and the Turkish Lira increases from 2.68 to 3.64 from 1993 to 1994 (36 percent) with the economic crisis in Turkey, the PPP between Germany and Croatia jumps from 2.35 to 4.10 (74 percent) from 1991 to 1992 with the onset of the war in Croatia, and the PPP between Germany and Russia jumps from 3.21 to 4.52 (41 percent) from 1998 to 1999.

When we examine the exchange rate and source-country price variables, we see a significant co-movement between these variables, as expected. However, there are important divergences at certain years, as reflected in the movement of the PPP over time in Figure A2. If source country prices fully adjusted to the shocks in the exchange rate or vice versa, PPP would remain constant. This, however, is obviously not the case. For instance, the exchange rate between the Euro and the Turkish Lira increased by 90 percent from 2000 to 2001 due to the economic crisis in Turkey, whereas the PPP relationship between the two countries increased by 27 percent. Similarly, in the 1997-98 economic crisis in the Philippines, the exchange rate with Germany increased by 37 percent, while PPP rose by only 13 percent. In some cases, due to sluggish adjustment in source-country prices, the response of PPP matches more closely movements in the exchange rate. The case of the Philippines from 2002 to 2003 is one example. While the exchange rate increased by 26 percent, PPP jumped by 22 percent.

Divergence between changes in the exchange rate and the source-country price level—which represents changes in the PPP variable over time—is critical for our identification strategy.

It is also important to highlight two other notable features of our key macro-level variables of interest. First, when we compare the evolution of PPP over time for the various source countries in Figure A2, we observe an important co-movement across source countries, which presumably results from shocks in Germany that are common to all source countries. Second, both the exchange rate and source-country price level variables have visible time trends. In our estimation, it is therefore very important to account for time effects that capture the shocks in Germany that are common for immigrants from all source countries.

4.2 Empirical Specification and Estimation

In order to test for the implications of the theoretical model regarding the relationship between immigrants' saving behavior and the key macro-level variables (Proposition 1), we use the following empirical specification,

$$s_{i,t} = \alpha_0 + \alpha_1\ er_{i,t-1} + \alpha_2\ p^H_{i,t-1} + \mathbf{x}^{'}_{it}\ \boldsymbol{\theta} + \gamma_t + \tau_i + \varepsilon_{i,t}, \tag{27}$$

where $s_{i,t}$ is monthly savings of individual i at time t, $er_{i,t-1}$ is the exchange rate between Germany and individual i's home country at time $t-1$, $p^H_{i,t-1}$ is the price level at time $t-1$ in the home country of individual i. These variables all enter in logarithmic form; hence, we can interpret the parameters α_1 and α_2 as elasticities. $\mathbf{x}_{it}$ stands for the set of control variables for individual i at time t, γ_t stands for time dummies, τ_i captures fixed effects, and ε is the error term. According to implications of the theoretical model, we expect our key parameters of interest α_1 to be positive and α_2 to be negative. Most interviews in the GSOEP are conducted in the first half of the year. We therefore use prices of the previous year in equation (27). To test the implications of our model regarding how the effects of the key macro-level variables change by years to retirement (Proposition 2), we modify the above specification as follows,

$$\begin{aligned} s_{i,t} \;=\; & \beta_0 + \beta_1 er_{i,t-1} + \beta_2(er_{i,t-1} * ytr_{it}) + \beta_3\ p^H_{i,t-1} + \beta_4(p^H_{i,t-1} * ytr_{it}) \\ & + \beta_5\ (p^G_{t-1} * ytr_{it}) + \mathbf{x}^{'}_{it}\boldsymbol{\delta} + \gamma_t + \tau_i + \eta_{i,t}. \end{aligned} \tag{28}$$

where ytr_{it} is the number of years to retirement for individual i at time t, p^G_{t-1} is the price level in Germany at time $t-1$, and η is the error term. In accordance with our model, we expect β_1 and β_4 to be positive and β_2, β_3, and β_5 to be negative. The control variables, $\mathbf{x}$, include the key characteristics of the household and household head pertaining to their saving

behavior: household income and household size (both in logarithmic form), employment status of the household head, the number of employed individuals in the household, and dummies for married, child abroad, spouse abroad, and German spouse with reference to the household head, in addition to dummies for the duration of residence of the household head in Germany.[22] While we cannot identify the effect of the price level in Germany, which varies only over time (and we have time dummies in equation (27)), the interaction term of the price level in Germany with time to retirement, which varies both over time and over individuals, can be identified in equation (28).

A potential specification concern in equation (27) is that our key macro-level variables could partly stand for other macro-level variables such as GDP per capita or political conflict status that may also affect the saving rate. For instance, if there is an economic crisis in Turkey, not only would the exchange rate and prices in Turkey change, but family members of a migrant back in Turkey may also demand more remittances due to their lower income, which would possibly come at the expense of a migrant's savings. Similarly, unexpected political instability in Turkey may not only influence economic conditions and therefore the exchange rate with the Euro, but also an immigrant household's return plans and therefore its saving behavior. Accordingly, control variables in X also include per-capita GDP in the source countries (in logarithmic form) as well as an index of political conflict.

Macro-level shocks in Germany could also be confounding the effects of our key macro variables in equation (27). Suppose that a negative economic shock changes the way natives perceive immigrants in Germany. This in turn may affect immigrants' propensity to return to their home country and their saving behavior in addition to having a direct influence on the exchange rate and prices in Germany. To account for these types of shocks, we include calendar year dummies, which are common for immigrants from different countries and serve to capture the effect of macro-level shocks in Germany.

We estimate equations (27) and (28) using different panel data estimation methods. In order to account for the censored nature of the savings variable, we use Tobit models. Since

[22] We divide the frequency distribution of the duration of residence variable into 8 equal parts. The resulting dummy variables are for the following ranges of the duration of residence variable: 7-9, 10-13, 13-17, 18-21, 22-26, 27-31, 32+.

unconditional fixed-effects Tobit models are biased (due to the so-called incidental parameters problem), we use the semiparametric estimator for fixed-effects Tobit models developed by Honore (1992). This is our preferred Tobit estimation method because it eliminates time-invariant unobserved heterogeneity. We also use Tobit random-effects model and Mundlak-Chamberlain approach to check the robustness of our findings.

Propositions one and two of the theoretical model are derived under the assumption that immigrants return at the time of retirement. We would therefore expect them to be more relevant for immigrants who in fact intend to return. We run our estimations on the full sample as well as the four subsamples defined by return intentions, explained in the Data Section, to determine whether the evidence in support of Propositions 1 and 2 becomes stronger as we gradually tighten the restriction on return intention.

4.3 Empirical Findings

We begin our empirical analysis by presenting in Figure 1 the raw relationships between immigrants' monthly savings and our key price variables of interest—the exchange rate, the source-country price level, and PPP—after controlling for source-country and time dummies. The raw relationships suggest that the exchange rate is positively and the source-country price level is negatively associated with immigrants' savings. These initial results are in line with Proposition 1 of our theoretical model. Furthermore, the raw relationships indicate a positive relationship between PPP and savings, which is also consistent with Proposition 1. We now present results from our econometric models which are conditional on the full set of control variables and individual fixed-effects.

Figure 1 about here

Table 2 presents the main estimation results in two panels; panel (A) shows the effects of the elements of the PPP variable—the nominal exchange rate, the source-country price level, and the host-country price level—and panel (B) shows the effect of the PPP variable. In each panel, the results are given for five separate samples: the full sample and the four subsamples defined by return intentions. For each sample, two separate regressions are presented. Proposition 1 is tested using the specification in equation (27) in the odd-numbered columns, and Proposition 2 is tested using the specification in equation (28) in the even-numbered columns.

As can be seen in all odd-numbered columns in panel (A) of Table 2, the estimates confirm Proposition 1: monthly savings increase in the exchange rate and decrease in the source-country price level. While the coefficients are statistically significant for all samples, both the magnitude of coefficients and their statistical significance increase substantially as we gradually restrict the sample to individuals with stronger return intentions from sample (A) to sample (E). Quantitatively, the elasticity of savings with respect to the exchange rate is 0.83 with the full sample. It increases to 1.64 with sample (B), exceeds 2.1 with sample (C), and exceeds 2.6 with samples (D) and (E). The magnitude of the elasticity with respect to the source-country price level is similar but has the opposite sign.

The evidence for Proposition 2 is given in the even-numbered columns in panel (A) of Table 2. The positive effect of the exchange rate and the negative effect of the source-country price level both diminish as the number of years to retirement increases. However, the interaction term of the exchange rate becomes statistically significant at the 5 percent level only with samples (D) and (E)—the samples in which immigrants have stronger return intentions—whereas the interaction term of the source-country price level is statistically significant with the full sample, as well as with samples (D) and (E). It is important to note that the interaction terms of both variables become gradually larger in magnitude as the restriction on return intention increases from column (2) to column (10).

The only part of our propositions that the data do not produce evidence for is the part of Proposition 2 with regard to how the effect of host country prices vary with years to retirement. While the coefficient estimates in the even-numbered columns in Table 2 are consistent with Proposition 2 in that the effect of *host* country prices decreases in years to retirement, the estimates are not statistically significant at the conventional levels except for that with sample (A). The lack of evidence for this variable is perhaps not surprising because there is only time variation in host country prices unlike the other two elements of PPP for which there is also cross-country variation.

Table 2 about here

As can be seen in panel (B) of Table 2, the patterns for the effect of PPP over the two specifications and five samples are very similar to those in panel (A). There is evidence for a positive effect of PPP on the saving rate with all samples. Moreover, as the degree of

the restriction on return intentions is strengthened, the coefficient estimates become larger in magnitude and statistical significance increases. Quantitatively, the elasticity of savings with respect to PPP is very similar in absolute terms to the elasticity of savings with respect to the exchange rate and with respect to the source-country price level. Our theoretical model in fact implies that the absolute value of these elasticities should be the same. In fact, formal hypothesis testing reveals that there is no evidence that the coefficients of the exchange rate and source-country price level variables in the odd-numbered columns are different for any of the five samples.

In order to understand how the effects of the exchange rate and of the source-country price level change with years to retirement, we use our estimates from Table 2 to calculate the joint effects for years to retirement ranging from 0 to 40 and display these in Table 3. With the full sample, there is evidence for a positive effect of the exchange rate and for a negative effect of the source-country price level as long as the number of years to retirement is 20 or less. At 15 years to retirement, which is 2 years below the median of 17, the absolute values of the elasticity of savings with respect to the exchange rate and with respect to the source-country price level are both close to unity. Given that the mean saving rate is about 8 percent, a 10-percent increase in the exchange rate brings about a 0.8 percentage-point increase in the saving rate. Just before retirement, the absolute value of the elasticity of savings with respect to either variable exceeds 1.75 with the full sample.

When we examine the estimates across different samples in Table 3, we observe that the evidence for Proposition 1 exists in all five samples when the number of years to retirement is 15 or less. In addition, the estimated elasticities become higher as we gradually restrict the sample based on return intentions from sample (A) to sample (E). For instance, the estimated elasticity with sample (E) at 15 years to retirement implies that a 10-percent increase in the exchange rate brings about a 27.8-percent increase in savings, which is equivalent to a 2.2 percentage-point increase in the saving rate, given its mean value of 8 percent. At the same time, the range of years to retirement for which there is evidence for Proposition 1 widens from sample (A) to sample (B). The evidence for Proposition 1 exists even at 25 years to retirement with sample (B). However, as we make even stronger restrictions on return intentions in samples (C) to (E), the range of years to retirement for which there is evidence for Proposition 1 narrows as the effect of smaller sample size starts to dominate.

Table 3 about here

Finally, we briefly discuss the findings with regard to other control variables, which are given in Table A2 in the Appendix. There is strong evidence, as expected, that savings increase in household income and decrease in household size. The estimated income elasticity of savings is quite high, with a value above three. Savings also increase in the employment status of the household head, although once the employment status of the household head is accounted for, the total number of employed individuals in the household does not have a statistically significant effect on savings. Among the other characteristics of the household head that are included in the regression, the location of children is the only variable which has a statistically significant effect: savings increase when there are children in the home country. As for the relationship between savings and the duration of residence, it seems to be hump shaped. After accounting for all other factors, savings at 7-13 years of residence are higher than they are at 0-6 years of residence. There is no evidence, however, for a difference between savings at 0-6 years of residence and savings after 13 years of residence.

4.3.1 Robustness Checks

The above findings confirm the two propositions of our theoretical model. In this section, we turn our attention to the robustness of our findings. The battery of sensitivity checks we conduct include the use of alternative sets of control variables, including country-specific time trends, the use of alternative definitions of the dependent variable, examining whether missing observations in our dependent variables cause a bias, and the use of alternative estimation methods.

