

Purchasing-Power-Parity and the Saving Behavior of Temporary Migrants¹

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Abstract

How does the 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 using data from the German Socioeconomic Panel on immigrants from 88 source countries. As implied by our theoretical model, we find that the saving rate increases with the price of host-country in terms of source-country currency, 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 about one-half. Moreover, as we gradually restrict the sample to individuals with stronger return intentions, the estimated magnitudes of the coefficients 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 any temporary migrant. Savings repatriated to the home country are key to an immigrant household's long-term welfare improvement. These savings have a direct impact on the capacity to accumulate human capital, undertake entrepreneurship, acquire land and upgrade the efficiency of agricultural activities, improve the quality of the family's housing and 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) estimated that diaspora savings in 2012 is a total of \$511 billion for the developing countries or 2.3% of their GDP. In the case of low-income countries, the share of migrants' savings in GDP in 2012 was around 9.3% and even higher for Fragile and Conflict Affected States. 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 enterprises, lowering a major obstacle to growth and development.

Given the significant role of repatriated savings in contributing to an improvement in household welfare at the micro level and the 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. One key factor is the purchasing power parity (PPP) relationship between the host and the source country (see, e.g., Djajić, 1989, Bauer and Sinning, 2011, and De Arcangelis and Joxhe, 2015). This study examines, both theoretically and empirically, how unanticipated shocks to PPP and their timing affect a temporary migrants' saving behavior.

Within our theoretical framework, migrants make optimal saving and return-migration decisions in a dynamic setting. We consider two distinct cases: (1) An interior solution such that 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. (2) 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-

¹See, for example, McCormick and Wahba (2001), Dustmann and Kirchkamp (2002), Mesnard (2004), Osili (2005), Djajić (2010), Demurger and Xu (2011), and Djajić and Vinogradova (2015). 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.

country price level, but is ambiguously affected by an increase in the nominal exchange rate. Moreover, the magnitude of any change in the saving rate is unaffected by the timing of the price shock within a migrant's period of residence abroad.

These results are different from the ones we obtain when a migrant finds it optimal to choose the corner solution for the timing of return. Then the saving rate unambiguously increases in response to an increase in the nominal exchange rate under the realistic assumption that the degree of concavity of the utility function is less than unity. 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.

We test the implications of our theoretical model using data from the German Socioeconomic Panel (GSOEP) for 2017.² The GSOEP includes annual data on immigrants' monthly savings in the host country from 1992 to 2017, as well as a rich set of information on immigrants' individual-level characteristics. We combine this information on immigrants from 88 different source countries with their source-country-level characteristics. A particularly helpful feature of the GSOEP is that it also provides 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 savings increase in the nominal exchange rate but decrease in the source-country price level. A 10% increase in the nominal exchange rate leads to a 4.34% increase in savings, whereas a 10% increase in the source-country price level leads to a 4.55% decrease in savings. Moreover, in line with the predictions of our theoretical model, the absolute magnitude of both coefficients increases as the amount of time left until retirement becomes shorter. For instance, just before retirement, a 10% increase in the nominal exchange rate brings about a 12.8% increase in savings. Furthermore, as we gradually restrict the sample to individuals with stronger return intentions, the estimated magnitudes of the coefficients and their statistical significance increase.

Our study builds on the theoretical and empirical literature which considers the role of

²Data 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 GSOEP.

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 temporary migrant's pattern of consumption and labor supply decisions 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 In 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 the planning horizon of a migrant who 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*.⁴ 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 affected remittance flows and triggered investment in entrepreneurial activity back home, by enabling migrant households to overcome liquidity constraints.⁵

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 in these 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 of foreign workers residing in Australia. He finds that a favorable shock leads to a decline in the probability of return, providing evidence for

³See, for example, Dustmann (2001), Djajić (2014a), Djajić and Vinogradova (2015), and Vinogradova (2016).

⁴Two recent papers, Nekoei (2013) and Nguyen and Duncan (2017), investigate a causal link between migrants' labor-market outcomes and real-exchange-rate shocks.

⁵Faini (1994) is an earlier study on the relationship between exchange rate shocks and remittance flows. A number of more recent empirical studies focus on various other aspects of the remitting behavior of immigrants. Dustmann and Mestress (2010), Bauer and Sinning (2011), and Sinning (2011) examine evidence on the link between return intentions and remitting behavior.

rejecting the target-saving hypothesis and in favor of the life-cycle considerations.⁶

Thus a key distinction between the present study and those earlier empirical 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. Our dataset also contains information on each migrant's age, duration of stay abroad, and intentions to return to the source country. This enables us to empirically test the predictions of our model on how such factors interact with changes in the exchange rate and/or price levels in influencing a migrant's saving rate. Our theoretical analysis also facilitates the choice of the most appropriate empirical specification and allows us to interpret the estimation results in the context of the model's predictions. Moreover, the panel structure of our data allows us to account for the time-invariant unobserved heterogeneity and our unique data on return intentions allow us to test some more subtle and novel implications of the theoretical model.⁷

The remainder of the paper is organized as follows. Section 2 develops and analyzes our theoretical model. Section 3 describes the data while Section 4 explains our estimation strategy. The findings are presented in Section 5. Finally, Section 6 offers concluding remarks.

2 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. Unlike Mexico-USA migration or that between Asian labor-exporting economies and the oil-producing states in the Middle East, we are dealing here with workers who are typically involved in a single migration spell rather than circular migration. And while their migration was expected to be only temporary, many of the workers chose to stay for decades and even permanently.⁸

It is clear that for immigrants who intend to remain permanently in Germany, the exchange

⁶Kirdar (2012) also uses the variation in PPP across countries to identify the parameters of his structural model of return migration and the saving behavior of immigrants in Germany.

⁷These data on return intentions are also used in Dustmann and Mestres (2010), who analyze return intentions, migrants' savings, and asset holdings.

⁸Münzenmaier and Walter (1983) find that the proportion of guest workers intending to stay permanently in Germany increases with the time elapsed since arrival in Germany. Steiner and Velling (1992, p.4) point out that "as a migrant becomes more integrated in the host country, the optimal duration of stay may change and may eventually become permanent."

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. In 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. These price variables have a direct effect on the purchasing power of accumulated assets as well as on the optimal time profile of consumption while abroad and after return to the source country.

We see the 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).⁹

2.1 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 nominal wage w_t^* , at home she receives the nominal 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 currency in terms of the source-country currency at time t , is denoted by e_t . We shall assume that the cost of consumption in the host country is 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

⁹The 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 including Australia, Canada, 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 after arrival.

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 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. Since our empirical contribution focusses on the behavior of temporary migrants who choose the corner solution, let us begin by considering that problem first, while leaving the analysis of an interior solution for the Appendix.

2.2 Return for Retirement Only

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 than 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 B1 in the online Appendix B, 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.¹⁰

When a migrant plans to return to the source country at $t = T$, her problem is to maximize the lifetime utility of consumption

$$\max_{c_t, c_t^*} \int_0^T u(c_t^*) dt + \int_T^{T+R} u(c_t) dt, \quad (1)$$

where c_t^* and c_t are the time- t flows of consumption abroad and after return to the source

¹⁰Using 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. For immigrants from four guestworker countries (Turkey, Italy, Greece, and Spain), which form an important part of our sample in this study as well, Kırdar (2009) finds that the return migration hazard rate jumps from 9.3% at ages 55-59 to 25.8% at ages 60-64 and to 41.0% at ages 65-69.

country, respectively, and $u(\cdot)$ is a migrant's time-invariant utility function. 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.¹¹

While abroad, a migrant saves in order to accumulate assets in the form of foreign currency that later serve to support her consumption in the home country after return at time T .¹² Assuming that the foreign wage is 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, T , is given by

$$A_T^* = A_0^* + \int_0^T (w^* - p_t^* c_t^*) dt, \quad (2)$$

where $A_0^* \gtrless 0$ is the initial stock of assets, net of migration costs, also in the form of foreign currency.¹³

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. 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).

Not anticipating any price shock, the budget constraint facing a migrant is given by

$$e_0 \left[A_0^* + \int_0^T (w^* - p_0^* c_t^*) dt \right] = - \int_T^{T+R} (e_0 \alpha T w^* - p_t c_t) dt, \quad (3)$$

where α is a constant and $\alpha T < 1$ 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.¹⁴

¹¹The role of interest differentials across countries 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).

¹²The case in which savings are continuously remitted to the source country and held in the form of domestic currency is examined in the online Appendix. 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.

¹³Note that a migrant may be indebted at the time of arrival in the host country (i.e., $A_0^* < 0$). It is sometimes the case that migrants borrow in order to pay for the cost of migration or choose to migrate precisely because they happen to be in debt for reasons unrelated to migration costs.

¹⁴If a migrant worked and paid contributions in Germany for more than 60 months, she will receive a German pension after reaching the official German pensionable age. With respect to pensions, EU nationals have the same rights as German citizens. Moreover, many of the non-EU sending countries (including Brazil, Bosnia and

The first-order conditions for maximizing (1) with respect to c_t^* and c_t subject to (3) are:

$$u'(c_t^*) - \lambda e_0 p_0^* = 0, \quad (4)$$

$$u'(c_t) - \lambda p_0 = 0, \quad (5)$$

where λ is the constant Lagrange multiplier. Eqs. (3) - (5) enable us to solve for c_t, c_t^* and λ , as functions of the the exogenous variables affecting a migrant's behavior.

Since e_0, p_0 and p_0^* in eqs. (4) and (5) are constant, the marginal utilities of consumption, $u'(c_t^*)$ and $u'(c_t)$, and the corresponding optimal consumption rates 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. (4) and (5) imply that when a migrant returns to the source country at $t = T$, 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 $0 < \theta < 1$.¹⁵ Using (4) and (5), we can write

$$c_0 = c_0^* \left(\frac{e_0 p_0^*}{p_0} \right)^{1/\theta} = c_0^* \Pi_0^{1/\theta} > c_0^*, \quad (6)$$

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

With the aid of eqs. (3) and (6), we obtain the constant optimal consumption rate abroad prior to any shock to the PPP relationship between the two countries:

$$c_0^* = \frac{e_0 A_0^* + T(1 + R\alpha)e_0 w^*}{T e_0 p_0^* + R p_0 \Pi_0^{1/\theta}}, \quad A_0^* \gtrless 0. \quad (7)$$

Herzegovina, Chile, Israel, Kosovo, Morocco, North Macedonia, Montenegro, Republic of Korea, Serbia, Turkey, Tunisia, USA, etc.) have pension insurance agreements with Germany. Under these agreements periods of work that do not qualify for a pension in Germany are taken into account in those other countries (see Müller, Mayer and Bauer, 2014). Also note that, in writing the budget constraint, we assume that any pension benefits that may have been earned prior to emigration 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.

¹⁵Estimates 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.

2.2.1 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.¹⁶ In conducting our investigation, we assume that at $t = \phi < T$, (i.e., while our 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 a 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. (7) and plans to return to the source country at $t = T$. By the time an unanticipated change in the PPP relationship occurs at time ϕ , our migrant will have accumulated $\phi(w^* - p_0^*c_0^*)$ units of foreign currency. The problem at $t = \phi$, when the shock is realized, is to recalculate the optimal consumption program from time ϕ to $T + R$, given her asset holdings at that moment. Her optimal consumption rates at home and abroad will change. Denoting 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.

$$e_1[A_0^* + \phi(w^* - p_0^*c_0^*)] + (T - \phi)e_1(w^* - p_1^*c_1^*) + R[\alpha T e_1 w^* - \Pi_1^{1/\theta} p_1 c_1^*] = 0, \quad (8)$$

where Π_1 refers to the PPP relationship following a shock to the corresponding variables. We thus have

$$p_1^*c_1^* = \frac{A_0^* + \phi(w^* - p_0^*c_0^*) + [T - \phi + R\alpha T]w^*}{(T - \phi + R\Pi_1^{1/\theta-1})}. \quad (9)$$

¹⁶As 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 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. 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. We therefore relegate derivations and discussion of that behavior to the appendix.

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. (9) with respect to e_1, p_1^* and p_1 ¹⁷:

$$\frac{d(p_1^*c_1^*)}{de_1} \frac{e_1}{p_1^*c_1^*} = -\frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta-1}}{T-\phi+R\Pi_1^{1/\theta-1}} \geq 0 \Leftrightarrow \theta \geq 1 \quad (10)$$

$$\frac{d(p_1^*c_1^*)}{dp_1^*} \frac{p_1^*}{p_1^*c_1^*} = -\frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta-1}}{T-\phi+R\Pi_1^{1/\theta-1}} \geq 0 \Leftrightarrow \theta \geq 1, \quad (11)$$

$$\frac{d(p_1^*c_1^*)}{dp_1} \frac{p_1}{p_1^*c_1^*} = \frac{R\left(\frac{1-\theta}{\theta}\right)\Pi_1^{1/\theta-1}}{T-\phi+R\Pi_1^{1/\theta-1}} \geq 0 \Leftrightarrow \theta \leq 1. \quad (12)$$

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, resulting in no change in PPP, the effect on $p_1^*c_1^*$, given by the sum of 10 and 12 is nil. 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 $\theta < 1$. A real appreciation of home currency has a negative impact on a migrant's saving rate abroad.*

Moreover, with all the expressions on the right of eqs. (10) - (12) being identical, except for the sign, it follows that the impact on the saving rate of a given %age change in e, p, p^* or PPP is identical when measured in absolute value. Note, in addition, that movements in the source-country wage obviously have no impact on p^*c^* when a migrant chooses the corner solution, intending to engage only in consumption activity after return.¹⁸

¹⁷These effects can be derived in an alternative way by, first, computing the difference $p_1^*c_1^* - p_0^*c_0^*$ and then examining its sign when e, p^* , and p change. The derivations are provided in the online appendix.

¹⁸As noted by a referee, it would be interesting to see how the saving behavior of a migrant would differ if, after

As may be seen in eqs. (10) - (12), 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. 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. (10) - (12) with respect to ϕ , which yields:

$$\frac{d}{d\phi} \left(\frac{d(p_1^*c_1^*)}{de_1} \frac{e_1}{p_1^*c_1^*} \right) = \frac{R \left(\frac{\theta-1}{\theta} \right) \Pi_1^{1/\theta-1}}{\left[T - \phi + R\Pi_1^{1/\theta-1} \right]^2} \geq 0 \Leftrightarrow \theta \geq 1, \quad (13)$$

$$\frac{d}{d\phi} \left(\frac{d(p_1^*c_1^*)}{dp_1^*} \frac{p_1^*}{p_1^*c_1^*} \right) = \frac{R \left(\frac{\theta-1}{\theta} \right) \Pi_1^{1/\theta-1}}{\left[T - \phi + R\Pi_1^{1/\theta-1} \right]^2} \geq 0 \Leftrightarrow \theta \geq 1, \quad (14)$$

$$\frac{d}{d\phi} \left(\frac{d(p_1^*c_1^*)}{dp_1} \frac{p_1}{p_1^*c_1^*} \right) = \frac{R \left(\frac{1-\theta}{\theta} \right) \Pi_1^{1/\theta-1}}{\left[T - \phi + R\Pi_1^{1/\theta-1} \right]^2} \geq 0 \Leftrightarrow \theta \leq 1. \quad (15)$$

The condition $\theta < 1$ is both necessary and sufficient for (13) and (14) to be negative. In that case, the decrease in 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. (13), 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 realistically 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. (6). 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

return to the home country at $t = T$, she planned to continue working at the wage w for ρ units of time. If the migrant could adjust her return date, as in our interior solution case analyzed in the Appendix, she would reduce her duration of stay abroad and increase her saving rate. Since in the corner solution case she cannot adjust τ (either because she is committed to return at T or her reoptimized τ is still above T), she will *reduce* her saving rate abroad. Algebraically, we find $\frac{d(p_1^*c_1^*)}{dw} = \frac{\rho}{e_1(T-\phi+R\Pi_1^{1/\theta-1})} > 0$. Note that the adjustment of the saving rate to a change in the exchange rate (but not to price levels) will also be affected. For the case $\theta \in (0, 1)$ ($\theta > 1$), the increase in the saving rate in eq. (10) is reinforced (dampened). The effect of ϕ in eq. (13) is unchanged.

higher rate of spending at home, the saving rate abroad has to increase and increase more, the shorter the remaining period of asset accumulation 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. (14) and (15), 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 in the case of $\theta < 1$ 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. (13) - (15) 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.

3 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 an important part of the immigrant sample in GSOEP, the immigrant samples are refreshed over time to sustain representability. In addition, the GSOEP initiated the collection of new immigrant waves in 2013 and 2015, which enrich the composition of immigrants in terms of country of origin and their duration of residence in Germany. We use all immigrant households in the 2017 version of GSOEP, which includes annual data from 1984 to 2017. An important advantage of the GSOEP is the low attrition rate (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. 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 exclude ethnic-German migrants as well as refugees and asylum seekers from our sample.¹⁹

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.²⁰ Second, since the theoretical model assumes that wages in the host country are higher than those in the source country, we drop countries where the average GDP per capita over time is higher than that for Germany on the plausible assumption that GDP per capita in developed countries is a good proxy for

¹⁹Only 3.19% of ethnic Germans and 4.68% of refugees/asylum seekers intend to return. Hence, they do not fit the temporary migrant profile of our model. However, we check the robustness of our findings to this restriction.

²⁰In the context of our theoretical model, individuals coming from countries where purchasing power is lower than that in Germany would turn out to be permanent migrants. They would have no motive to return as the cost of living is higher in their country of origin. Since we are interested in the saving behavior of temporary migrants, we exclude these observations.

wages. These two restrictions essentially eliminate migrants from rich countries, whose number is small. Nonetheless, we check the robustness of our findings to this exclusion. The resulting final sample includes households from 88 source countries.

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 2017. We drop person-year observations in which the household head is aged 65 or over (in accordance with the retirement age in Germany) because we are interested in 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 1992-2017 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.²¹ This variable, however, is censored below or 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: employment status (employed=1), marital status (married=1), whether there is a spouse abroad (=1) and a child abroad (=1), and whether the spouse is German (=1). Monthly savings and household income are normalized in 2010 euros. Values of household income 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 (savings as a percentage of monthly household income) as the dependent variable in certain robustness checks.²²

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

²¹The 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?". This question was split into two in the 2015 questionnaire, one eliciting "savings for asset accumulation per month in Euros" and the other one "precautionary savings per month in Euros". We sum up the values of the answers to these questions to be consistent with the pre-2015 question. Our findings are robust if we use data up to 2015.

²²There 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. Therefore, we take the following approach in the construction of the saving rate variable. First, we generate a variable for the minimum consumption needs of households, according to their composition, using the social assistance welfare scheme in Germany. 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.

number of years of intended duration of residence in Germany. We utilize this information in our empirical analysis to distinguish 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 subsamples include immigrants who report an intention to return at least 20% of the time (sample C), at least 40 % of the time (sample D), and at least 60% 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 come from the World Development Indicators (WDI) database of the World Bank.²³ The exchange rate stands for the amount of local currency that is equivalent to 1 euro. The consumer price index in Germany is already provided in the GSOEP, which is normalized to 100 for the year 2010. We generate the price index in the source country using these three pieces of information (German CPI, the exchange rate, and PPP) using the equality $p = (p^* \times e) / PPP$. Hence the price in the home country is measured in local currency. 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 Major Episodes of Political Violence dataset, provided by the Center for Systemic Peace (2020). This dataset includes information on both interstate conflict and societal conflict. Interstate 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.