Alternative Set of Controls

Table 4 shows the sensitivity of our findings to the use of alternative sets of control variables. The specifications in panel (A) include only time dummies and duration of residence dummies in addition to the key country-level variables. In panel (B), we add the country-level covariates other than the key country-level variables to the set of controls in panel (A); and in panel (C), we add only the individual-level covariates used in Table 2 to the set of controls in panel (A). The coefficient estimates in the odd-numbered columns of Table 4, used in the test of Proposition

1, are very similar to those in Table 2.[23] The estimates in all even-numbered columns of panels (A) and (B) of Table 4 provide supporting evidence for Proposition 2—regardless of the sample. However, once we include individual level covariates in panel (C) of Table 4, the evidence for Proposition 2 becomes limited to the full sample and the two samples with the strongest return intentions—which is consistent with the main findings in Table 2. We repeat the exercise in Table 4 with PPP as the key variable of interest in Table A3 in the Appendix. Again, the results vary little in comparison to those in Table 2.

Table 4 about here

In another sensitivity check with regard to the set of control variables, we add country-specific time trends to the set of control variables in Table 2. When we interpret equation (27) as a difference-in-differences framework where we compare countries over time, we are making the common-trend assumption across countries in savings. However, if there are different trends in savings across countries and the degree of trend is correlated with the change in macro-level variables, we would have a specification problem. To account for this possibility, we add country-specific time trends.[24] As can be seen in Table 5, while the estimates still provide supporting evidence for Proposition 1, both the coefficient magnitudes in absolute terms and their statistical significance are somewhat lower. The coefficient of the exchange rate variable across the five samples is roughly a quarter lower and its statistical significance is limited to sample (C). The coefficient of the source-country price level variable is also lower with samples (A) and (B), but not much different with the other samples. Moreover, its statistical significance persists in all samples (B) to (D). The results of the estimation of equation (28) show that evidence for Proposition 2 exists with samples (D) and (E) for both the exchange rate and source-country price level variables, which is in line with main findings in Table 2. In essence, our key findings hold with this demanding specification (given our modest sample size) despite lower overall statistical significance and somewhat lower coefficient estimates.

[23] The only notable difference is that statistical significance falls just below the 10 percent level with the full sample in panels (A) and (B); however, once we account for the variation in individual-level characteristics in panel (C), standard errors fall and statistical significance at the 10 percent level emerges with the full sample—as in Table 2.

[24] This specification check has been ignored by the previous literature on the link between PPP and migrants' economic behavior.

Table 5 about here

Alternative Dependent Variable

In the second set of robustness checks, we examine the robustness of our findings to the use of alternative definitions of the dependent variable. Table 6 presents the estimation results when the dependent variable is a dummy variable for positive savings.[25] Overall, the patterns in Table 6 are very similar to those in Table 2. Statistical significance is overall higher in Table 6 than it is in Table 2 in relation to the evidence for both propositions. For instance, there is evidence for Proposition 1 at least at the 5-percent level even with the full sample; and, there is evidence for Proposition 2 with sample (C) in addition to that with samples (D) and (E). Quantitatively, the results imply that a 10-percent increase in the exchange rate leads to a 0.76 percentage-point increase in the probability of a positive saving outcome with the full sample. (The baseline level of the percentage of a positive saving outcome is 44 percent.) As expected, this effect is much larger for samples restricted to individuals with stronger return intentions. A 10-percent increase in the exchange rate brings about a 1.7 percentage-point increase with sample (B) and more than a 2.3 percentage-point increase with samples (D) and (E).

Table 6 about here

In another robustness check of our findings to the definition of the savings variable, we use the saving rate as the dependent variable. The estimation results with this dependent variable, presented in Table 7, show that our key findings hold. Overall, while the statistical evidence for Proposition 1 is somewhat weaker, the statistical evidence for Proposition 2 is much stronger than that presented in Table 2. In fact, the evidence for Proposition 2 holds across all samples in Table 7. Quantitatively, with the full sample, a 10-percent increase in the exchange rate brings about a 0.56 percentage-point increase in the saving rate whereas a 10-percent increase in the source-country price level has a similar effect in the opposite direction. While the magnitudes of the coefficients increase as we move from sample (A) to (E), as in other tables, the statistical significance for Proposition 1 diminishes faster in this case and is lost with sample (E) completely.

[25] Note that the sample size is slightly higher than that in Table 2 due to a lower number of missing observations for this variable compared to the level of savings variable used in Table 2. The estimation results when the sample is kept the same as that in Table 2 are provided in Table A4 in the Appendix, where the results change only trivially.

Table 7 about here

We present the results when no correction is made for saving rate values above one in Table A5 in the Appendix. Here, the evidence becomes stronger in terms of statistical significance. Moreover, the coefficient magnitudes are larger; a 10-percent increase in the nominal exchange rate causes a 2.9 to 3.8 percentage-points increase in the saving rate according to samples (B) to (D). The facts that the estimates with the saving rate definition in Table 7 are very much in line with those in previous tables and that the estimates in Table A5 in the Appendix are much higher suggest that not accounting for the outlier values of the saving rate variable overestimates the effect.

Next, we check the robustness of our findings in Table 2 to the outlier values of the savings variable—given the finding on the sensitivity of the results to the outlier values of the saving rate variable discussed in the previous paragraph. Here, we use the adjusted savings based on the minimum consumption approach outlined earlier, which ensures that savings do not exceed household income. The estimation results given in Table A6 in the Appendix show that the results in Table 2 are not sensitive to the exclusion of the outlier values of savings—unlike the case for the saving rate variable. This finding is perhaps not a surprise as the savings variable enters in logarithmic form to the regression.

Missing Observations

In another robustness check, we examine whether the missing observations in our dependent variables cause a bias. Across the observations for which the key macro-level variables are available, the savings amount is missing in 12.2 percent, the saving decision is missing in 10.8 percent, and the return intention is missing in 18 percent. For this reason, we check whether the missing status of these variables are related to our key variables of interest. The estimation results of regressing the missing status of these variables on the key variables of interest in addition to the full set of controls in Table 2, given in Table A7 in the Appendix, show that the missing status of these variables do not depend on the key variables of interest.

Alternative Estimation Methods

In a final robustness check, we use two alternative estimation methods: the standard Tobit random effects model and a Tobit model with the Mundlak approach, which estimates a Tobit random-effects model with group-means of independent variables. The Mundlak approach first

specifies an auxiliary distribution of the unobserved individual-effects using the within means of time-variant characteristics. It then estimates a random-effects Tobit model conditional on this auxiliary distribution of heterogeneity. The time-invariant characteristics we use in the auxiliary distribution are household income and household size (both in logarithmic form), employment status of the household head, the number of employed individuals in the household, and dummies for married, child abroad, spouse abroad, and German spouse with reference to the household head. The results from the Tobit random effects model and the Mundlak approach are presented in Tables A8 and A9, respectively.

The estimates with the alternative estimation methods confirm our findings. In fact, both the coefficient estimates and their statistical significance are higher with these alternative methods. The estimates with the Mundlak approach lie in between the estimates with the Tobit random effects and the Honore Tobit fixed effects estimates, but are closer to the Tobit random effects estimates. Our finding that the fixed-effects estimates are smaller in magnitude and statistical significance is similar to the findings of Nguyen and Duncan (2017), who find that the effect of PPP on immigrants' labor market outcomes vanish once individual-level unobserved heterogeneity is accounted for. Although our estimates also diminish with the use of fixed effects, their statistical as well as economic significance persists.

4.3.2 Potential Effects via Household Income

The effects of our key variables of interest on savings could at least partially result from their effect on household income. In fact, Nekoei (2013) finds that immigrants in the US work fewer hours and earn less when the dollar appreciates. Similarly, Nguyen and Duncan (2017) find that male immigrants in Australia work fewer hours when the local currency appreciates, but not female immigrants. In this section, we examine whether household income responds to our key variables of interest. The estimation results are given in Table 8, where the set of control variables is the same as that in Table 2, except for household income (which is now the dependent variable).

With specification (1), there is no evidence that our key variables of interest affect household income for any of the five samples. When we allow the effects of our key variables of interest to vary by time to retirement with specification (2), there is once again no evidence for an effect of

these variables on household income with the full sample. However, as we restrict the sample by return intentions, there emerges an effect on household income at certain values of the number of years to retirement. The exchange rate variable has a positive effect on household income at very low values of years to retirement and a negative effect on household income at high values of years to retirement with no evidence of an effect at the median value. The effect of the home country price level is similar in terms of the pattern, but has the opposite direction.

Table 8 about here

We do not think that this evidence that our key variables of interest affect household income with specification (2) for certain samples is a serious issue with respect to the robustness of our findings. One reason is that the magnitude of the effect of the key variables of interest on household income is trivial compared to their effect on savings. With sample (E), for example, the elasticity of household income with respect to the exchange rate just before retirement is 0.167 compared to the elasticity of savings with the respect the nominal exchange rate just before retirement, which is 6.25, as can be seen in Table 2. Second, as shown previously in Table 4, when we exclude the set of individual-level covariates, including household income, our findings on the effect of the key variables of interest still hold. In fact, with this exclusion, the coefficient estimates are very similar and only the standard errors are somewhat higher, as expected. Third, even if a tiny part of the effect of the key variables on savings come through their effect on household income, we have shown in Table 7 that the key variables of interest have significant effects on the saving rate.

4.3.3 Potential Sample Selection due to Panel Attrition

A common problem in studies investigating the causal links between PPP and immigrants' behavior is sample selection due to return migration and panel attrition. This problem is less acute with panel data than with cross-section data because time-invariant unobserved characteristics that explain return migration are eliminated. Nonetheless, even with panel data, if attrition is correlated with the shocks to our key variables of interest, our estimates would be biased. To see a possible direction of the bias, suppose that a positive shock to PPP induces an immigrant, whose saving behavior is highly sensitive to a PPP shock, to return to her home country. If this immigrant were to remain in Germany, her response would contribute

to a larger estimated value of the coefficient measuring the effect of PPP on saving. Thus in this case, we would be underestimating the effect of PPP on saving behavior.

In this section, we investigate how relevant this concern is in our context by checking whether panel attrition for any reason is correlated with the key variables of interest. We define a dummy variable for panel attrition, which takes the value of zero for all years an individual is in the sample and the value of one for the first year he/she is not in the sample, and estimate equation (27) with this dummy as the dependent variable. The results of this estimation are given in Table A10 in the Appendix. Across all five samples, there is only evidence with the full sample that the nominal exchange rate affects attrition, and this evidence is only at the 10-percent statistical significance level. There is no evidence for any sample that source country prices or PPP affects attrition.

Another approach we take to assess if there is nonrandom panel attrition, we redo our main estimation in Table 2 with restrictions on duration of residence. Tables A11 to A13 in the Appendix show the estimation results where the sample is restricted using upper limits on duration of residence that are 25 years, 20 years, and 15 years, respectively. We cannot place further restrictions as the sample size becomes too small.[26] The estimates with 25 years of residence restriction, given in Table A11, are very similar to those in Table 2 both in terms of statistical significance and coefficient magnitudes. With 20 years and 15 years of residence restrictions, given in Tables A12 and A13 respectively, the general patterns hold, although the statistical significance is lower due to the lower sample size.

These findings indicate that sample selection due to panel attrition is not a serious concern in our setting. At first, this may look contradictory to the previous studies establishing a causal link between PPP and return realizations as well as intentions of immigrants in the same context (Kırdar, 2009, 2013). However, a significant fraction of attrition from the sample occurs for reasons other than return migration; and, once we take all reasons for attrition together, there remains no evidence of a link between our key variables of interest and attrition.

[26] In the full sample, 74 percent of the observations have 25 or fewer years of residence, 61 percent have 20 or fewer years of residence, and 47 percent have 15 or fewer years of residence.

4.3.4 Heterogeneity

The above estimated effects of the key variables of interest on saving behavior reflect an "average effect" for a heterogenous group of migrants. The response of migrants, however, might differ significantly with respect to their individual-level and country-level characteristics**.** For instance, migrants with stronger ties to their home country might respond more. We now turn our attention to the heterogeneity in our baseline estimates in terms of certain home country-level and individual-level covariates by generating a binary variable for each covariate using an appropriate threshold as described below. Due to the relatively small sample size, we prefer using interaction models, rather than splitting the sample based on the dummy variable and running separate regressions for either value of the dummy variable. Specifically, we use the following model,

$$\begin{aligned} s_{i,t} &= \beta_0 + \beta_1 d_{i,t} + \varphi_1 d_{i,t} * er_{i,t-1} + \varphi_2 (1 - d_{i,t}) * er_{i,t-1} \\ &\quad + \gamma_1 d_{i,t}\ p^H_{i,t-1} + \gamma_2 (1 - d_{i,t}) p^H_{i,t-1} + \mathbf{x}'_{it}\boldsymbol{\delta} + \gamma_t + \tau_i + \eta_{i,t}, \end{aligned} \tag{29}$$

where $d_{i,t}$ denotes the dummy variable we generate using an appropriate threshold for each characteristic. The heterogeneity in the exchange rate variable with respect to $d_{i,t}$ is measured by the parameters φ_1 and φ_2, and the heterogeneity in the source-country price variable is measured by the parameters γ_1 and γ_2. The remaining symbols used in equation (29) are defined as in equation (27).