3.1 Descriptive Statistics

Table 1 provides descriptive statistics on household-level characteristics in panel (A), where individual-level characteristics refer to the household head, and on country-level characteristics in panel (B). Household-level characteristics are further divided into two panels; panel (A1) gives descriptive statistics for the 2,524 households in the sample whereas panel (A2) gives

²³We use the price level ratio of PPP conversion factor (GDP) to market exchange rate for PPP and DEC alternative conversion factor for the exchange rate. The latter is the official exchange rate reported in the IMF's International Financial Statistics. As the PPP variable is given with respect to the US, we convert it with respect to Germany. Similarly, the exchange rate variable is with respect to the US dollar, which we convert to euros.

descriptive statistics for the 10,035 household-year observations across the panel. According to panel (A1), household heads' mean age at arrival is about 29, and 62% of the household heads are male. Panel (A2) shows that positive savings are reported in 36.7% of the household-year observations, and the mean amount of the reported monthly non-negative savings is about 225 euros. The saving rate we generate using the minimum consumption approach has a mean value of 0.076 whereas the mean saving rate conditional on saving is 0.206. An intention to return home is reported in 35% of the household-year observations. In the panel, the average time since migration is just under 18 years, the average time to retirement is just above 19 years, and the average age is almost 46. While the fraction of observations in which household heads are married is 0.74, the majority of spouses and underage children reside in Germany.

Table 1 about here

Table B1 in online Appendix B shows how descriptive statistics vary across the five subsamples defined by immigrants' return intentions. Whether or not immigrants register positive savings increases by 10–15% (5 percentage points) from the full sample to subsample E, whereas the *level* of savings increases considerably more with return intentions—by about 40% from the full sample to subsample E. Table B2 in Appendix B presents descriptive statistics by country of origin for the 88 countries in our sample. Of the 2,524 households in the sample, 39.5% originate from four "guestworker" countries (Turkey, 17.1%; Greece, 7.1%; Italy, 10.5%, Spain, 4.8%). The other major source-countries are Eastern European countries (Poland, 15%; Romania, 10%; Bulgaria, 3.6%).

Since our identification comes from the variation in the key macro variables over time we examine this variation for a *selected* subsample of the source countries. This subsample includes the 7 countries with the most immigrants in our sample (listed above), as well as two selected countries from Asia (the Philippines and Kazakhstan) and one from Africa (Ghana). The PPP between these countries and Germany, the log exchange rate and the log price level are shown in Figures B2, B3, and B4, respectively, in Appendix B. PPP in some countries exhibits substantial shocks in certain years. For instance, the PPP between German and Turkey increased from 2.68 to 3.64 from 1993 to 1994 (36%) with the economic crisis in Turkey.²⁴

²⁴When 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 in certain years, as reflected in the movement of the PPP over time in Figure B2. 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% from 2000 to 2001 due

4 Empirical Strategy

Propositions 1 and 2 of the theoretical model are derived under the assumption that immigrants plan to return at the time of retirement. We therefore expect these propositions to be more relevant for immigrants who show an intention to return. We run our estimations on the full sample as well as the four subsamples defined by return intentions to determine whether the evidence in support of Propositions 1 and 2 becomes stronger as we gradually tighten the restriction on return intention.

In order to test the implications of Proposition 1, we use the following empirical specification,

$$s_{it} = \alpha_0 + \alpha_1 er_{c,t-1} + \alpha_2 p_{c,t-1}^H + \mathbf{x}_{it}' \boldsymbol{\theta} + \gamma_t + \tau_i + \varepsilon_{it}, \quad (16)$$

where s_{it} is monthly savings of household i at time t , $er_{c,t-1}$ is the exchange rate between Germany and household i 's home country c at time $t - 1$, and $p_{c,t-1}^H$ is the price level at time $t - 1$ in the home country c of household i . \mathbf{x}_{it} stands for the set of control variables for household i at time t , γ_t stands for time dummies, τ_i captures household 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 (16).

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,

$$s_{it} = \beta_0 + \beta_1 er_{c,t-1} + \beta_2 (er_{c,t-1} * ytr_{it}) + \beta_3 p_{c,t-1}^H + \beta_4 (p_{c,t-1}^H * ytr_{it}) + \beta_5 (p_{t-1}^G * ytr_{it}) + \mathbf{x}_{it}' \boldsymbol{\delta} + \gamma_t + \tau_i + \eta_{it}. \quad (17)$$

where ytr_{it} is the number of years to retirement for the head of household i at time t , p_{t-1}^G is the price level in Germany at time $t - 1$, and η is the error term. In accordance with our model,

to the economic crisis in Turkey, whereas the PPP relationship between the two countries increased by 27%. 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%, PPP jumped by 22%.

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, German spouse, and the duration of residence in Germany with reference to the household head.²⁵ While we cannot identify the effect of the price level in Germany, which varies only over time, the interaction term of the price level in Germany with time to retirement, which varies both over time and over households, can be identified in equation (17). A potential specification concern in equation (16) is that our key macro variables could partly stand for other macro-level variables that may also affect the saving rate, such as GDP per capita or political conflict status. Accordingly, control variables in \mathbf{x} also include per-capita GDP in the source countries (in logarithmic form) as well as an index of political conflict.

We estimate equations (16) and (17) using different panel data estimators which allow for the time-invariant unobserved heterogeneity at the household level. Our main estimator is PPML (Poisson fixed-effects regression). Santos-Silva and Tenreyro (2006) show that this estimator performs better than other fixed-effects estimators in the case of data with many zeros, as in our setting. For robustness checks, we also use Tobit and OLS fixed-effects estimators. Since unconditional fixed-effects estimates in a Tobit model are biased due to the so-called incidental parameters problem, we use the semiparametric estimator for fixed-effects Tobit models developed by Honore (1992). In all regressions, we cluster the standard errors at the country-of-origin level because our key variables of interest vary at this level.²⁶ In OLS and Tobit regressions, savings as well as the key macro variables of interest enter in logarithmic form,²⁷ enabling us to interpret the parameters α_1 and α_2 as elasticities. In Poisson regressions, only the key macro variables of interest enter in logarithmic form. Since the right hand side of Poisson regression is in exponential form (and coefficients have semi-elasticity interpretation), α_1 and α_2 are also interpreted as elasticities in PPML.

²⁵We divide the frequency distribution of the duration of residence variable (in years) into 8 equal parts. The resulting dummy variables are for the following ranges: 5-7, 8-11, 12-15, 16-20, 21-25, 26-31, 32+.

²⁶Since the user-written *Stata* command of Honore Tobit Fixed Effects (*pan Tob*) does not allow for clustering, we use cluster-bootstrap to estimate the standard errors with this estimator.

²⁷We add one to the savings data before taking the logarithm.

5 Empirical Findings

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. 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 (16) in the odd-numbered columns, and Proposition 2 is tested using the specification in equation (17) in the even-numbered columns.

5.1 Baseline Results

Column (1) in panel (A) of Table 2 shows that monthly savings increase in the exchange rate and decrease in the source-country price level, confirming Proposition 1. Quantitatively, the elasticity of savings with respect to the exchange rate is 0.434. The elasticity with respect to the source-country price level is similar in magnitude. In addition, column (1) in panel (B) shows evidence for a positive effect of PPP on the saving rate with the elasticity estimate of 0.468. This implies, for instance, that when the PPP between Turkey and Germany increases by 36%, as in 2001, Turkish households in Germany raise their savings on average by about 17%.

Column (2) of Table 2 provides evidence in support of Proposition 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. We also see in column (2) that the coefficient of the interaction of *host* country prices with years to retirement is negative, as expected, although not statistically significant at the conventional levels. Similarly, column (2) in panel (B) shows that the positive effect of PPP on the saving rate diminishes as the number of years to retirement 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. Formal hypothesis testing reveals that there is no evidence that the coefficients of exchange rate and source-country price level variables are statistically different at the conventional levels.

Table 2 about here

In order to better 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 them 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. 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 0.5 at 20 years to retirement, but they exceed one as 5 or fewer years remain to retirement and reach almost 1.3 just before retirement.

Table 3 about here

These findings with the full sample strongly confirm both propositions derived from the theoretical model. Next, we conduct the same analysis for subsamples defined by return intentions. Using such subsamples raises concerns about sample selection. We alleviate this concern by using average return intentions over the observed duration of residence in Germany rather than the return intentions at the time of saving decision. We believe that utilizing this rare information on return intentions constitutes a valuable exercise. Since the theoretical model assumes that immigrants plan to return at the time of retirement, we expect the empirical evidence in support of our model's predictions to become stronger as we restrict the sample according to return intentions.

The estimates in the odd-numbered columns in panel (A) of Table 2 confirm Proposition 1 for all samples. While the coefficients are statistically significant throughout, both the magnitude of coefficients and their statistical significance rise substantially as we gradually restrict the sample to individuals with stronger return intentions. Quantitatively, the elasticity of savings with respect to the exchange rate increases from 0.434 for the full sample to 0.744 with sample (B), to 0.875 with sample (C), to 0.925 with sample (D), and it exceeds 1 with sample (E). A similar pattern exists for the elasticity with respect to the source-country price level.

The even-numbered columns in panel (A) of Table 2 indicate that in all samples 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 rises. Both interaction coefficients are statistically significant at least at the 5% level with all samples. It is also worth noting that the interaction terms of both variables are larger with samples (D) and (E) than with the main

sample. The effect of *host* country prices also decreases in years to retirement, although the estimates are not statistically significant at the conventional levels. The lack of statistical significance is not surprising because the time variation in host country prices are common for all source-countries unlike the time-variation in the other two elements of PPP. Finally, panel (B) of Table 2 shows that the patterns for the effect of PPP over the two specifications and five samples are very similar to those in panel (A). As the degree of the restriction on return intentions is strengthened, the coefficient estimates become larger in magnitude and statistical significance increases.²⁸

The joint estimates at various values of years to retirement in Table 3 show that the evidence for Proposition 1 exists in all five samples when the number of years to retirement is 20 or less. In samples (B) to (E), the evidence stretches to a wider range of years to retirement, below 25 years. With the full sample, the elasticity of savings with respect to the exchange rate is 0.45 at 20 years to retirement but increases to 1.28 at the time of retirement. 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) is almost unity at 20 years to retirement and 1.9 at the time of retirement.

5.2 Robustness Checks

In this section we discuss a series of robustness checks with respect to the use of alternative estimators, samples, sets of controls, and definitions of the dependent variable. We also examine non-random panel attrition and the question of whether missing observations in our dependent variable cause a bias.

5.2.1 Alternative Estimators

We use five alternative estimators - pooled OLS, OLS fixed-effects, pooled Tobit, Honore Tobit fixed effects, and pooled Poisson. The results by return intentions for these five alternative estimators are given in Tables B4–B8 in the online Appendix B. The evidence supporting Proposition 1 exists for all estimators but the pooled OLS and Honore Tobit fixed-effects. However,

²⁸The findings for other control variables are given in Table B3 in the online Appendix B. There is strong evidence that savings increase in household income and decrease in household size. The estimated income elasticity of savings is just above unity. Evidence of a higher saving propensity for married individuals is observed for samples indicating stronger return intentions. Also for these samples, evidence exists that households from wealthier source countries save less and households from conflict-ridden countries save more.

the pooled OLS estimates do not account either for censoring of the dependent variable at zero or for time-invariant unobserved heterogeneity. When we account for unobserved heterogeneity with the OLS fixed-effects estimator, strong evidence for Proposition 1 emerges. The Honore Tobit fixed-effects estimates yield coefficients with the expected sign but they are not statistically significant (note that here standard errors are estimated via bootstrapping). However, the coefficient magnitudes are similar to those estimated with the OLS fixed-effects and PPML estimators.

The evidence for Proposition 2 remains with all estimators, except for the Honore Tobit fixed-effects with bootstrapped standard errors. It does emerge, however, also for the Honore Tobit fixed-effects estimator when using samples (D) and (E), which consist of migrants with the strongest return intentions. The interaction term between *host* country prices and years to retirement is statistically significant with the pooled estimators but not with the fixed-effects estimators, because little variation remains when we use the latter.

5.2.2 Alternative Samples

First, we remove the restrictions on PPP and source-country wages which essentially adds households from rich countries to the sample. The absolute magnitudes of the coefficients become only slightly lower with this sample. Second, we add ethnic-German migrants and refugees/asylum seekers. The coefficient estimates are noticeably smaller in magnitude in this case, which is expected because a very low fraction of ethnic Germans and refugees/asylum seekers have intentions to return to their countries of origin. Third, we drop the observations from Euro-area countries after 1999 since for them the exchange rate variable does not exhibit variation after that year. Finally, we restrict the main sample until 2014 because of the change in the questionnaire in 2015 on the savings variable. The results can be found in Table B9 in the online Appendix B. The evidence in support of both propositions remains intact in all these alternative samples.

5.2.3 Further Robustness Checks

Here, we provide a summary of the other robustness checks we conduct. A detailed discussion is available in the online Appendix C. First, we examine the robustness of our findings to the use of alternative definitions of the dependent variable. We show that our results remain

unaffected when we take a dummy variable for positive savings or the saving rate as the dependent variable. In another robustness check, we examine whether potential non-randomness of missing observations in our sample could generate a bias. For this purpose, we generate a missing-variable dummy, which takes the value of one if any of the variables in our main specification (other than the key macro-level variables) is missing and zero otherwise. We find no statistically significant relationship between this dummy variable and our key macro-level variables.

When we interpret equation (16) in a difference-in-differences framework where we compare countries over time, we are making the common-trend assumption regarding savings across countries. However, if these trends are different and the 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 to our main specification and show that our results are robust.

The effects of our key variables of interest on savings could partially result through their effect on household income (Nekoei, 2013; Nguyen and Duncan, 2017). Similar issues might arise with our other household-level covariates, as for example the location of spouse and children through the effect on return intentions. In light of this we examine the sensitivity of our findings to the exclusion of household-level covariates on labor market outcomes and household composition and find that our findings hold.

A common problem in studies investigating 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. However, even with panel data, if attrition is correlated with the shocks to our key variables of interest, our estimates would be biased.²⁹ In a final robustness check, we investigate whether panel attrition is in fact correlated with the key variables of interest and find no evidence of such correlation.

²⁹Suppose 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 the saving behavior.

5.3 Extensions

5.3.1 Heterogeneity

The estimated effects of the key variables of interest on the saving behavior reflect an "average effect" for a heterogeneous 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 exhibit a stronger response. In this section we turn our attention to the heterogeneity with respect to home-country-level and individual-level characteristics in our baseline estimates. A more detailed discussion can be found in the online Appendix D.

The results are presented in Figure 1, where column 1 refers to the exchange rate variable, column 2 to the source-country price level, and column 3 to PPP. Panel A refers to the country-level characteristics and Panel B to the individual-level characteristics. The results in Panel A indicate that there is no evidence of heterogeneous responses to the key variables of interest when we differentiate between source countries with a relatively high vs low PPP (first row). The effects are noticeably stronger for immigrants from wealthier source countries (second row) and guest-worker countries (third row), although only the effect of the home-country price is statistically significant. The results in Panel B indicate that the effects of the key variables of interest are larger for male, married, and older immigrant household heads, who also exhibit a stronger intention to return. Similarly, the effects are substantially larger for household heads with a spouse abroad and weaker for those who have a German partner or a house in Germany or who are German citizens, as expected.

Figure 1 about here

5.3.2 Saving and Remitting

Our theoretical analysis is based on the assumption that all savings are in the form of foreign currency. The possibility that savings are continuously remitted to the source country and held in the form of domestic currency is examined in the online Appendix A. We show that the results regarding the effects of price-level and exchange-rate changes on a migrant's saving behavior are qualitatively the same. At the same time, examining the GSOEP dataset in the online Appendix D, we find that the propensity for migrants to keep savings in their source

country is rather small. Among those with positive savings, only 9.8% sent at least some of their savings back home. This amounted to an average of only 5.7% of their total savings, which is broadly consistent with our assumption that migrants hold their savings in the form of foreign currency. In addition, examining the information on the amount of remittances and the reason for remitting, we find that most of the remittances are for family consumption and not for the purpose of asset accumulation. Finally, comparing the data on the amount remitted for family members and others in the home country and the total amount saved, we find that the former is less than 20% of the latter.

In the online Appendix D.2 we show that our main findings are robust to the inclusion of remittances as an additional control variable. We further examine the relationship between remittances and PPP in the same setup that we use for analyzing the relationship between savings and PPP. We find that migrants send fewer remittances in response to an increase in PPP, although this is marginally statistically insignificant at the conventional levels. A statistically significant negative effect emerges, however, when we restrict the sample to the groups of more recent immigrants in samples M1 and M2.

6 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 using the data from the German Socio-economic Panel (GSOEP) for the period 1992-2017.

From a broader perspective, the aim of our theoretical and empirical analysis is to contribute to a better understanding of the complex relationship between migration and development. Our interest in the specific problem of how PPP affects the saving behavior of temporary migrants stems from the observations that (a) diaspora savings can be of substantial magnitude in relation to aggregate savings in countries of emigration, (b) temporary employment abroad is the dominant mode of international migration in a large number of developing countries, and (c) exchange rates and price levels tend to be highly volatile throughout the developing world. In this context, PPP fluctuations can potentially have a significant impact on the saving

behavior of temporary migrants and their contribution to the development process back home.

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. This second case turns out to be empirically more relevant for migrants in our sample. In this case 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.

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 with the exchange rate and decrease with 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 are found to be stronger for immigrants with stronger return intentions. Quantitatively, the elasticity of savings with respect to the exchange rate is 0.43 for the full sample. It increases to 0.77 for the sample of individuals who indicate an intention to return to the home country at least once and to 1.18 for the sample of individuals who indicate a return intention at least 60% of the time. The elasticity with respect to the source-country price level is similar in magnitude. These elasticities vary substantially depending on the timing of the price shock in relation to the retirement date. While the absolute value of the elasticity of savings with respect to the exchange rate (as well as the source-country price level) is about 0.5 at 20 years to retirement, it reaches a value of almost 1.3 just before retirement. In sum, our findings point to quantitatively large effects of PPP fluctuations on temporary migrants' saving decisions.