The results are presented in Figure 2, for the exchange rate variable in column (1) and for the source-country price level variable in column (2). The figure presents the estimates of φ_1 and γ_1 with a circle ($d_{i,t} = 1$) and the estimates of φ_2 and γ_2 are shown with a triangle ($d_{i,t} = 0$). The vertical lines passing through zero are presented to show statistical significance and the dashed lines around the parameter estimates are 90% confidence intervals. In a separate specification, we estimate the heterogeneity in the effect of PPP using the same interaction model as above. The results are given in the final column of Figure 2.

Figure 2 presents several distinct patterns for the country-level characteristics in the upper panel and for the individual-level characteristics in the lower panel. An increase in the exchange rate (in the source-country price level) implies a larger (smaller) effect on savings among the

low-PPP countries (PPP<1.5). A similar result is obtained for richer home-countries (where GDP per capita is higher than the 75th percentile value at $11,127). On the other hand, the heterogeneity in the effects of our key variables with respect to the conflict status is much smaller. These results are all consistent with the descriptive statistics in Table A1 of the Appendix, which shows that average PPP falls and average GDP per capita increases substantially as return intentions get stronger.[27] On the other hand, the proportional change in the average conflict index from sample (A) to sample (E) is smaller.

The geographic proximity of the source country to Germany might also affect the saving responses of immigrants. It can influence return decisions via its effect on migration costs as well as the costs of remaining in contact with the community back home. However, we do not find any difference between the distant source countries (whose distance to Germany is greater than the median, 2111 km) and the proximate source countries in terms of the effects of the key variables of interest. Finally, we investigate whether the behavior of immigrants from the guestworker countries (Turkey, Greece, Italy, and Spain) differs from that of immigrants from other source countries. Immigrants from guestworker countries are indeed more responsive to changes in the exchange rate and in the source-country price level and this is perfectly consistent with the differences they exhibit in terms of their return intentions. While guestworkers indicate an intention to return in 53.8 percent of the observations, other immigrants indicate an intention to return only in 13.3 percent of the observations.

Heterogeneity in the effects for individual-level characteristics is displayed in panel (B) of Figure 2. The estimated effects are larger for men than they are for women, which we would expect, as men report an intention to return in 32 percent of the observations whereas women report such an intention in 20 percent of the observations. The estimated effects are larger for older individuals (older than 55), which is consistent with Proposition 2. The only other variables for which there is substantial heterogeneity are house-ownership status in Germany and spouse living abroad. Certainly, owning a house in Germany is intimately linked to an intention to stay and so the estimated effects are smaller. By contrast, a spouse living abroad implies a stronger intention to return and so the estimated effects are larger in magnitude.

[27] In fact, the average PPP decreases from 2.42 in sample (A) to 1.95 in sample (E) and the average GDP per capita increases from $12,458 to $17,125 from sample (A) to sample (E).

Figure 2 about here

5 Concluding Remarks

In this paper we examine how the saving behavior of temporary migrants responds to unanticipated changes in the purchasing-power-parity (PPP) relationship. We do so by first constructing a theoretical model that focuses on the optimal saving and return decisions of temporary migrants and subsequently test the model by using the data from the German Socio-economic Panel (GSOEP) for the period 1992-2013.

Within the theoretical model, we distinguish between two cases: a) an interior solution, whereby a migrant returns to the source country *prior* to the age of retirement, with the intention of continuing to participate in the labor market after return and b) a corner solution, in which case a migrant returns *at the* age of retirement only for the purpose of enjoying a more favorable environment for consumption in the home country. When an interior solution is optimal, an unanticipated increase in the price level of the source country lowers the optimal saving rate abroad for the remainder of the stay, while an appreciation of foreign in terms of source-country currency has an ambiguous effect on the saving rate. The precise timing of the shock to PPP, however, is found not to affect the saving rate but only the optimal duration of stay abroad. By contrast, when the economic conditions facing a migrant abroad and at home imply that a corner solution is optimal, an unanticipated increase in the value of foreign in terms of domestic currency or the price level abroad triggers an increase in the saving rate, while an increase in the home price level has the opposite effect. Our model also implies that any given increase in PPP should result in an increase in the saving rate of the same magnitude, regardless of whether the change in PPP stems from a change in the exchange rate or one of the price levels. Moreover, the sensitivity of the saving rate to unanticipated changes in the price level and the exchange rate is found to increase as the timing of the shock gets closer to a migrant's expected return (i.e., retirement) date.

This second case, in which migrants return to the source country at the age of retirement, turns out to be the empirically more relevant one for migrants sampled in the GSOEP over the 1992-2013 period. The focus of our empirical investigation is therefore on testing the predictions

related to the corner solution of our model. The GSOEP dataset is particularly suited for our empirical analysis because it (i) contains information on migrants' savings in the host country, (ii) oversamples immigrant households, and (iii) contains information on return intentions. The data provide strong evidence that savings increase in the exchange rate and decrease in the source-country price level. Also in line with the theoretical predictions, the positive effect of the exchange rate and the negative effect of the source-country price level both decrease as years to retirement increase. Furthermore, these relationships become stronger for immigrants with stronger return intentions.

Quantitatively, the elasticity of savings with respect to the exchange rate is 0.83 for the full sample. It increases to 1.64 for the sample of individuals who indicate an intention to return to the home country in at least one year in the data and to 2.6 for the sample of individuals who indicate a return intention at least 60 percent of the time. The elasticity with respect to the source-country price level is similar in magnitude but has the opposite sign. At the median level of years to retirement (around 17), the absolute values of the elasticity of savings with respect to the exchange rate and with respect to the source-country price level are both close to unity with the full sample. Just before retirement, however, the absolute value of the elasticity of savings is 1.75 with respect to the exchange rate and 1.89 with respect to the source-country price level.

At a more general level, this theoretical and empirical analysis of the saving behavior of temporary migrants helps contribute to our understanding of the role of international migration in the development process. In a very large number of developing countries, temporary employment abroad is a dominant mode of international migration. Temporariness in itself has important, yet subtle implications for economic behavior in a dynamic context. This is especially so with respect to savings accumulation, since both foreign and domestic economic conditions are at play. Our interest in understanding how the exchange rate and the home-country price level affect migrants' savings is based on two important observations: (a) these key price variables tend to be highly volatile in developing countries and (b) diaspora savings can be of substantial magnitude in relation to aggregate savings in countries of emigration. Thus the factors that drive the saving behavior of temporary migrants can potentially play a fundamental role in the development process of countries of emigration.

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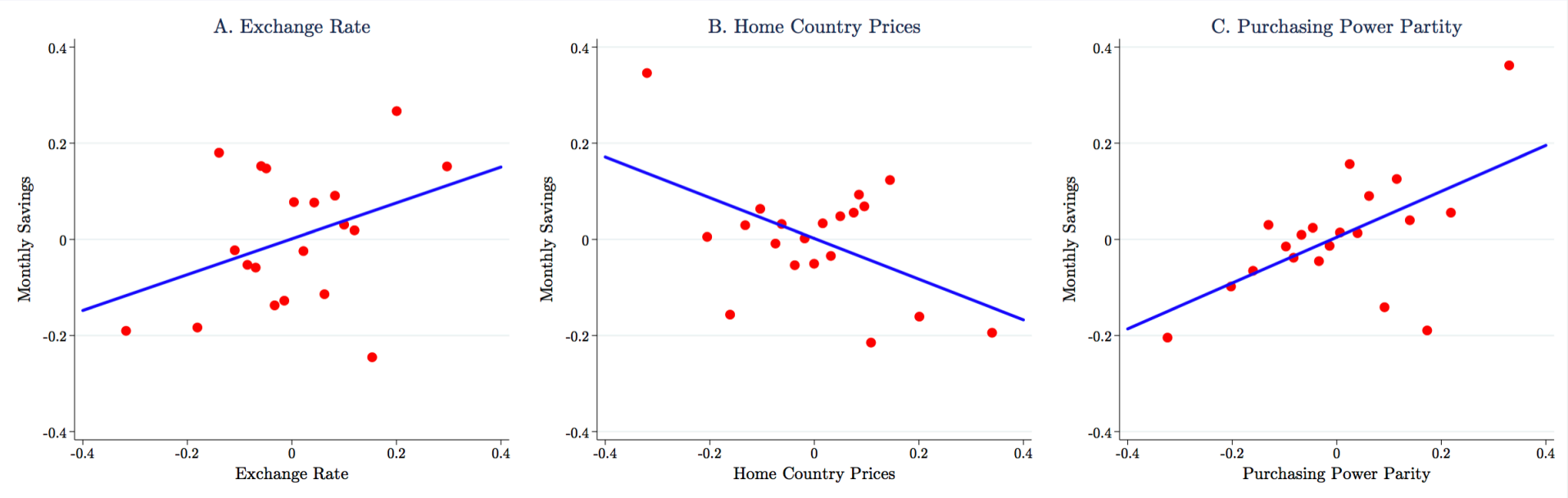
Table 1: Descriptive Statistics

	Mean	St. Dev.	Min	Max	Obs.
A) Individual-level Characteristics					
A1) Cross-Section Characteristics					
Year of Immigration	1991.90	13.36	1952	2013	2,966
Age at Arrival	30.16	8.80	18	63	2,966
Male	0.65	0.48	0	1	2,966
A2) Panel-Level Characteristics					
Positive Savings	0.44	0.50	0	1	11,080
Average Monthly Savings (Euros)	244.75	525.59	0	12245.32	11,080
Adjusted Savings (using Min. Consumption)	227.47	443.14	0	4898.13	11,080
Saving Rate (using Adjusted Savings)	0.08	0.15	0	0.89	11,080
Intend to Return	0.29	0.46	0	1	10,186
Age	47.14	10.34	20	64	11,080
Years since migration	17.89	10.22	0	46	11,080
Years to retirement	17.86	10.34	1	45	11,080
Annual Household Income (Euros)	28366.75	13934.01	4613	84081	11,080
Household Size	3.25	1.55	1	13	11,080
Employed (Household head)	0.64	0.48	0	1	11,080
Number employed in household	1.30	1.02	0	6	11,080
Married	0.80	0.40	0	1	11,080
Spouse abroad	0.01	0.11	0	1	11,080
Child abroad	0.03	0.17	0	1	11,080
Partner German	0.08	0.27	0	1	11,080
B) Country-level Characteristics					
Purchasing Power Parity	2.42	1.18	0.99	10.58	11,080
Exchange Rate	246.00	1758.70	0.00	28509.52	11,080
Price in Home Country	7746.58	56279.36	0.00	966545.60	11,080
Price in Germany	88.95	9.98	70.19	104.13	11,080
Gross Domestic Product	12458.54	9781.59	186.92	38239.06	11,080
Country Conflict Index	0.76	1.36	0	7	11,080

Notes: The sample includes immigrant household heads who arrived in Germany after age 18 in the 1992-2013 waves of the German Socioeconomic Panel. The set of origin countries of immigrants is restricted to those where ppp with Germany averages above 1 in the 1991-2012 period and where the average GDP per capita in the 1991-2012 period is lower than that in Germany. Origin countries for which key macro-variables are not available for any year in the 1991-2012 period are also excluded (most notably ex-Yugoslavia). The panel format is restricted to observations in which individuals are under the age of 65.

Figure 1: Raw Relationships: Savings, Exchange Rate, Home Country Prices, and Purchasing Power Parity



Notes: The figure shows the raw relationships between monthly savings and the key variables of interest - exchange rates, home country prices, and purchasing power parity - conditional on time and country fixed-effects. The figure in each panel is drawn by using the mean predicted monthly savings over 20 equal-sized bins of predicted exchange rates, home country prices, and purchasing power parity, respectively. OLS lines are drawn using the raw data.