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Table 1: Descriptive Statistics

	Mean	St. Dev.	Min	Max	Obs.
A) Household-Level Characteristics (Individual-level characteristics are for the head of the household.)					
A1) Cross-Section Characteristics					
Year of Immigration	1995.033	16.412	1952	2016	2,524
Age at Arrival	29.249	7.926	18	61	2,524
Male	0.622	0.485	0	1	2,524
A2) Panel-Level Characteristics					
Positive Savings	0.367	0.482	0	1	10,035
Average Monthly Savings (Euros)	225.620	546.314	0	12245.320	10,035
Adjusted Savings (using Min. Consumption)	208.868	454.142	0	5585.693	10,035
Saving Rate (using Adjusted Savings)	0.076	0.147	0	0.935	10,035
Average Monthly Savings conditional on saving	615.242	757.780	0.960	12245.320	3,680
Adjusted Savings conditional on saving	569.561	597.505	0	5585.693	3,680
Saving Rate conditional on saving	0.206	0.179	0	0.935	3,680
Intend to Return	0.352	0.478	0	1	9,588
Age	45.813	10.821	19	64	10,035
Years since migration	17.891	10.890	0	46	10,035
Years to retirement	19.187	10.821	1	46	10,035
Annual Household Income (Euros)	27930.150	14343.790	2093.631	86466.950	10,035
Household Size	3.131	1.495	1	13	10,035
Employed (Household head)	0.620	0.485	0	1	10,035
Number employed in household	1.230	1.001	0	6	10,035
Married	0.742	0.438	0	1	10,035
Spouse abroad	0.023	0.151	0	1	10,035
Child abroad	0.044	0.206	0	1	10,035
Partner German	0.108	0.310	0	1	10,035
B) Country-level Characteristics					
Purchasing Power Parity	2.154	1.000	0.835	11.028	10,035
Exchange Rate (1 Euro in local currency)	231.263	1951.093	0.005	35170.380	10,035
Price in Home Country (in local currency)	7809.687	66033.400	0.136	1146391.000	10,035
Price in Germany (CPI=100 in 2010)	92.385	11.981	70.187	107.417	10,035
Gross Domestic Product	14423.760	10382.910	187.517	38272.190	10,035
Country Conflict Index	0.682	1.277	0	7	10,035

Notes: The sample includes immigrant household heads who arrived in Germany after age 18 in the 1992-2017 waves of the German Socioeconomic Panel. The set of origin countries of immigrants is restricted to those where the average GDP per capita in the 1991-2016 period is lower than that in Germany and where purchasing power parity in the 1991-2016 period is higher than that in Germany -- which essentially excludes rich countries from the sample. Origin countries for which key macro-variables are not available for any year in the 1991-2016 period are also excluded (most notably ex-Yugoslavia). The sample also excludes ethnic-German migrants and refugees/asylum seekers. The panel format is restricted to observations in which individuals are under the age of 65.

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

	Dependent Variable: Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Main 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	0.434**	1.276***	0.774***	1.457***	0.875***	1.413***	0.925***	1.570***	1.177***	1.902***
	[0.215]	[0.308]	[0.157]	[0.272]	[0.145]	[0.297]	[0.125]	[0.337]	[0.152]	[0.363]
Log Exchange Rate * YTR		-0.041***		-0.040***		-0.033**		-0.044**		-0.047**
		[0.016]		[0.015]		[0.015]		[0.019]		[0.024]
Log Home C. Price	-0.455**	-1.267***	-0.764***	-1.409***	-0.866***	-1.404***	-0.845***	-1.538***	-1.060***	-1.883***
	[0.207]	[0.276]	[0.158]	[0.236]	[0.143]	[0.272]	[0.123]	[0.326]	[0.127]	[0.347]
Log Home C. Price * YTR		0.038**		0.036***		0.032**		0.043**		0.049**
		[0.015]		[0.013]		[0.013]		[0.018]		[0.022]
Log Host C. Price * YTR		-0.079		-0.008		-0.006		-0.027		-0.036
		[0.073]		[0.066]		[0.076]		[0.064]		[0.071]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.468**	1.094***	0.756***	1.279***	0.861***	1.297***	0.806***	1.615***	0.992***	2.064***
	[0.206]	[0.274]	[0.167]	[0.233]	[0.148]	[0.242]	[0.144]	[0.300]	[0.183]	[0.383]
Log PPP * YTR		-0.031**		-0.029*		-0.025*		-0.048***		-0.061***
		[0.015]		[0.015]		[0.013]		[0.017]		[0.020]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

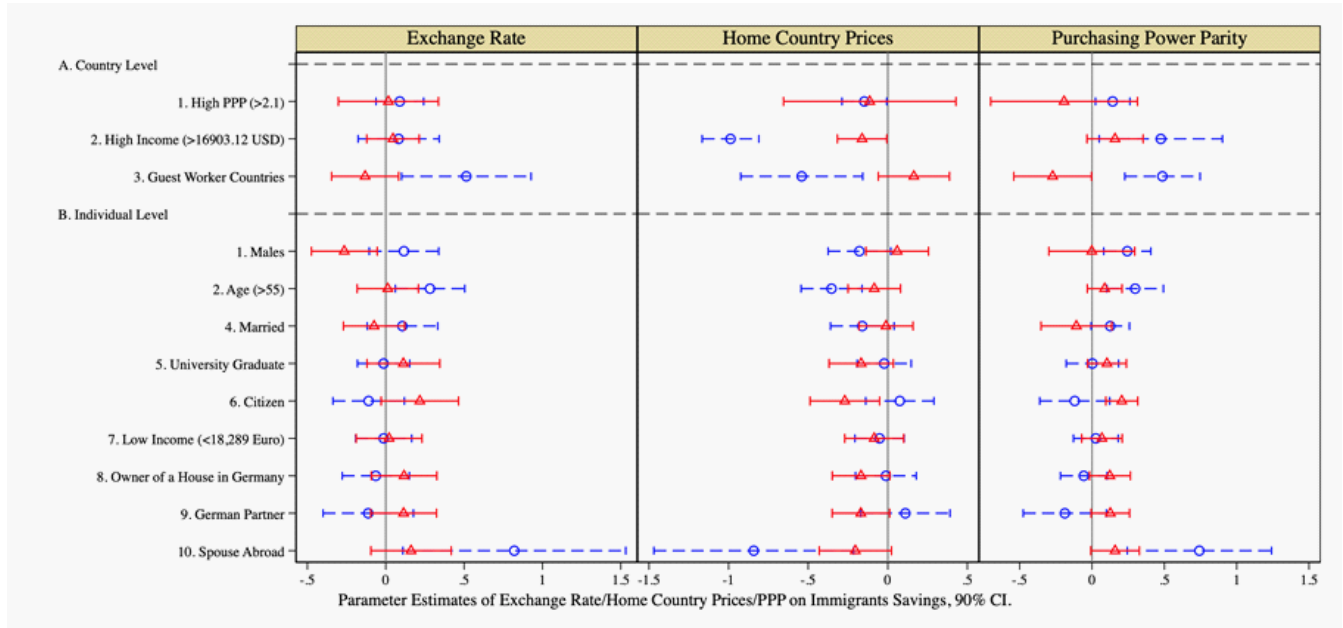
Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 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	1.276	0.308	***	1.457	0.272	***	1.413	0.297	***	1.570	0.337	***	1.902	0.363	***
5	1.069	0.251	***	1.256	0.213	***	1.246	0.238	***	1.352	0.254	***	1.666	0.263	***
10	0.863	0.209	***	1.056	0.167	***	1.079	0.189	***	1.135	0.184	***	1.430	0.187	***
15	0.656	0.191	***	0.856	0.148	***	0.912	0.161	***	0.917	0.149	***	1.194	0.173	***
20	0.449	0.204	**	0.655	0.166	***	0.744	0.165	***	0.700	0.172	***	0.958	0.232	***
25	0.242	0.243		0.455	0.212	**	0.577	0.199	***	0.482	0.236	**	0.722	0.326	**
30	0.036	0.298		0.255	0.272		0.410	0.251		0.265	0.318		0.486	0.433	
35	-0.171	0.362		0.054	0.338		0.243	0.312		0.047	0.406		0.250	0.546	
40	-0.378	0.431		-0.146	0.408		0.075	0.378		-0.170	0.498		0.013	0.662	
B) Log Home Country Price Level															
YTR	Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE	
0	-1.267	0.276	***	-1.409	0.236	***	-1.404	0.272	***	-1.538	0.326	***	-1.883	0.347	***
5	-1.078	0.222	***	-1.229	0.186	***	-1.246	0.220	***	-1.322	0.250	***	-1.636	0.254	***
10	-0.889	0.183	***	-1.048	0.150	***	-1.088	0.176	***	-1.106	0.184	***	-1.390	0.178	***
15	-0.700	0.169	***	-0.868	0.137	***	-0.930	0.150	***	-0.889	0.145	***	-1.144	0.150	***
20	-0.511	0.186	***	-0.687	0.154	***	-0.773	0.150	***	-0.673	0.154	***	-0.898	0.192	***
25	-0.322	0.227		-0.507	0.193	***	-0.615	0.176	***	-0.457	0.206	**	-0.652	0.273	**
30	-0.133	0.282		-0.326	0.243		-0.457	0.220	**	-0.241	0.277		-0.406	0.369	
35	0.056	0.344		-0.146	0.300		-0.299	0.272		-0.025	0.356		-0.160	0.470	
40	0.244	0.410		0.035	0.359		-0.141	0.329		0.191	0.439		0.087	0.573	

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.

Figure 1: Heterogeneity Analysis according to Selected Country-level and Individual-level Characteristics



Notes: Results are obtained using the interaction model in equation (18), 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 75th percentile. In the panel for individual-level characteristics, a person belongs to the low income group if her income lies below the 25th percentile of this variable.

A Appendix to the Theoretical Model

A.1 Interior Solution

Conditions in the labor and goods markets at home and abroad may be such that it pays to return to the source country at time $\tau < T$. This can well be the case if a worker migrates early in the planning horizon (large T) and/or if the international wage differential in favor of the host country is sufficiently small, while a large price-level differential makes it very attractive for a migrant to consume at home rather than abroad. In such an environment a migrant may choose to return to the source country before the retirement date.

To simplify the analysis and the algebra, we assume as in Section 3 that the rate of time preference and the rates of interest at home and abroad are equal to zero. Thus the objective is to maximize

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

with respect to c_t^* , c_t , and τ , subject to the constraint that the value of the initial stock of assets plus 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.

$$e_0 \left[A_0^* + \int_0^\tau (w^* - p_0^* c_t^*) dt \right] = - \int_\tau^T (w - p_0 c_t) dt - \int_T^{T+R} [e_0 \alpha \tau w^* - p_0 c_t] dt, \quad (\text{A.2})$$

where we use the same notation as in the main text. Defining the Lagrangian associated with a migrant's maximization problem as

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

the first order conditions are

$$\frac{\partial L}{\partial c_t^*} = u'(c_t^*) - \lambda e_0 p_0^* = 0, \quad (\text{A.3})$$

$$\frac{\partial L}{\partial c_t} = u'(c_t) - \lambda p_0 = 0, \quad (\text{A.4})$$

$$\frac{\partial L}{\partial \tau} = u(c_\tau^*) - u(c_\tau) + \lambda [e_0 (w^* - p_0^* c_\tau^*) - (w - p_0 c_\tau) + R e_0 \alpha w^*] = 0 \quad (\text{A.5})$$

and the budget constraint (A.2). 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.