Table 2: Tests of Propositions I and II by Return Intentions

	Dependent Variable: Log Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.827*	1.757**	1.641**	2.560**	2.133**	3.302**	2.604**	5.274***	2.748**	6.250***
	[0.448]	[0.747]	[0.739]	[1.176]	[0.869]	[1.345]	[1.060]	[1.673]	[1.357]	[2.027]
Log Exchange Rate * YTR		-0.049		-0.046		-0.072		-0.186**		-0.232**
		[0.030]		[0.052]		[0.059]		[0.083]		[0.096]
Log Home C. Price	-0.790*	-1.889**	-1.723**	-2.571**	-2.196***	-3.537***	-2.588**	-5.557***	-2.703**	-6.652***
	[0.430]	[0.767]	[0.719]	[1.208]	[0.842]	[1.373]	[1.031]	[1.680]	[1.319]	[2.013]
Log Home C. Price * YTR		0.055*		0.040		0.077		0.190**		0.241***
		[0.031]		[0.052]		[0.059]		[0.081]		[0.093]
Log Host C. Price * YTR		-0.530***		-0.200		-0.033		-0.059		-0.024
		[0.169]		[0.226]		[0.265]		[0.313]		[0.312]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717
B) PPP as Key Variable of Interest										
Log PPP	0.759*	1.028	1.851**	2.194*	2.280***	3.297**	2.564**	5.171***	2.639**	6.315***
	[0.430]	[0.755]	[0.722]	[1.179]	[0.836]	[1.334]	[1.033]	[1.565]	[1.317]	[1.921]
Log PPP * YTR		-0.013		-0.016		-0.052		-0.146**		-0.199**
		[0.029]		[0.048]		[0.054]		[0.068]		[0.082]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table 3: Joint Effects of Exchange Rate Variables and of Home Country Price Variables in Even-Numbered Columns in Table 2

	Full Sample (Sample A)			Return Intention at Least for One Year (Sample B)			Return Intention more than 20 Percent of the Time (Sample C)			Return Intention more than 40 Percent of the Time (Sample D)			Return Intention more than 60 Percent of the Time (Sample E)		
A) Log Exchange Rate															
YTR	Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE	
0	1.757	0.747	**	2.560	1.176	**	3.302	1.345	**	5.274	1.673	***	6.250	2.027	***
5	1.510	0.633	**	2.328	0.982	**	2.940	1.138	**	4.346	1.381	***	5.092	1.696	***
10	1.262	0.537	**	2.097	0.826	**	2.578	0.977	***	3.418	1.165	***	3.935	1.451	***
15	1.015	0.470	**	1.865	0.733	**	2.216	0.888	**	2.489	1.073	**	2.777	1.340	**
20	0.768	0.447	*	1.633	0.727	**	1.854	0.892	**	1.561	1.136		1.619	1.396	
25	0.520	0.473		1.402	0.810	*	1.492	0.989		0.633	1.331		0.462	1.601	
30	0.273	0.542		1.170	0.959		1.130	1.154		-0.295	1.612		-0.696	1.909	
35	0.026	0.640		0.938	1.150		0.768	1.364		-1.223	1.942		-1.853	2.277	
40	-0.222	0.755		0.707	1.363		0.406	1.601		-2.151	2.299		-3.011	2.681	
B) Log Home Country Price Level															
YTR	Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE	
0	-1.889	0.767	**	-2.571	1.208	**	-3.537	1.373	**	-5.557	1.680	***	-6.652	2.013	***
5	-1.615	0.644	**	-2.370	1.006	**	-3.154	1.154	***	-4.609	1.381	***	-5.448	1.681	***
10	-1.341	0.538	**	-2.168	0.837	**	-2.770	0.978	***	-3.661	1.149	***	-4.244	1.425	***
15	-1.066	0.461	**	-1.966	0.725	***	-2.386	0.868	***	-2.712	1.032	***	-3.040	1.293	**
20	-0.792	0.430	*	-1.764	0.699	**	-2.002	0.852	**	-1.764	1.068	*	-1.836	1.321	
25	-0.518	0.453		-1.563	0.766	**	-1.618	0.935	*	-0.816	1.243		-0.632	1.501	
30	-0.244	0.525		-1.361	0.906		-1.234	1.094		0.132	1.510		0.571	1.788	
35	0.030	0.628		-1.159	1.092		-0.850	1.302		1.080	1.829		1.775	2.139	
40	0.304	0.749		-0.957	1.304		-0.466	1.539		2.028	2.178		2.979	2.527	

Notes: Coefficients and standard errors give the joint estimates -- based on the estimates in even-numbered columns of Table 2 where the dependent variable is log savings -- of the exchange rate variable and its interaction with years to retirement in panel (A) and of the home country price variable and its interaction with years to migration in panel (B) at selected values of years to retirement given in row headings. YTR stands for years to retirement. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table 4: Robustness Check I-A – Shorter Lists of Control Variables

	Dependent Variable: Log Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
A) Control Variables: Time Dummies, Duration of Residence Dummies										
Log Exchange Rate	0.712	2.067**	1.414*	3.857***	1.815**	4.441***	2.507**	5.744***	2.471*	6.462***
	[0.492]	[0.877]	[0.831]	[1.335]	[0.897]	[1.495]	[1.037]	[1.751]	[1.430]	[2.245]
Log Exchange Rate * YTR		-0.067*		-0.124**		-0.159**		-0.223***		-0.269**
		[0.035]		[0.059]		[0.069]		[0.086]		[0.108]
Log Home C. Price	-0.766	-2.294**	-1.601**	-3.990***	-2.048**	-4.868***	-2.686***	-6.243***	-2.644*	-7.194***
	[0.475]	[0.909]	[0.800]	[1.391]	[0.861]	[1.543]	[0.994]	[1.773]	[1.366]	[2.230]
Log Home C. Price * YTR		0.073**		0.116*		0.162**		0.229***		0.284***
		[0.037]		[0.061]		[0.070]		[0.085]		[0.104]
Log Host C. Price * YTR		0.038		0.413		0.614**		0.511*		0.500
		[0.181]		[0.251]		[0.266]		[0.310]		[0.316]
Observations	11,453	11,453	5,586	5,586	4,760	4,760	3,856	3,856	2,888	2,888
No. of households	3021	3021	1022	1022	948	948	849	849	740	740
B) Controls in (A) + Country-level Covariates other than the Key Variables of Interest										
Log Exchange Rate	0.772	1.899**	1.846**	3.852***	2.213**	4.337***	2.725**	5.721***	2.571*	6.366***
	[0.523]	[0.880]	[0.900]	[1.333]	[0.964]	[1.454]	[1.128]	[1.763]	[1.457]	[2.217]
Log Exchange Rate * YTR		-0.062*		-0.117*		-0.149**		-0.227**		-0.268**
		[0.037]		[0.063]		[0.070]		[0.094]		[0.112]
Log Home C. Price	-0.774	-2.080**	-2.023**	-3.995***	-2.369**	-4.709***	-2.856***	-6.193***	-2.696*	-7.077***
	[0.502]	[0.914]	[0.875]	[1.387]	[0.934]	[1.500]	[1.092]	[1.786]	[1.411]	[2.198]
Log Home C. Price * YTR		0.067*		0.110*		0.152**		0.233**		0.284***
		[0.038]		[0.064]		[0.070]		[0.092]		[0.107]
Log Host C. Price * YTR		0.053		0.409		0.612**		0.501		0.489
		[0.182]		[0.251]		[0.265]		[0.310]		[0.317]
Observations	11,419	11,419	5,574	5,574	4,748	4,748	3,848	3,848	2,880	2,880
No. of households	3014	3014	1019	1019	945	945	847	847	738	738
C) Controls in (A) + Full List of Individual-level Covariates										
Log Exchange Rate	0.770*	1.877**	1.292*	2.512**	1.895**	3.291**	2.475**	5.173***	2.412*	6.367***
	[0.424]	[0.747]	[0.680]	[1.173]	[0.802]	[1.362]	[0.991]	[1.642]	[1.344]	[2.035]
Log Exchange Rate * YTR		-0.054*		-0.055		-0.077		-0.170**		-0.242***
		[0.030]		[0.049]		[0.057]		[0.073]		[0.088]
Log Home C. Price	-0.771*	-2.046***	-1.348**	-2.485**	-1.998***	-3.563**	-2.486***	-5.488***	-2.395*	-6.792***
	[0.412]	[0.767]	[0.658]	[1.203]	[0.772]	[1.389]	[0.951]	[1.642]	[1.287]	[2.016]
Log Home C. Price * YTR		0.059*		0.048		0.081		0.175**		0.250***
		[0.031]		[0.050]		[0.058]		[0.073]		[0.086]
Log Host C. Price * YTR		-0.540***		-0.193		-0.029		-0.055		-0.020
		[0.169]		[0.226]		[0.266]		[0.312]		[0.312]
Observations	11,114	11,114	5,412	5,412	4,597	4,597	3,723	3,723	2,779	2,779
No. of households	2973	2973	1001	1001	927	927	828	828	719	719

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. The full list of individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table 5: Robustness Check I-B – Country-Specific Time Trends as Additional Control Variables

	Dependent Variable: Log Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.554	0.032	1.215	1.174	1.719*	2.426	1.747	4.777***	1.805	6.163***
	[0.487]	[0.815]	[0.779]	[1.427]	[1.016]	[1.601]	[1.225]	[1.849]	[1.558]	[2.324]
Log Exchange Rate * YTR		0.024		-0.000		-0.044		-0.211**		-0.290***
		[0.035]		[0.065]		[0.074]		[0.099]		[0.107]
Log Home C. Price	-0.674	-0.697	-1.397*	-1.540	-2.000**	-2.913*	-2.517**	-5.701***	-2.750*	-7.259***
	[0.486]	[0.809]	[0.774]	[1.340]	[0.984]	[1.551]	[1.172]	[1.764]	[1.508]	[2.215]
Log Home C. Price * YTR		-0.001		0.006		0.052		0.215**		0.293***
		[0.035]		[0.060]		[0.069]		[0.092]		[0.100]
Log Host C. Price * YTR		-0.599***		-0.374		-0.290		-0.328		-0.185
		[0.181]		[0.259]		[0.295]		[0.327]		[0.349]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	3192	3192	1066	1066	992	992	892	892	782	782
B) PPP as Key Variable of Interest										
Log PPP	0.631	-0.286	1.320*	1.474	1.910*	2.889*	2.257*	5.335***	2.299	6.559***
	[0.476]	[0.778]	[0.756]	[1.302]	[0.975]	[1.500]	[1.163]	[1.753]	[1.509]	[2.177]
Log PPP * YTR		0.051		-0.009		-0.056		-0.213**		-0.281***
		[0.033]		[0.059]		[0.066]		[0.091]		[0.105]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	3192	3192	1066	1066	992	992	892	892	782	782

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include country-specific time trends, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table 6: Robustness Check II-A – Dummy Variable for Positive Savings as the Dependent Variable

Dependent Variable: Dummy Variable for Positive Savings										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.076***	0.134**	0.169***	0.236***	0.212***	0.331***	0.249***	0.456***	0.230***	0.513***
	[0.025]	[0.051]	[0.053]	[0.070]	[0.054]	[0.097]	[0.063]	[0.123]	[0.076]	[0.129]
Log Exchange Rate * YTR		-0.003		-0.003		-0.008**		-0.015***		-0.020***
		[0.002]		[0.004]		[0.004]		[0.005]		[0.006]
Log Home C. Price	-0.059**	-0.128**	-0.156***	-0.210***	-0.199***	-0.323***	-0.234***	-0.457***	-0.213***	-0.515***
	[0.027]	[0.058]	[0.049]	[0.068]	[0.049]	[0.097]	[0.062]	[0.125]	[0.078]	[0.136]
Log Home C. Price * YTR		0.004		0.003		0.008**		0.015***		0.020***
		[0.002]		[0.004]		[0.004]		[0.005]		[0.006]
Log Host C. Price * YTR		-0.034*		0.002		0.026*		0.020		0.025
		[0.019]		[0.014]		[0.015]		[0.020]		[0.017]
Observations	11,244	11,244	5,488	5,488	4,661	4,661	3,783	3,783	2,827	2,827
No. of households	0.048	0.049	0.064	0.065	0.079	0.081	0.077	0.080	0.086	0.092
B) PPP as Key Variable of Interest										
Log PPP	0.045	0.095	0.136***	0.223***	0.181***	0.347***	0.212***	0.467***	0.186**	0.512***
	[0.030]	[0.062]	[0.048]	[0.079]	[0.049]	[0.100]	[0.067]	[0.112]	[0.090]	[0.119]
Log PPP * YTR		-0.002		-0.004		-0.009***		-0.014***		-0.018***
		[0.003]		[0.003]		[0.003]		[0.003]		[0.003]
Observations	11,244	11,244	5,488	5,488	4,661	4,661	3,783	3,783	2,827	2,827
No. of households	0.047	0.048	0.064	0.064	0.079	0.080	0.076	0.079	0.086	0.090

Notes: The full sample includes all immigrant household heads who arrived in Germany after age 18 in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. OLS Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table 7: Robustness Check II-B – Saving Rate (Defined Using Minimum Consumption Needs) as the Dependent Variable

Dependent Variable: Saving Rate (Defined Using Minimum Consumption Needs)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.056*	0.155***	0.141**	0.271***	0.132*	0.273***	0.140	0.335***	0.186	0.414**
	[0.032]	[0.053]	[0.060]	[0.090]	[0.072]	[0.102]	[0.088]	[0.130]	[0.119]	[0.170]
Log Exchange Rate * YTR		-0.005**		-0.007*		-0.008**		-0.013**		-0.015**
		[0.002]		[0.004]		[0.004]		[0.006]		[0.007]
Log Home C. Price	-0.054*	-0.158***	-0.143**	-0.269***	-0.136**	-0.280***	-0.139*	-0.345***	-0.186	-0.432***
	[0.031]	[0.054]	[0.058]	[0.091]	[0.069]	[0.102]	[0.083]	[0.129]	[0.113]	[0.166]
Log Home C. Price * YTR		0.005**		0.007*		0.008**		0.013**		0.015**
		[0.002]		[0.004]		[0.004]		[0.006]		[0.007]
Log Host C. Price * YTR		-0.023**		-0.011		-0.005		-0.009		-0.004
		[0.011]		[0.016]		[0.018]		[0.020]		[0.022]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717
B) PPP as Key Variable of Interest										
Log PPP	0.052*	0.129**	0.145**	0.244***	0.140**	0.245**	0.137*	0.300**	0.185*	0.376**
	[0.030]	[0.052]	[0.056]	[0.091]	[0.067]	[0.103]	[0.081]	[0.125]	[0.110]	[0.165]
Log PPP * YTR		-0.004*		-0.005		-0.006		-0.009*		-0.011*
		[0.002]		[0.004]		[0.004]		[0.005]		[0.006]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717

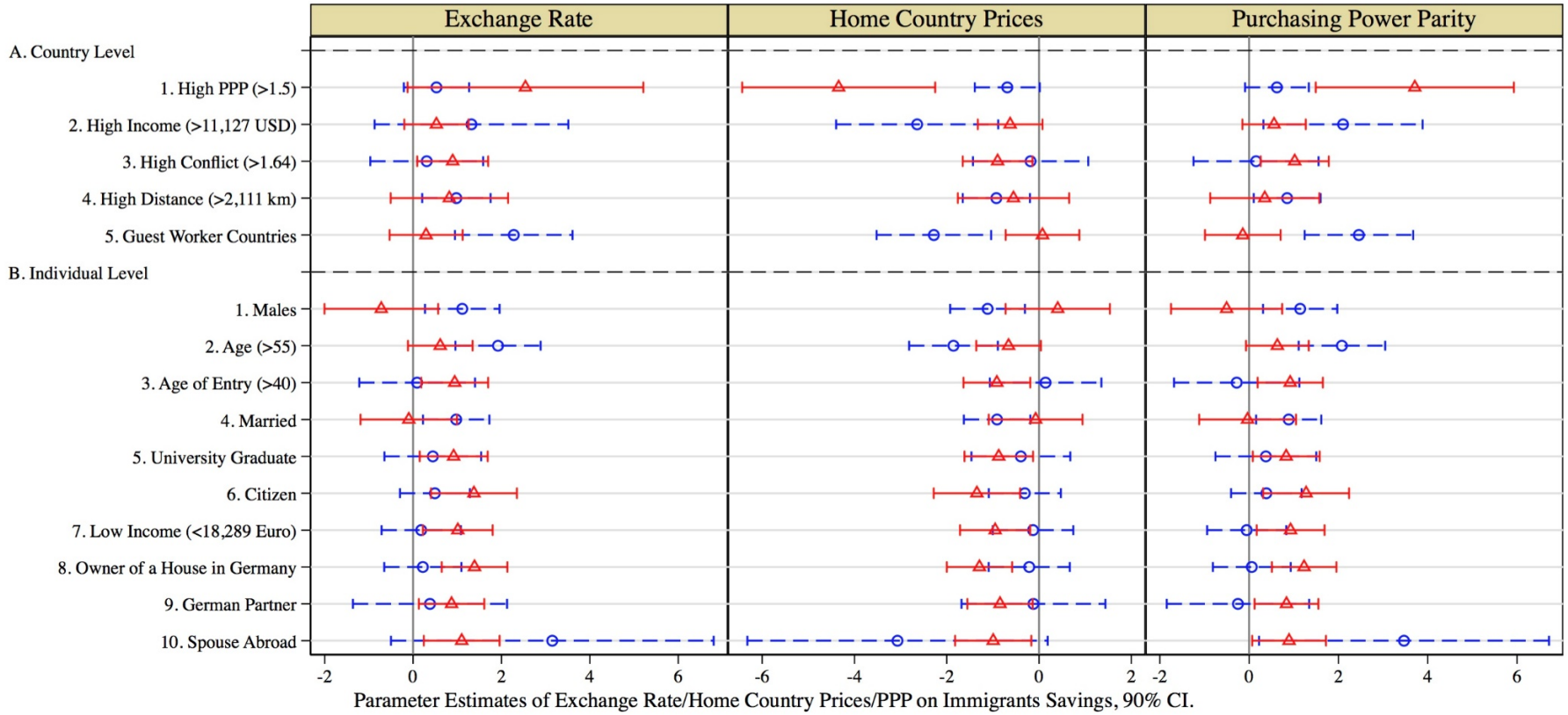
Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In defining the saving rate, if monthly savings are higher than the difference between the monthly household income and the monthly minimum consumption needs of household (calculated according to the rules of German social assistance welfare program), monthly savings are replaced by the latter variable. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Top 1 and bottom 1 percentiles of household income are dropped. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table 8: Effects of Key Variables of Interest on Household Income

	Dependent Variable: Log Household Income									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	-0.007	0.050	-0.051	0.046	-0.039	0.124	-0.019	0.082	-0.023	0.167*
	[0.026]	[0.034]	[0.034]	[0.064]	[0.043]	[0.077]	[0.043]	[0.065]	[0.050]	[0.085]
Log Exchange Rate * YTR		-0.003		-0.006*		-0.010***		-0.007**		-0.013***
		[0.002]		[0.003]		[0.003]		[0.003]		[0.003]
Log Home C. Price	0.000	-0.047	0.038	-0.047	0.028	-0.120	0.006	-0.087	0.010	-0.183**
	[0.023]	[0.037]	[0.033]	[0.064]	[0.042]	[0.075]	[0.043]	[0.058]	[0.052]	[0.081]
Log Home C. Price * YTR		0.002		0.005		0.009***		0.007**		0.013***
		[0.002]		[0.003]		[0.003]		[0.003]		[0.003]
Log Host C. Price * YTR		0.035***		0.033***		0.048***		0.040***		0.049***
		[0.013]		[0.010]		[0.008]		[0.011]		[0.012]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	0.416	0.420	0.455	0.458	0.461	0.467	0.440	0.444	0.464	0.474
B) PPP as Key Variable of Interest										
Log PPP	0.005	0.098**	-0.017	0.043	-0.011	0.106	0.012	0.062	0.010	0.146*
	[0.021]	[0.046]	[0.037]	[0.065]	[0.045]	[0.084]	[0.046]	[0.057]	[0.062]	[0.075]
Log PPP * YTR		-0.005**		-0.003		-0.006**		-0.003		-0.008***
		[0.002]		[0.003]		[0.003]		[0.002]		[0.002]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	0.416	0.417	0.455	0.455	0.460	0.461	0.440	0.440	0.464	0.465

Notes: The full sample includes all immigrant household heads who arrived in Germany after age 18 in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. OLS Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration groups. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Figure 2: Heterogeneity Analysis by Selected Country-level and Individual-level Characteristics



Notes: Results are obtained using the interaction model in equation (29), where we investigate the heterogeneity in the effects of exchange rate, home country prices, and purchasing power parity on monthly savings over various individual- and country-level characteristics. We define a binary variable, d, for each characteristic of interest (The specific definition for each d is given in the parentheses above). Circles represent the estimated coefficient when d is equal to one and triangles represent the coefficients when d is equal to zero. Solid and dashed lines around the estimated coefficients represent the 90% confidence intervals. The vertical lines are located at zero to identify the statistical significance of coefficients at the 10% level. In the panel for country-level characteristics, a country belongs to the high income group if its income is above the 75^{th} percentile, to the high conflict group if its conflict index is above the 75^{th} percentile, and to the high distance group if its distance to Germany is above the median. In the panel for individual-level characteristics, a person belongs to the low income group if her income lies below the 25^{th} percentile of this variable.

A Appendix A

A.1 Alternative Specification: All Savings Continuously Remitted to the Source Country in the form of Domestic Currency

If all savings out of earnings abroad are immediately converted into domestic currency and remitted back to the source country, then assuming again that the change in PPP is due to a change in e, p^* or p at $t = \phi$, a migrant's optimal consumption rate abroad from time ϕ to T satisfies the following budget constraint.

$$e_0[A_0^* + \phi(w^* - p_0^* c_0^*)] + (T - \phi)e_1(w^* - p_1^* c_1^*) + R[\alpha T e_1 w^* - \Pi_1^{1/\theta} p_1 c_1^*] = 0, \tag{30}$$

where we assume, as before, that pension income is received from abroad in the form of foreign currency. We then have

$$p_1^* c_1^* = \frac{\frac{e_0}{e_1}[A_0^* + \phi(w^* - p_0^* c_0^*)] + [T - \phi + R\alpha T]w^*}{[T - \phi + R\Pi_1^{1/\theta - 1}]}. \tag{31}$$

The impact of a change in any of the components of PPP on c_1^* can be seen by differentiating eq. (31) with respect to each of the variables.

$$\begin{aligned}
\frac{d(p_1^* c_1^*)}{de_1}\frac{e_1}{p_1^* c_1^*} &= -\frac{[1 + R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}]}{T - \phi + R\Pi_1^{1/\theta - 1}} = \\
&= -\frac{1}{T - \phi + R\Pi_1^{1/\theta - 1}} - \frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}}{T - \phi + R\Pi_1^{1/\theta - 1}} < 0 \Leftrightarrow \theta < 1 \qquad (32) \\
\frac{d(p_1^* c_1^*)}{dp_1^*}\frac{p_1^*}{p_1^* c_1^*} &= -\frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}}{T - \phi + R\Pi_1^{1/\theta - 1}} \gtrless 0 \Leftrightarrow \theta \gtrless 1, \qquad (33) \\
\frac{d(p_1^* c_1^*)}{dp_1}\frac{p_1}{p_1^* c_1^*} &= \frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta - 1}}{T - \phi + R\Pi_1^{1/\theta - 1}} \gtrless 0 \Leftrightarrow \theta \lesseqgtr 1. \qquad (34)
\end{aligned}$$

Comparing Eq. (21) with (32), we see that the last terms are identical, while the first term in (32) is unambiguously negative. The elasticity of consumption with respect to the exchange rate in the setting where all assets are continuously remitted back home and held in the form of domestic currency is therefore algebraically smaller than if assets are accumulated in the form of foreign currency. But why should consumption abroad decline by more when the migrant holds his savings in the form of domestic rather than foreign currency? By holding domestic currency, he experiences a capital loss on his savings, when measured in terms of foreign currency, as a result of an increase in e. This calls for a relatively greater reduction in consumption abroad

in order to generate the savings needed to meet his optimal consumption program after return. Thus the qualitative impact of an increase in the exchange rate on p^*c^* is the same, regardless of whether the migrant remits savings continuously to the source country and holds them in the form of domestic currency, as we assume here, or holds savings in the form of foreign currency over the entire planning horizon, as we assumed earlier. This is important from the perspective of our study as we do not address the problem of what determines whether and what fraction of savings a migrant chooses to hold in the form of domestic currency. Eqs. (33) and (34) are, on the other hand, exactly identical to (22) and (23), respectively.

The effect of YSM on (32) – (34) is also identical to (24) – (26). Since the last two expressions, respectively, are the same, only the effect of ϕ on the elasticity with respect to the exchange rate deserves a further comment. As the last terms in (21) and (32) are identical, we need to consider only the effect of ϕ on the first term in (32). This is given by

$$-\frac{d}{d\phi}\left\{\frac{1}{T-\phi+R\Pi_1^{1/\theta-1}}\right\}=-\frac{1}{\left[T-\phi+R\Pi_1^{1/\theta-1}\right]^2}<0. \tag{35}$$

Since (24) is negative (for $\theta<1$), which is also the same as the effect of YSM on the last term in (32), we can conclude that the overall effect of YSM on (32) is unambiguously negative. These are qualitatively the same results we obtained earlier under the assumption that a migrant's savings are held in the form of foreign currency.

A.2 Appendix to Section 2

The optimal return date after a PPP shock becomes

$$\tau=\frac{\phi e_1(p_0^*c_0^*-p_1^*c_1^*)+T(\alpha e_1w^*-w)-R(\alpha e_1w^*-p_1c_1)}{e_1(w^*-p_1^*c_1^*)-(w-p_1c_1)}$$

and

$$\begin{aligned}\frac{d\tau}{dp_1^*} &= \frac{1}{\Delta_\tau}\left\{\frac{e_1c_1^*\left(1+\frac{dc_1^*}{dp_1^*}\frac{p_1^*}{c_1^*}\right)(\tau-\phi)+(R-\tau)\frac{dc_1}{dp_1^*}}{e_1(w^*-p_1^*c_1^*)-(w-p_1c_1)}\right\},\\ \frac{d\tau}{dp_1} &= \frac{1}{\Delta_\tau}\left\{\frac{e_1p_1^*\frac{dc_1^*}{dp_1}(\tau-\phi)+c_1\left(1+\frac{dc_1}{dp_1}\frac{p_1}{c_1}\right)(R-\tau)}{e_1(w^*-p_1^*c_1^*)-(w-p_1c_1)}\right\},\end{aligned}$$

where

$$\Delta_\tau = 1 - \frac{(T-R)e_1 w^* \alpha'}{e_1(w^* - p_1^* c_1^*) - (w - p_1 c_1)} \gtrless 0,$$

$$1 + \frac{dc_1^*}{dp_1^*}\frac{p_1^*}{c_1^*} = \frac{\theta - 1}{\theta}\frac{\Pi_1^{1/\theta-1}}{\Pi_1^{1/\theta-1} - 1} \gtrless 0 \Leftrightarrow \theta \gtrless 1,$$

$$\frac{dc_1}{dp_1^*} = \frac{c_1}{p_1^*}\left(\frac{1 - 1/\theta}{\Pi_1^{1/\theta-1} - 1}\right) \lesseqgtr 0 \Leftrightarrow \theta \lesseqgtr 1,$$

$$1 + \frac{dc_1}{dp_1}\frac{p_1}{c_1} = \frac{1/\theta - 1}{\Pi_1^{1/\theta-1} - 1} \gtrless 0 \Leftrightarrow \theta \lesseqgtr 1.$$

The expression for Δ_τ is unambiguously positive if $R/T > \theta$ and of ambiguous sign otherwise.