Assuming, as in the main text, that the utility function takes the form $u(x) = \frac{x^{1-\theta}}{1-\theta}$, we can write

$$c_0 = c_0^* \left(\frac{e_0 p_0^*}{p_0} \right)^{1/\theta} = c_0^* \Pi_0^{1/\theta} > c_0^*. \quad (\text{A.6})$$

With the aid of (A.6), eq. (A.5) 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.

$$c_0^* = \left(\frac{1-\theta}{\theta} \right) \frac{e_0 w^* (1 + \alpha R) - w}{p_0 \left(\Pi_0^{1/\theta} - \Pi_0 \right)}. \quad (\text{A.7})$$

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 reflected in the last term of eq. (A.5). This implies a higher optimal consumption rate abroad in eq. (A.7) 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. This is in sharp contrast with the corner solution, analyzed in the main text, where the optimal consumption rate is found to be directly related to the initial stock of assets.

Using (A.6), we can also write the budget constraint (A.2) as

$$e_0 A_0^* + \tau e_0 (w^* - p_0^* c_0^*) + (T - \tau) \left(w - p_0 c_0^* \Pi_0^{1/\theta} \right) + R \left[e_0 \alpha \tau w^* - p_0 c_0^* \Pi_0^{1/\theta} \right] = 0, \quad (\text{A.8})$$

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^* :

$$\tau = \frac{p_0 c_0^* \Pi_0^{1/\theta} (T + R) - T w - e_0 A_0^*}{e_0 (w^* - p_0^* c_0^*) - \left(w - p_0 c_0^* \Pi_0^{1/\theta} \right) + R e_0 \alpha w^*}. \quad (\text{A.9})$$

Thus a larger initial stock of asset holdings results in a shorter optimal duration of stay abroad. 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. (A.7) into (A.9) to determine the value of τ that is just sufficient to enable the migrant to cover the cost of her optimal consumption program.

It is interesting to ask under what conditions does a migrant find the corner solution rather than an interior solution to be optimal. Intuitively, a temporary migrant chooses the corner solution when the value of c^* that satisfies condition (A.7) and the corresponding value of c ,

given by eq.(A.6), 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 (6) and (7) of the main text and the budget constraint (3) (with the duration of stay abroad set at $\tau = T$).

A.1.1 An Unanticipated Change in PPP

We can determine the impact of an unanticipated change in e , p , or p^* on saving and consumption rates abroad by simply differentiating (A.7) 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 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 %age change in each of the relevant price variables can be written as follows:

$$\frac{d(p_0^*c_0^*)}{de_0} \frac{e_0}{p_0^*c_0^*} = \frac{w}{ew^*(1 + R\alpha) - w} - \left(\frac{1 - \theta}{\theta}\right) \frac{\Pi_0^{1/\theta-1}}{\Pi_0^{1/\theta-1} - 1}, \quad (\text{A.10})$$

$$\frac{d(p_0^*c_0^*)}{dp_0^*} \frac{p_0^*}{p_0^*c_0^*} = 1 - \frac{\frac{1}{\theta}\Pi_0^{1/\theta-1} - 1}{\Pi_0^{1/\theta-1} - 1} \geq 0 \Leftrightarrow \theta \geq 1, \quad (\text{A.11})$$

$$\frac{d(p_0^*c_0^*)}{dp_0} \frac{p_0}{p_0^*c_0^*} = \left(\frac{1 - \theta}{\theta}\right) \frac{\Pi_0^{1/\theta-1}}{\Pi_0^{1/\theta-1} - 1} \geq 0 \Leftrightarrow \theta \leq 1, \quad (\text{A.12})$$

$$\frac{d(p_0^*c_0^*)}{dw} \frac{w}{p_0^*c_0^*} = -\frac{w}{ew^*(1 + R\alpha) - w} < 0, \quad (\text{A.13})$$

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 $\theta < 1$.³⁰ 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. (A.10) and (A.12) 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 . 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. (A.10), (A.12), and (A.13) is zero). Furthermore, in light of eqs. (A.10) - (A.13), it is interesting to note that in contrast with the case of the corner solution, the timing, ϕ , of the unanticipated shock does not affect the magnitude of the change in the saving rate when an interior solution is optimal.

³⁰Our focus here is on a migrant's spending abroad and the implications for her saving behavior. The effect on the consumption rate at *home* follows directly from eq. (A.6): c_1 increases relative to c_1^* in response to an unanticipated increase in p^* or a decrease in p .

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A.2 Corner Solution: Nominal Consumption Changes Due to a PPP shock (Proposition 1)

The results in eqs. (10) - (12) can be derived in an alternative way by considering the difference between $p_0^*c_0^*$ and $p_1^*c_1^*$, which we define as Δ , for convenience:

$$\begin{aligned}
 \Delta \equiv p_1^*c_1^* - p_0^*c_0^* &= \frac{A_0^* + \phi(w^* - p_0^*c_0^*) + [T - \phi + R\alpha T]w^*}{T - \phi + R\Pi_1^{1/\theta-1}} - p_0^*c_0^* = \\
 &= \frac{A_0^* - \phi p_0^*c_0^* + T(1 + R\alpha)w^*}{T - \phi + R\Pi_1^{1/\theta-1}} - p_0^*c_0^* = \\
 &= \frac{A_0^* - \phi p_0^*c_0^* + T(1 + R\alpha)w^* - (T - \phi + R\Pi_1^{1/\theta-1})p_0^*c_0^*}{T - \phi + R\Pi_1^{1/\theta-1}} = \\
 &= \frac{A_0^* + T(1 + R\alpha)w^* - (T + R\Pi_1^{1/\theta-1})p_0^*c_0^*}{T - \phi + R\Pi_1^{1/\theta-1}}.
 \end{aligned}$$

The sign of this expression depends only on the sign of the numerator, which can be developed as follows, using the solution for c_0^* from eq. (7):

$$\begin{aligned}
 &A_0^* + T(1 + R\alpha)w^* - (T + R\Pi_1^{1/\theta-1})p_0^*c_0^* = \\
 &= A_0^* + T(1 + R\alpha)w^* - [A_0^* + T(1 + \alpha R)w^*] \frac{(T + R\Pi_1^{1/\theta-1})}{(T + R\Pi_0^{1/\theta-1})} = \\
 &= [A_0^* + T(1 + \alpha R)w^*] \left[1 - \frac{(T + R\Pi_1^{1/\theta-1})}{(T + R\Pi_0^{1/\theta-1})} \right].
 \end{aligned}$$

The sign of the expression depends on the relationship between Π_0 and Π_1 and the magnitude of θ . Thus, if

- e increases (holding prices fixed), then $\Pi_1 > \Pi_0$ and $\Pi_1^{1/\theta-1} \geq \Pi_0^{1/\theta-1} \Leftrightarrow \theta \leq 1$;
- p^* increases, then $\Pi_1 > \Pi_0$ and $\Pi_1^{1/\theta-1} \geq \Pi_0^{1/\theta-1} \Leftrightarrow \theta \leq 1$;
- p increases, then $\Pi_1 < \Pi_0$ and $\Pi_1^{1/\theta-1} \geq \Pi_0^{1/\theta-1} \Leftrightarrow \theta \geq 1$.

Thus, a change in PPP which raises e or p^* or lowers p implies that $p_1^*c_1^* \geq p_0^*c_0^*$ iff $\theta \geq 1$.

A.3 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.

$$e_0[A_0^* + \phi(w^* - p_0^*c_0^*)] + (T - \phi)e_1(w^* - p_1^*c_1^*) + R[\alpha T e_1 w^* - \Pi_1^{1/\theta} p_1 c_1^*] = 0, \quad (\text{A.14})$$

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

$$p_1^*c_1^* = \frac{\frac{e_0}{e_1}[A_0^* + \phi(w^* - p_0^*c_0^*)] + [T - \phi + R\alpha T]w^*}{[T - \phi + R\Pi_1^{1/\theta-1}]}. \quad (\text{A.15})$$

The impact of a change in any of the components of PPP on $p^*c_1^*$ can be seen by differentiating eq. (A.15) with respect to each of the variables.

$$\begin{aligned} \frac{d(p_1^*c_1^*)}{de_1} \frac{e_1}{p_1^*c_1^*} &= -\frac{[1 + R(\frac{1-\theta}{\theta})\Pi_1^{1/\theta-1}]}{T - \phi + R\Pi_1^{1/\theta-1}} = \\ &= -\frac{1}{T - \phi + R\Pi_1^{1/\theta-1}} - \frac{R(\frac{1-\theta}{\theta})\Pi_1^{1/\theta-1}}{T - \phi + R\Pi_1^{1/\theta-1}} < 0 \Leftrightarrow \theta < 1 \end{aligned} \quad (\text{A.16})$$

$$\frac{d(p_1^*c_1^*)}{dp_1^*} \frac{p_1^*}{p_1^*c_1^*} = -\frac{R(\frac{1-\theta}{\theta})\Pi_1^{1/\theta-1}}{T - \phi + R\Pi_1^{1/\theta-1}} \geq 0 \Leftrightarrow \theta \geq 1, \quad (\text{A.17})$$

$$\frac{d(p_1^*c_1^*)}{dp_1} \frac{p_1}{p_1^*c_1^*} = \frac{R(\frac{1-\theta}{\theta})\Pi_1^{1/\theta-1}}{T - \phi + R\Pi_1^{1/\theta-1}} \geq 0 \Leftrightarrow \theta \leq 1. \quad (\text{A.18})$$

Comparing Eq. (10) with (A.16), we see that the last terms are identical, while the first term in (A.16) 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. (A.17) and (A.18) are, on the other hand, exactly identical to (11) and (12), respectively.