B Appendix B: Tables and Figures in Appendix

Figure A1: Age Distribution at the Intended Time of Return

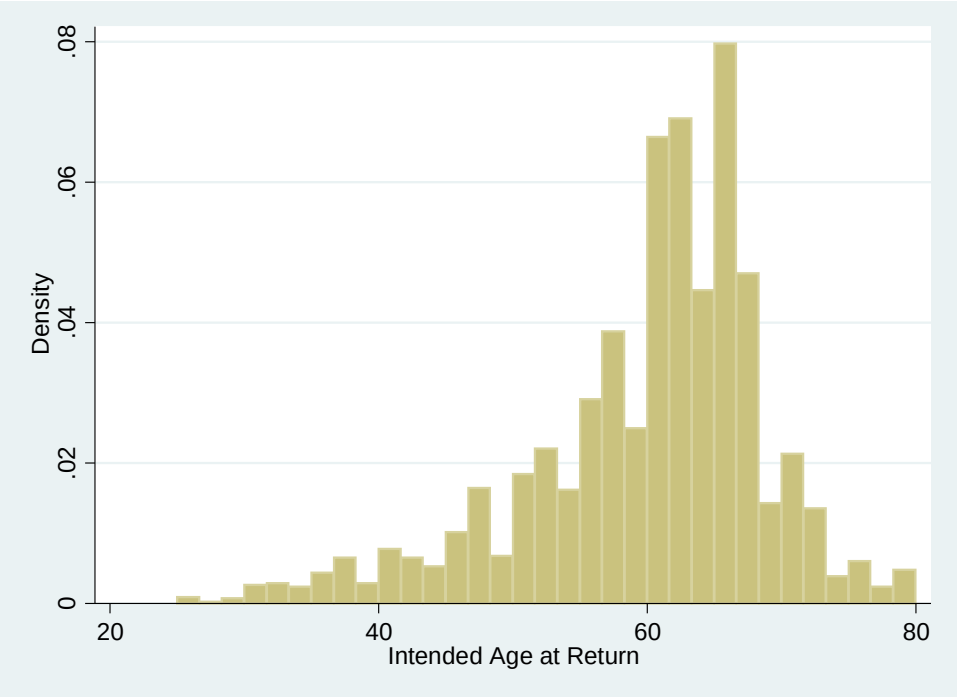


Figure A2: PPP of Selected Countries with Germany

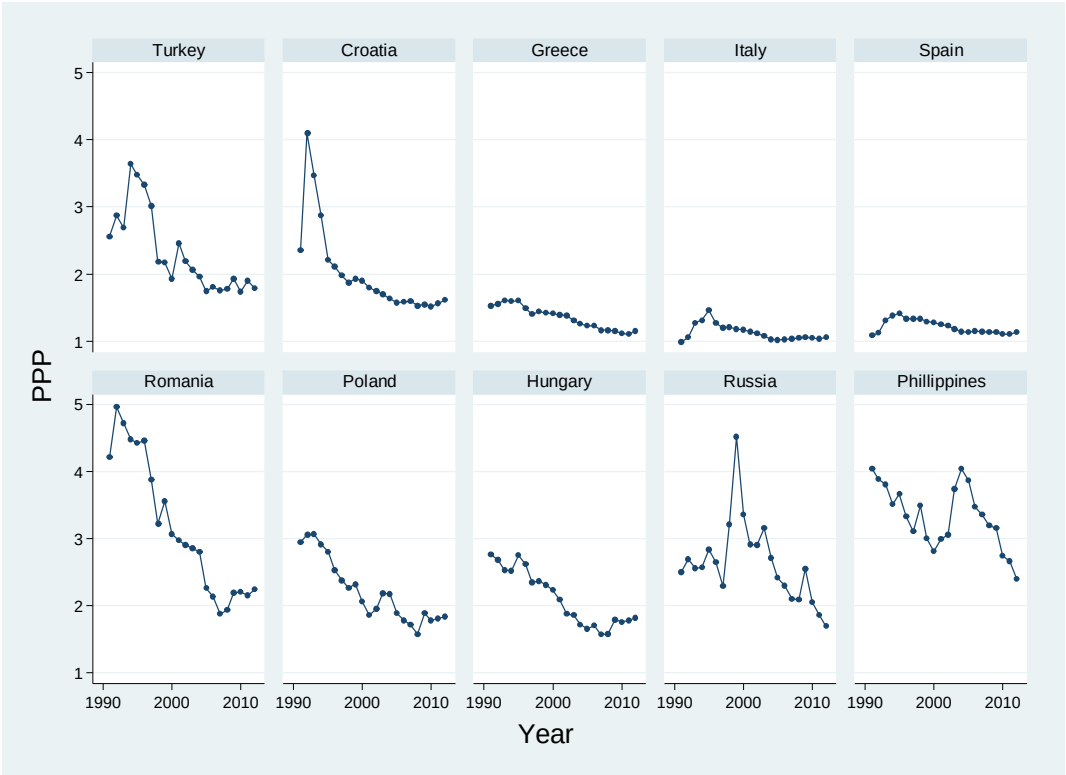


Figure A3: Log Exchange Rate of Selected Countries with Germany

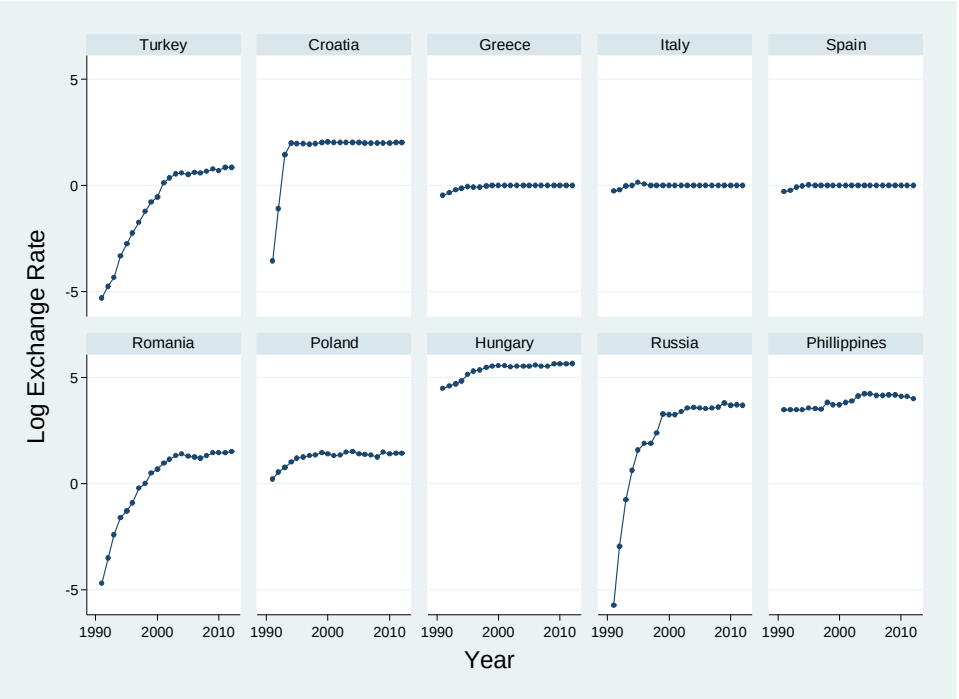


Figure A4: Log Price Level in Selected Source Countries

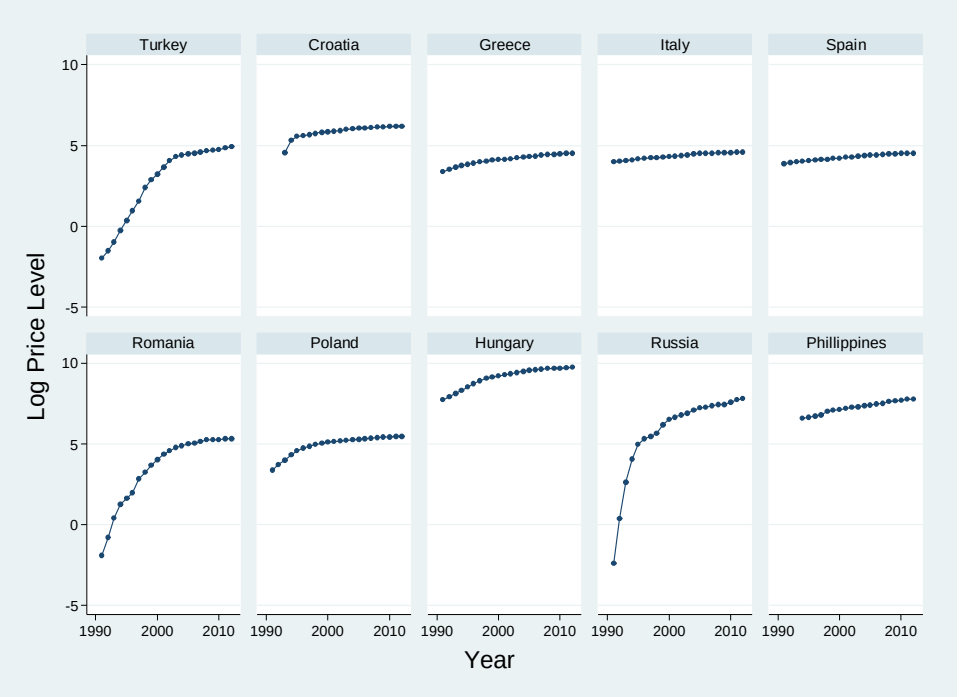


Table A1: Descriptive Statistics by Return Intentions

	Full Sample	Return Intention at Least for One Year	Return Intention more than 20% of the Time	Return Intention more than 40% of the Time	Return Intention more than 60% of the Time
A) Individual-level Characteristics					
A1) Cross-Section Characteristics					
Year of Immigration	1991.90	1984.10	1984.57	1985.53	1987.22
Age at Arrival	30.16	27.77	27.78	28.00	28.13
Male	0.65	0.76	0.76	0.74	0.72
A2) Panel-Level Characteristics					
Positive Savings	0.44	0.43	0.43	0.42	0.44
Average Monthly Savings (Euros)	244.75	292.08	298.68	306.14	331.68
Adjusted Savings (using Min. Consumption)	227.47	263.82	270.30	273.66	296.48
Saving Rate (using Adjusted Savings)	0.08	0.10	0.10	0.10	0.11
Intend to Return	0.29	0.57	0.65	0.75	0.85
Age	47.14	49.18	49.37	49.70	49.27
Years since migration	17.89	22.68	23.07	23.11	22.44
Years to retirement	17.86	15.82	15.63	15.30	15.73
Annual Household Income (Euros)	28366.75	28208.53	28118.76	28048.36	28392.91
Household Size	3.25	3.29	3.27	3.23	3.15
Employed (Household head)	0.64	0.66	0.66	0.64	0.61
Number employed in household	1.30	1.43	1.45	1.43	1.38
Married	0.80	0.82	0.82	0.82	0.82
Spouse abroad	0.01	0.02	0.03	0.03	0.03
Child abroad	0.03	0.04	0.04	0.05	0.05
Partner German	0.08	0.10	0.09	0.06	0.07
B) Country-level Characteristics					
Purchasing Power Parity	2.42	2.06	2.01	1.99	1.95
Exchange Rate	246.00	176.27	133.94	159.67	83.81
Price in Home Country	7746.58	5318.64	4047.68	4742.92	2931.40
Price in Germany	88.95	85.15	84.87	84.92	85.14
Gross Domestic Product	12458.54	16248.33	16828.22	17113.97	17125.61
Country Conflict Index	0.76	0.90	0.89	0.88	0.90

Notes: The sample includes immigrant household heads who arrived in Germany after age 18 in the 1992-2013 waves of the German Socioeconomic Panel. The set of origin countries of immigrants is restricted to those where ppp with Germany averages above 1 in the 1991-2012 period and where the average GDP per capita in the 1991-2012 period is lower than that in Germany. Origin countries for which key macro-variables are not available for any year in the 1991-2012 period are also excluded (most notably ex-Yugoslavia). The panel format is restricted to observations in which individuals are under the age of 65.

Table A2: Effects of Other Control Variables

	Dependent Variable: Log Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
Log Household Income	3.207***	3.257***	3.129***	3.139***	3.167***	3.116***	3.132***	3.050***	3.156***	2.976***
	[0.246]	[0.247]	[0.344]	[0.348]	[0.377]	[0.383]	[0.455]	[0.457]	[0.543]	[0.543]
Log Household Size	-0.928***	-0.805**	-0.967**	-0.921**	-0.664	-0.779	-0.949*	-1.215**	-0.981	-1.468**
	[0.329]	[0.342]	[0.422]	[0.439]	[0.481]	[0.501]	[0.529]	[0.569]	[0.608]	[0.688]
Employed (H. Head)	0.757***	0.918***	0.875***	0.950***	0.937***	0.832**	0.624	0.394	0.850*	0.478
	[0.240]	[0.245]	[0.320]	[0.334]	[0.343]	[0.355]	[0.387]	[0.393]	[0.446]	[0.455]
Number Employed	0.036	0.050	0.073	0.077	0.013	0.036	0.061	0.124	-0.003	0.120
	[0.115]	[0.115]	[0.155]	[0.158]	[0.167]	[0.170]	[0.203]	[0.208]	[0.229]	[0.237]
Married (H. Head)	0.268	0.208	-0.809	-0.814	-1.158**	-1.137**	-0.412	-0.278	-0.477	-0.142
	[0.442]	[0.420]	[0.560]	[0.553]	[0.533]	[0.536]	[0.601]	[0.547]	[0.556]	[0.531]
Spouse Abroad (H. Head)	0.208	-0.161	0.245	0.047	0.132	0.052	0.136	-0.044	0.248	0.087
	[0.562]	[0.416]	[0.601]	[0.513]	[0.576]	[0.610]	[0.564]	[0.598]	[0.479]	[0.549]
Child Abroad (H. Head)	0.865*	0.914*	0.530	0.556	0.582	0.604	0.517	0.559	0.433	0.520
	[0.459]	[0.467]	[0.533]	[0.542]	[0.537]	[0.540]	[0.607]	[0.606]	[0.789]	[0.802]
German Partner (H. Head)	0.072	0.208	1.208	1.235	1.807	1.796	-0.606	-0.756	-0.850	-1.062
	[0.476]	[0.481]	[1.047]	[1.052]	[1.349]	[1.342]	[4.986]	[4.976]	[3.636]	[3.647]
Log GDP per capita	0.480	0.132	0.904	0.297	0.638	0.055	0.601	-1.134	2.902	0.599
	[0.821]	[0.809]	[1.125]	[1.184]	[1.749]	[1.703]	[1.981]	[1.886]	[2.247]	[2.177]
Political Conflict Index	0.087	0.088	-0.127	-0.122	0.053	0.063	0.051	0.065	0.033	0.069
	[0.075]	[0.075]	[0.132]	[0.127]	[0.174]	[0.170]	[0.218]	[0.213]	[0.236]	[0.237]
Duration of Residence										
7-9 years	0.461*	0.544**	1.451***	1.505***	1.741***	1.504***	1.889***	1.346*	1.926**	1.120
	[0.253]	[0.260]	[0.475]	[0.514]	[0.558]	[0.579]	[0.732]	[0.705]	[0.801]	[0.770]
10-13 years	0.246	0.425	1.508**	1.633**	1.936**	1.549*	2.731***	1.989**	2.926**	1.914*
	[0.360]	[0.365]	[0.711]	[0.776]	[0.800]	[0.862]	[1.028]	[1.012]	[1.146]	[1.100]
14-17 years	0.077	0.396	1.512	1.714*	1.969**	1.420	2.579**	1.532	2.523*	1.175
	[0.495]	[0.505]	[0.925]	[1.041]	[0.992]	[1.126]	[1.265]	[1.271]	[1.345]	[1.285]
18-21 years	-0.103	0.321	0.868	1.136	1.242	0.555	1.781	0.464	2.119	0.382
	[0.625]	[0.638]	[1.063]	[1.207]	[1.156]	[1.325]	[1.433]	[1.493]	[1.530]	[1.522]
22-26 years	-0.651	-0.172	0.555	0.838	1.085	0.390	1.495	0.142	1.723	-0.085
	[0.740]	[0.752]	[1.203]	[1.343]	[1.303]	[1.473]	[1.560]	[1.631]	[1.686]	[1.687]
27-31 years	-0.936	-0.403	0.540	0.809	1.106	0.433	1.419	0.083	1.830	0.081
	[0.882]	[0.888]	[1.363]	[1.478]	[1.489]	[1.626]	[1.739]	[1.782]	[1.925]	[1.870]
32+ years	-1.209	-0.770	0.575	0.786	1.220	0.587	1.588	0.352	2.049	0.490
	[1.029]	[1.032]	[1.516]	[1.597]	[1.649]	[1.747]	[1.928]	[1.928]	[2.178]	[2.066]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. Honore Tobit Fixed Effects regressions are used. In addition to the variables above, the specifications in the odd-numbered columns include log exchange rate and log home country price level whereas the specifications in the even-numbered columns also include the interaction of these variables with years to retirement as well as the interaction of host country price level with years to retirement. All specifications also include time dummies. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A3: Robustness Check - Effects of Elements of PPP with Shorter Lists of Control Variables

	Dependent Variable: Log Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
A) Control Variables: Time Dummies, Duration of Residence Dummies										
Log PPP	0.804*	2.359***	2.048***	3.818***	2.725***	4.878***	3.246***	5.990***	3.261**	7.308***
	[0.477]	[0.852]	[0.788]	[1.342]	[0.851]	[1.510]	[0.978]	[1.669]	[1.327]	[2.087]
Log PPP * YTR		-0.068**		-0.076		-0.094		-0.127*		-0.182**
		[0.032]		[0.054]		[0.062]		[0.071]		[0.082]
Observations	11,453	11,453	5,586	5,586	4,760	4,760	3,856	3,856	2,888	2,888
No. of households	3021	3021	1022	1022	948	948	849	849	740	740
B) Controls in (A) + Country-level Covariates other than the Key Variables of Interest										
Log PPP	0.775	2.205***	2.297***	3.752***	2.581***	4.819***	3.043***	5.902***	2.888**	7.024***
	[0.503]	[0.852]	[0.852]	[1.348]	[0.928]	[1.469]	[1.079]	[1.636]	[1.390]	[2.020]
Log PPP * YTR		-0.067**		-0.071		-0.117*		-0.161**		-0.224**
		[0.033]		[0.058]		[0.064]		[0.075]		[0.087]
Observations	11,419	11,419	5,574	5,574	4,748	4,748	3,848	3,848	2,880	2,880
No. of households	3014	3014	1019	1019	945	945	847	847	738	738
C) Controls in (A) + Full List of Individual-level Covariates										
Log PPP	0.772*	1.109	1.476**	2.202*	2.279***	3.257**	2.521***	5.161***	2.338*	6.438***
	[0.415]	[0.754]	[0.672]	[1.181]	[0.775]	[1.351]	[0.944]	[1.580]	[1.235]	[1.932]
Log PPP * YTR		-0.015		-0.031		-0.043		-0.124*		-0.188**
		[0.029]		[0.046]		[0.053]		[0.064]		[0.074]
Observations	11,114	11,114	5,412	5,412	4,597	4,597	3,723	3,723	2,779	2,779
No. of households	2973	2973	1001	1001	927	927	828	828	719	719

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. The full list of individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A4: Robustness Check – Dummy Variable for Positive Savings as the Dependent Variable when Sample is Restricted to That in Table 2

Dependent Variable: Dummy Variable for Positive Savings										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.080***	0.150***	0.176***	0.265***	0.218***	0.354***	0.256***	0.475***	0.232***	0.532***
	[0.027]	[0.051]	[0.056]	[0.072]	[0.055]	[0.100]	[0.063]	[0.126]	[0.078]	[0.122]
Log Exchange Rate * YTR		-0.004*		-0.005		-0.009**		-0.016***		-0.021***
		[0.002]		[0.004]		[0.004]		[0.005]		[0.006]
Log Home C. Price	-0.065**	-0.148**	-0.164***	-0.244***	-0.206***	-0.348***	-0.242***	-0.480***	-0.214***	-0.536***
	[0.029]	[0.058]	[0.051]	[0.067]	[0.048]	[0.098]	[0.060]	[0.127]	[0.078]	[0.130]
Log Home C. Price * YTR		0.004*		0.004		0.009**		0.016***		0.021***
		[0.003]		[0.004]		[0.004]		[0.005]		[0.005]
Log Host C. Price * YTR		-0.037**		-0.001		0.021		0.014		0.019
		[0.019]		[0.014]		[0.015]		[0.020]		[0.018]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	0.049	0.050	0.067	0.068	0.081	0.082	0.079	0.082	0.087	0.093
B) PPP as Key Variable of Interest										
Log PPP	0.052	0.108*	0.145***	0.253***	0.188***	0.369***	0.221***	0.488***	0.188**	0.532***
	[0.031]	[0.063]	[0.049]	[0.077]	[0.046]	[0.102]	[0.064]	[0.114]	[0.090]	[0.114]
Log PPP * YTR		-0.003		-0.005		-0.009***		-0.015***		-0.019***
		[0.003]		[0.003]		[0.003]		[0.004]		[0.003]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	0.049	0.049	0.067	0.068	0.080	0.082	0.078	0.081	0.086	0.091

Notes: The full sample includes all immigrant household heads who arrived in Germany after age 18 in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. OLS Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A5: Robustness Check: Saving Rate as the Dependent Variable – No Correction for Saving Rates above One

Dependent Variable: Saving Rate										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.114**	0.236***	0.290***	0.433***	0.327***	0.489***	0.373**	0.583***	0.472**	0.735**
	[0.054]	[0.085]	[0.102]	[0.144]	[0.119]	[0.163]	[0.154]	[0.212]	[0.226]	[0.290]
Log Exchange Rate * YTR		-0.007**		-0.008		-0.010		-0.014		-0.018
		[0.003]		[0.006]		[0.006]		[0.010]		[0.012]
Log Home C. Price	-0.115**	-0.248***	-0.295***	-0.437***	-0.330***	-0.501***	-0.368**	-0.594***	-0.470**	-0.770***
	[0.050]	[0.087]	[0.096]	[0.147]	[0.112]	[0.164]	[0.144]	[0.206]	[0.211]	[0.278]
Log Home C. Price * YTR		0.007**		0.008		0.010		0.014		0.019*
		[0.003]		[0.006]		[0.006]		[0.010]		[0.011]
Log Host C. Price * YTR		-0.036**		-0.029		-0.025		-0.030		-0.031
		[0.017]		[0.025]		[0.028]		[0.033]		[0.040]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717
B) PPP as Key Variable of Interest										
Log PPP	0.115**	0.194**	0.299***	0.407***	0.332***	0.465***	0.363***	0.565***	0.469**	0.714**
	[0.049]	[0.081]	[0.093]	[0.154]	[0.109]	[0.171]	[0.137]	[0.216]	[0.202]	[0.296]
Log PPP * YTR		-0.004		-0.006		-0.007		-0.012		-0.015
		[0.003]		[0.006]		[0.006]		[0.009]		[0.011]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. OLS fixed effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A6: Robustness Check - Savings Adjusted according to Minimum Consumption Needs

Dependent Variable: Log Savings										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.841*	1.874**	1.732**	2.826**	2.146**	3.539***	2.608**	5.233***	2.757**	6.073***
	[0.442]	[0.736]	[0.734]	[1.174]	[0.876]	[1.344]	[1.048]	[1.644]	[1.326]	[1.959]
Log Exchange Rate * YTR		-0.055*		-0.056		-0.086		-0.183**		-0.219**
		[0.030]		[0.051]		[0.059]		[0.080]		[0.093]
Log Home C. Price	-0.793*	-2.003***	-1.794**	-2.813**	-2.199***	-3.757***	-2.573**	-5.504***	-2.684**	-6.418***
	[0.424]	[0.755]	[0.715]	[1.204]	[0.850]	[1.368]	[1.023]	[1.655]	[1.293]	[1.959]
Log Home C. Price * YTR		0.060*		0.049		0.089		0.187**		0.228**
		[0.031]		[0.052]		[0.059]		[0.078]		[0.091]
Log Host C. Price * YTR		-0.526***		-0.179		-0.020		-0.058		0.006
		[0.170]		[0.226]		[0.267]		[0.308]		[0.307]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717
B) PPP as Key Variable of Interest										
Log PPP	0.754*	1.162	1.890***	2.476**	2.269***	3.517***	2.522**	5.177***	2.579**	6.159***
	[0.425]	[0.746]	[0.721]	[1.172]	[0.851]	[1.340]	[1.031]	[1.559]	[1.300]	[1.881]
Log PPP * YTR		-0.019		-0.028		-0.064		-0.148**		-0.194**
		[0.029]		[0.047]		[0.054]		[0.067]		[0.081]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2966	2966	998	998	924	924	826	826	717	717

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A7: Robustness Check – Checking whether Missing Status of Dependent Variables are Related to Key Variables of Interest