The effect of YSM on (A.16) – (A.18) is also identical to (13) – (15). 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 (10) and (A.16) are identical, we need to consider only the effect of ϕ on the first term in (A.16). This is given by

$$-\frac{d}{d\phi} \left\{ \frac{1}{T - \phi + R\Pi_1^{1/\theta-1}} \right\} = -\frac{1}{\left[T - \phi + R\Pi_1^{1/\theta-1} \right]^2} < 0. \quad (\text{A.19})$$

Since (13) is negative (for $\theta < 1$), which is also the same as the effect of YSM on the last term in (A.16), we can conclude that the overall effect of YSM on (A.16) 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.

B Appendix B: Tables and Figures in Appendix

Figure B1: Age Distribution at the Intended Time of Return

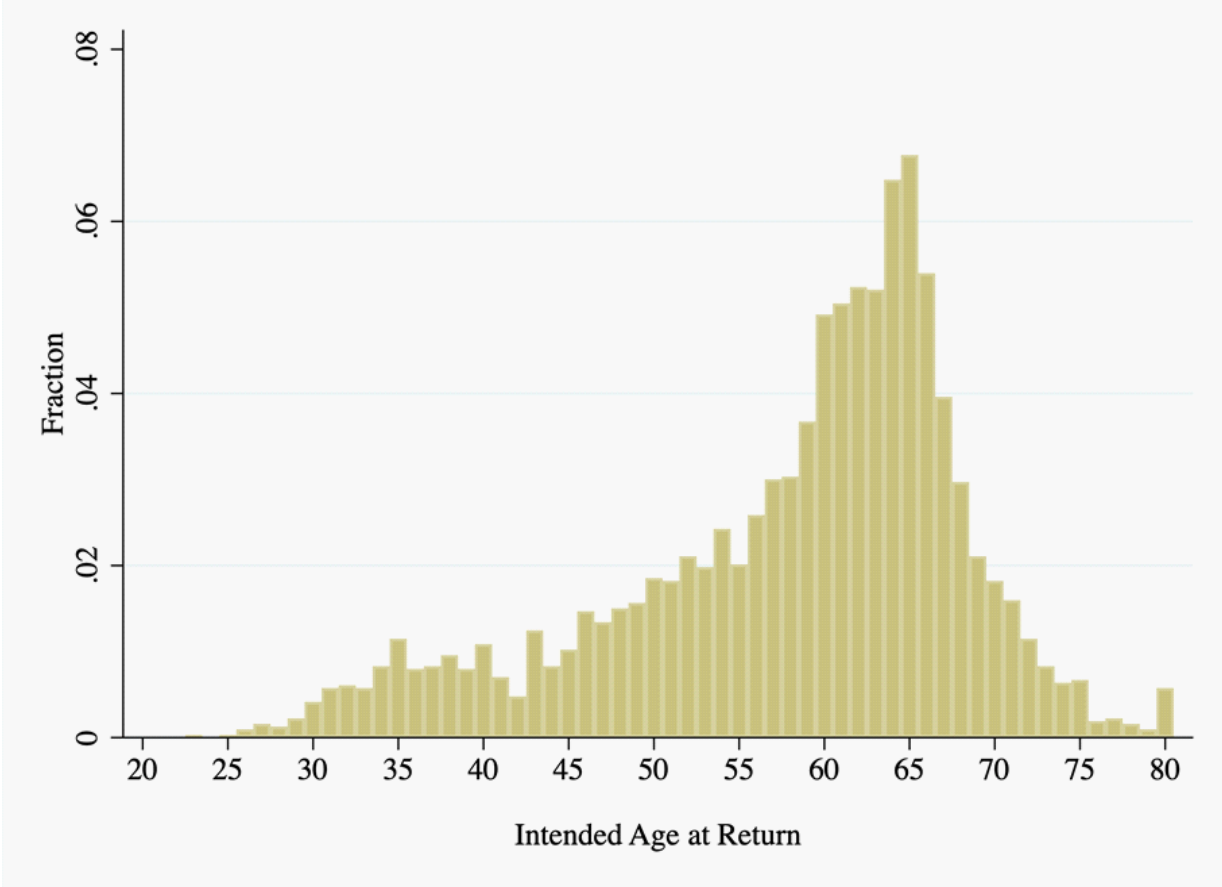


Figure B2: PPP of Selected Countries with Germany

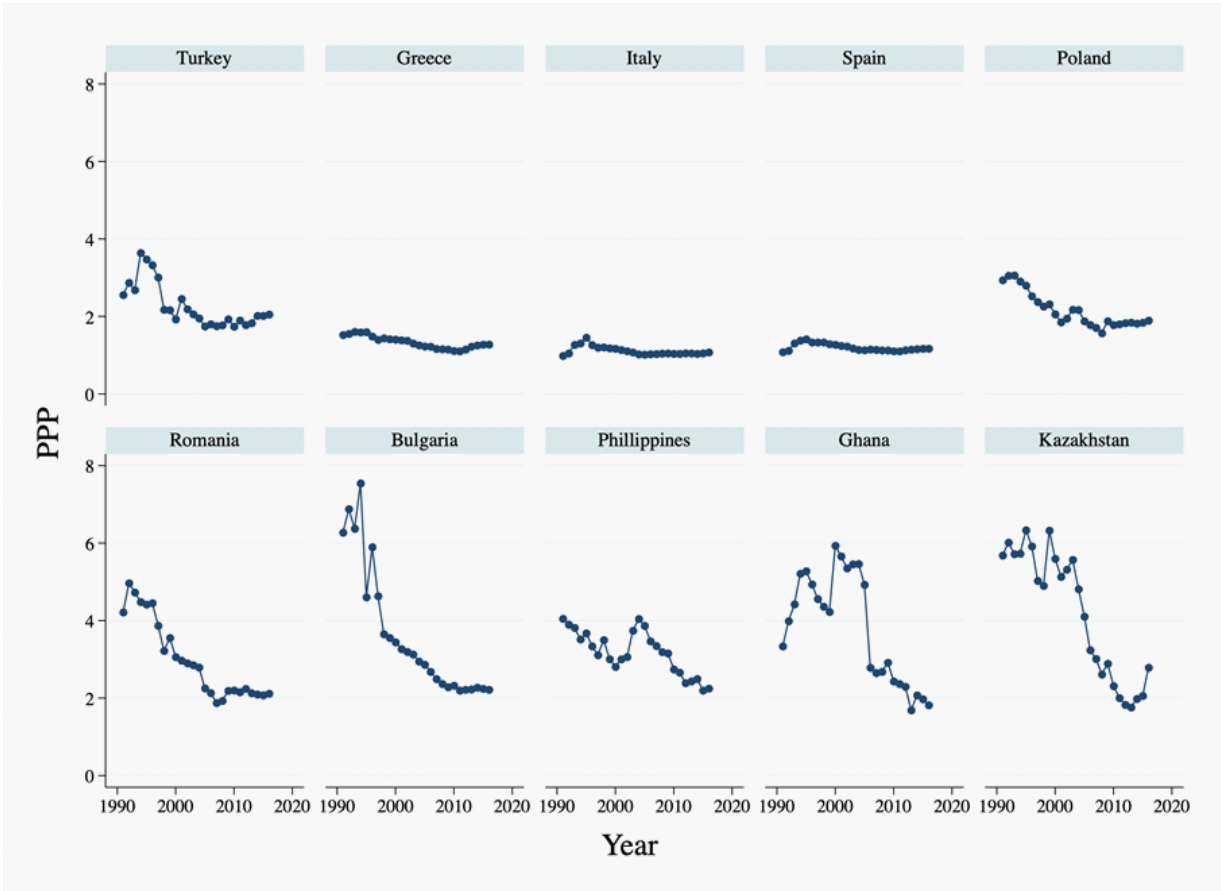


Figure B3: Log Exchange Rate of Selected Countries with Germany

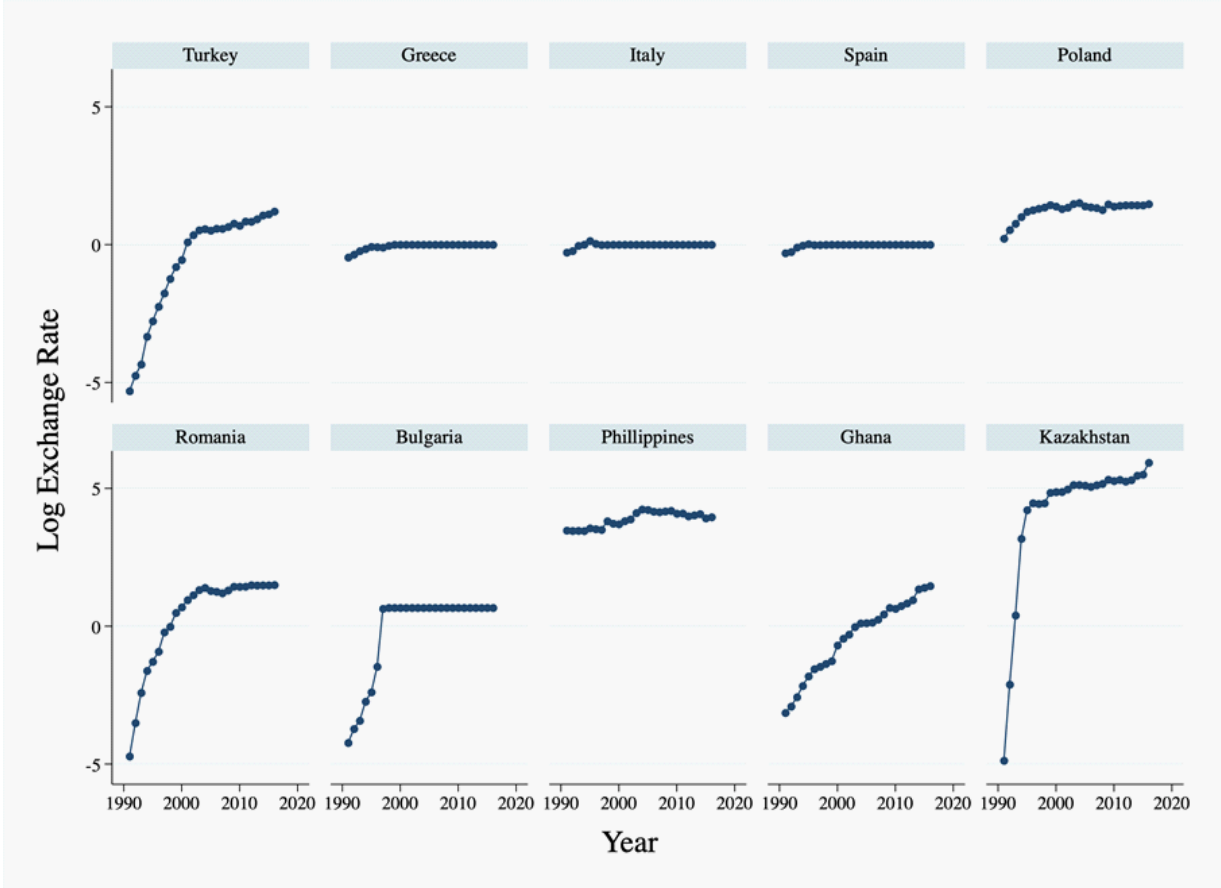


Figure B4: Log Price Level in Selected Source Countries

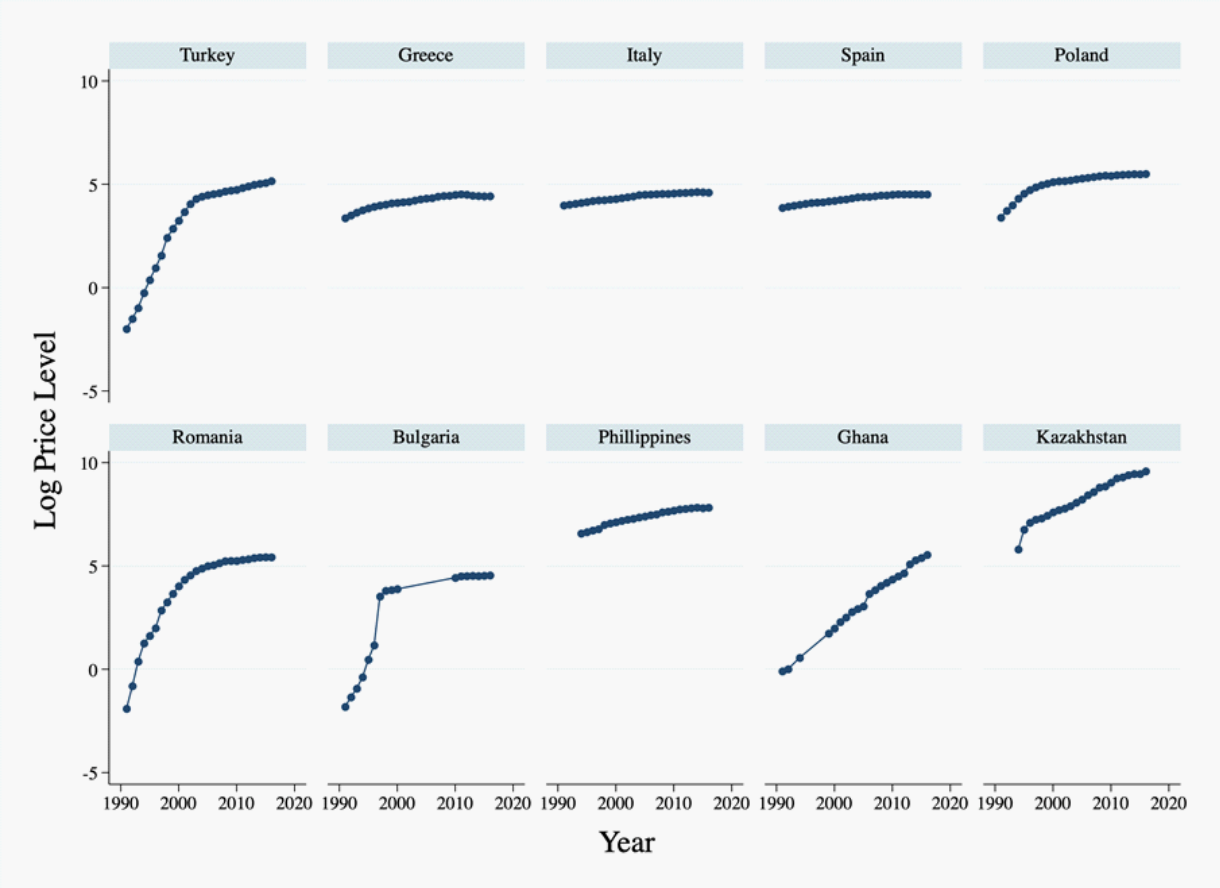


Table B1: Descriptive Statistics by Return Intentions

	Full Sample (Sample A)	Return Intention at Least for One Year (Sample B)	Return Intention more than 20% of the Time (Sample C)	Return Intention more than 40% of the Time (Sample D)	Return Intention more than 60% of the Time (Sample E)
A) Household-Level Characteristics (Individual-level characteristics are for the head of the household.)					
A1) Cross-Section Characteristics					
Year of Immigration	1995.033	1986.841	1987.519	1987.599	1988.391
Age at Arrival	29.249	27.995	28.093	28.154	28.290
Male	0.622	0.732	0.726	0.717	0.713
A2) Panel-Level Characteristics					
Positive Savings	0.367	0.401	0.404	0.402	0.418
Average Monthly Savings (Euros)	225.620	283.402	286.304	292.134	319.498
Adjusted Savings (using Min. Consumption)	208.868	257.077	260.020	262.350	286.398
Saving Rate (using Adjusted Savings)	0.076	0.094	0.096	0.097	0.104
Average Monthly Savings conditional on saving	615.242	706.302	709.088	726.305	764.880
Adjusted Savings conditional on saving	569.561	640.694	643.989	652.254	685.639
Saving Rate conditional on saving	0.206	0.235	0.237	0.242	0.249
Intend to Return	0.352	0.592	0.652	0.744	0.852
Age	45.813	48.351	48.239	48.355	48.058
Years since migration	17.891	21.733	21.531	21.427	20.917
Years to retirement	19.187	16.649	16.761	16.645	16.942