	(1)	(2)	(3)
	Missing Dummy Savings	Missing Savings Level	Missing Return Intention
A) Elements of PPP as Key Variables of Interest			
Log Exchange Rate	0.025	0.021	0.046
	[0.025]	[0.025]	[0.104]
Log Home C. Price	-0.015	-0.013	-0.026
	[0.026]	[0.024]	[0.084]
Observations	13,043	13,043	13,043
No. of households	3,178	3,178	3,178
B) PPP as Key Variable of Interest			
Log PPP	0.008	0.008	0.012
	[0.030]	[0.027]	[0.073]
Observations	13,043	13,043	13,043
No. of households	3,178	3,178	3,178

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. PPP stands for purchasing power parity. OLS fixed effects regressions are used. The control variables also include year dummies as well as individual-level controls for dummies for years since migration in 5-year intervals with reference to the household head. Standard errors are clustered at the country of origin level. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A8: Tests of Propositions I and II by Return Intentions – Tobit Random Effects Estimation

Dependent Variable: Log Savings										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	1.050**	2.152***	2.716***	3.955***	3.076***	3.808***	3.435***	5.046***	3.083**	5.325***
	[0.445]	[0.567]	[0.857]	[1.071]	[1.031]	[1.243]	[1.223]	[1.415]	[1.477]	[1.676]
Log Exchange Rate * YTR		-0.058***		-0.069**		-0.049		-0.116**		-0.148***
		[0.018]		[0.035]		[0.039]		[0.046]		[0.052]
Log Home C. Price	-1.027**	-2.243***	-2.737***	-3.999***	-3.046***	-4.045***	-3.378***	-5.317***	-3.034**	-5.597***
	[0.428]	[0.557]	[0.822]	[1.034]	[0.996]	[1.201]	[1.182]	[1.366]	[1.431]	[1.621]
Log Home C. Price * YTR		0.062***		0.068**		0.061		0.130***		0.161***
		[0.018]		[0.033]		[0.037]		[0.043]		[0.048]
Log Host C. Price * YTR		-0.058***		-0.061*		-0.048		-0.110***		-0.130***
		[0.017]		[0.032]		[0.036]		[0.042]		[0.047]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2,966	2,966	998	998	924	924	826	826	717	717
B) PPP as Key Variable of Interest										
Log PPP	1.009**	2.150***	2.774***	3.925***	3.004***	4.241***	3.292***	5.472***	2.959**	5.575***
	[0.423]	[0.549]	[0.798]	[1.009]	[0.978]	[1.173]	[1.159]	[1.336]	[1.405]	[1.591]
Log PPP * YTR		-0.056***		-0.059*		-0.066*		-0.130***		-0.154***
		[0.017]		[0.031]		[0.035]		[0.040]		[0.044]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2,966	2,966	998	998	924	924	826	826	717	717

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Tobit Random Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. The time-variant individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration. The time-invariant individual-level covariates include country-of-origin dummies, age-at-arrival dummies, and a female dummy. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A9: Tests of Propositions I and II by Return Intentions – Mundlak Approach

Dependent Variable: Log Savings										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample (Sample A)		Return Intention at Least for One Year (Sample B)		Return Intention more than 20 Percent of the Time (Sample C)		Return Intention more than 40 Percent of the Time (Sample D)		Return Intention more than 60 Percent of the Time (Sample E)	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	1.054**	2.166***	2.540***	3.766***	2.815***	3.543***	3.248***	4.783***	2.845*	4.921***
	[0.445]	[0.569]	[0.856]	[1.073]	[1.030]	[1.244]	[1.219]	[1.414]	[1.470]	[1.674]
Log Exchange Rate * YTR		-0.059***		-0.067*		-0.047		-0.110**		-0.137***
		[0.018]		[0.035]		[0.039]		[0.046]		[0.052]
Log Home C. Price	-1.031**	-2.296***	-2.572***	-3.828***	-2.815***	-3.804***	-3.232***	-5.090***	-2.840**	-5.239***
	[0.427]	[0.561]	[0.821]	[1.037]	[0.994]	[1.203]	[1.178]	[1.365]	[1.425]	[1.619]
Log Home C. Price * YTR		0.065***		0.067**		0.058		0.123***		0.150***
		[0.018]		[0.034]		[0.037]		[0.043]		[0.048]
Log Host C. Price * YTR		-0.062***		-0.063*		-0.049		-0.106**		-0.122***
		[0.018]		[0.033]		[0.036]		[0.042]		[0.047]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2,966	2,966	998	998	924	924	826	826	717	717
B) PPP as Key Variable of Interest										
Log PPP	1.013**	2.198***	2.625***	3.811***	2.815***	4.012***	3.208***	5.270***	2.833**	5.273***
	[0.423]	[0.552]	[0.796]	[1.013]	[0.975]	[1.176]	[1.154]	[1.335]	[1.397]	[1.587]
Log PPP * YTR		-0.058***		-0.060*		-0.063*		-0.123***		-0.143***
		[0.017]		[0.032]		[0.035]		[0.040]		[0.044]
Observations	11,080	11,080	5,400	5,400	4,585	4,585	3,715	3,715	2,771	2,771
No. of households	2,966	2,966	998	998	924	924	826	826	717	717

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Tobit random-effects estimation with a Mundlak approach is used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. The time-variant individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to dummies for years since migration. The time-invariant individual-level covariates include country-of-origin dummies, age-at-arrival dummies, and a female dummy. The independent variables whose group means are used include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A10: Attrition Check I – Effects of Key Variables of Interest on Panel Attrition

	Dependent Variable: Attrition				
	(1)	(2)	(3)	(4)	(5)
	Full Sample	Return Intention at Least for One Year	Return Intention more than 20 Percent of the	Return Intention more than 40 Percent of the	Return Intention more than 60 Percent of the
	A) Three Elements of PPP as Key Variables of Interest				
Log Exchange Rate	-0.024*	0.019	0.023	-0.003	-0.012
	[0.014]	[0.023]	[0.027]	[0.032]	[0.041]
Log Home C. Price	0.019	-0.027	-0.033	-0.010	-0.006
	[0.015]	[0.023]	[0.027]	[0.032]	[0.041]
Observations	9,114	4,863	4,079	3,242	2,335
No. of households	1,500	656	582	484	376
	B) PPP as Key Variable of Interest				
Log PPP	-0.014	0.040	0.048	0.033	0.040
	[0.018]	[0.026]	[0.030]	[0.036]	[0.049]
Observations	9,114	4,863	4,079	3,242	2,335
No. of households	1,500	656	582	484	376

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity. OLS fixed effects regressions are used. The control variables also include the logarithm of source country's GDP per capita, a control for political conflict in the source country, and year dummies as well as individual-level controls for log household size, number of employed persons in the household, dummies for employed, married, spouse abroad, child abroad, and German partner in addition to dummies for years since migration in 5-year intervals with reference to the household head. Standard errors are clustered at the country of origin level. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A11: Attrition Check II – Duration of Residence is 25 or Fewer Years

	Dependent Variable: Log Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time		Return Intention more than 60 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	1.077**	1.912**	2.189**	2.559	2.873**	3.445*	2.896**	5.909***	2.231	6.915**
	[0.522]	[0.947]	[0.981]	[1.761]	[1.160]	[1.883]	[1.428]	[2.268]	[1.918]	[3.049]
Log Exchange Rate * YTR		-0.042		-0.016		-0.032		-0.179*		-0.238*
		[0.035]		[0.070]		[0.070]		[0.099]		[0.126]
Log Home C. Price	-1.010**	-2.345**	-2.288**	-2.840	-2.858**	-3.693*	-2.743*	-6.036***	-2.195	-7.132**
	[0.507]	[0.981]	[0.978]	[1.807]	[1.141]	[1.950]	[1.418]	[2.317]	[1.922]	[3.102]
Log Home C. Price * YTR		0.058		0.021		0.041		0.182*		0.238*
		[0.037]		[0.069]		[0.070]		[0.098]		[0.123]
Log Host C. Price * YTR		-0.774***		-0.255		0.263		0.338		0.528
		[0.215]		[0.308]		[0.316]		[0.363]		[0.396]
Observations	8,196	8,196	3,069	3,069	2,543	2,543	2,044	2,044	1,602	1,602
No. of households	2695	2695	820	820	763	763	687	687	606	606
B) PPP as Key Variable of Interest										
Log PPP	0.995*	0.562	2.311**	2.194	2.856**	3.448*	2.738*	5.520***	2.195	5.410*
	[0.509]	[0.971]	[0.977]	[1.688]	[1.141]	[1.805]	[1.428]	[2.107]	[1.925]	[2.775]
Log PPP * YTR		0.018		0.005		-0.027		-0.141*		-0.148
		[0.035]		[0.063]		[0.064]		[0.086]		[0.104]
Observations	8,196	8,196	3,069	3,069	2,543	2,543	2,044	2,044	1,602	1,602
No. of households	2695	2695	820	820	763	763	687	687	606	606

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65 and their duration of residence is 25 or fewer years. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A12: Attrition Check III – Duration of Residence is 20 or Fewer Years

Dependent Variable: Log Savings								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time		Return Intention more than 40 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest								
Log Exchange Rate	0.775	2.587**	2.312*	4.750	3.410**	5.379*	2.551	6.490*
	[0.615]	[1.289]	[1.302]	[2.934]	[1.507]	[3.184]	[2.089]	[3.792]
Log Exchange Rate * YTR		-0.074*		-0.092		-0.077		-0.176
		[0.045]		[0.104]		[0.107]		[0.147]
Log Home C. Price	-0.505	-2.907**	-2.271*	-4.769	-2.989**	-5.080	-2.089	-6.376
	[0.607]	[1.397]	[1.314]	[3.032]	[1.465]	[3.385]	[2.025]	[3.991]
Log Home C. Price * YTR		0.091*		0.092		0.078		0.180
		[0.047]		[0.104]		[0.109]		[0.150]
Log Host C. Price * YTR		-0.949***		-0.886**		-0.000		-0.106
		[0.275]		[0.441]		[0.420]		[0.460]
Observations	6,740	6,740	2,012	2,012	1,587	1,587	1,246	1,246
No. of households	2436	2436	663	663	620	620	565	565
B) PPP as Key Variable of Interest								
Log PPP	0.507	0.367	2.311**	2.194	2.686*	6.165**	1.804	6.995*
	[0.611]	[1.203]	[0.977]	[1.688]	[1.537]	[3.031]	[2.086]	[3.663]
Log PPP * YTR		0.006		0.005		-0.124		-0.208
		[0.040]		[0.063]		[0.096]		[0.129]
Observations	6,740	6,740	3,069	3,069	1,587	1,587	1,246	1,246
No. of households	2436	2436	820	820	620	620	565	565

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65 and their duration of residence is 20 or fewer years. The other four samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.

Table A13: Attrition Check IV – Duration of Residence is 15 or Fewer Years

Dependent Variable: Log Savings						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		Return Intention at Least for One Year		Return Intention more than 20 Percent of the Time	
A) Three Elements of PPP as Key Variables of Interest						
Log Exchange Rate	0.409	2.351	1.854	9.449**	3.427*	11.404*
	[0.715]	[1.518]	[1.264]	[4.339]	[2.070]	[6.291]
Log Exchange Rate * YTR		-0.077		-0.264*		-0.264
		[0.050]		[0.147]		[0.186]
Log Home C. Price	0.076	-2.360	-1.872	-9.722**	-3.031	-12.152
	[0.724]	[1.745]	[1.244]	[4.891]	[1.969]	[7.547]
Log Home C. Price * YTR		0.089		0.264*		0.285
		[0.054]		[0.155]		[0.210]
Log Host C. Price * YTR		-0.858***		-1.177*		-0.893
		[0.332]		[0.636]		[0.713]
Observations	5,163	5,163	1,316	1,316	1,003	1,003
No. of households	1913	1913	476	476	439	439
B) PPP as Key Variable of Interest						
Log PPP	0.133	0.663	1.873	6.184	2.717	9.944**
	[0.707]	[1.312]	[1.246]	[4.119]	[2.048]	[4.857]
Log PPP * YTR		-0.022		-0.146		-0.228
		[0.041]		[0.139]		[0.141]
Observations	5,163	5,163	1,316	1,316	1,003	1,003
No. of households	1913	1913	476	476	439	439

Notes: The full sample includes all immigrant household heads (who arrived in Germany after age 18) in the 1992-2013 waves of the German Socioeconomic Panel in the person-age format while they are under the age of 65 and their duration of residence is 15 or fewer years. The other two samples make restrictions on the full sample based on immigrants' return intentions; these restrictions are specified in column headings. PPP stands for purchasing power parity and YTR stands for years till retirement. Honore Tobit Fixed Effects regressions are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covarites. Source-country level covariates other than the key variables of interest include the logarithm of GDP per capita and a political conflict index. Individual-level covariates include log household income, log household size, employment of household head, number of employed individuals in the household, and dummies for married, spouse abroad, child abroad, and German spouse with reference to the household head -- in addition to years since migration in 5-year intervals. Statistical significance *** at the 1 percent level, ** at the 5 percent level, * at the 10 percent level.