Annual Household Income (Euros)	27930.150	28208.390	28161.450	28234.220	28331.100
Household Size	3.131	3.195	3.188	3.166	3.087
Employed (Household head)	0.620	0.659	0.663	0.655	0.652
Number employed in household	1.230	1.403	1.413	1.404	1.388
Married	0.742	0.792	0.787	0.784	0.785
Spouse abroad	0.023	0.031	0.034	0.036	0.041
Child abroad	0.044	0.046	0.051	0.054	0.061
Partner German	0.108	0.106	0.093	0.075	0.081
B) Country-level Characteristics					
Purchasing Power Parity	2.154	1.994	1.952	1.938	1.908
Exchange Rate (1 Euro as local currency)	231.263	173.420	134.817	150.358	124.137
Price in Home Country	7809.687	5657.584	4563.700	5005.347	4435.974
Price in Germany (CPI=100 in 2010)	92.385	87.678	87.871	87.946	87.803
Gross Domestic Product	14423.760	16869.600	17121.410	17348.260	17536.140
Country Conflict Index	0.682	0.924	0.918	0.885	0.896

Notes: The main sample includes immigrant household heads who arrived in Germany after age 18 in the 1992-2017 waves of the German Socioeconomic Panel. The set of origin countries of immigrants is restricted to those where the average GDP per capita in the 1991-2016 period is lower than that in Germany and where purchasing power parity in the 1991-2016 period is higher than that in Germany -- which essentially excludes rich countries from the sample. Origin countries for which key macro-variables are not available for any year in the 1991-2016 period are also excluded (most notably ex-Yugoslavia). The sample also excludes ethnic-German migrants and refugees/asylum seekers. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The panel format is restricted to observations in which individuals are under the age of 65.

Table B2: Descriptive Statistics by Country of Origin

	PPP	Exchange Rate	Price in Home Country	Monthly Saving	Positive Saving	Saving Rate	Intend to Return	No. Obs.	No. HH
Turkey	2.468	0.91	45.83	195.16	0.300	0.066	0.439	2532	431
Greece	1.428	0.89	56.31	360.21	0.462	0.121	0.591	898	180
Italy	1.140	0.98	76.13	294.18	0.432	0.099	0.507	1458	265
Spain	1.223	0.94	67.58	471.28	0.606	0.165	0.581	525	122
Chile	1.768	602.72	32770.11	411.42	0.783	0.116	0.385	23	3
Romania	2.326	4.03	192.30	219.65	0.356	0.066	0.139	689	253
Poland	1.939	4.05	212.30	165.95	0.375	0.058	0.163	1199	378
Korea	1.477	1373.43	88602.11	123.79	0.423	0.044	0.200	26	5
Iran	4.151	13647.40	405333.70	84.82	0.171	0.018	0.221	70	16
Indonesia	4.307	10677.73	302832.20	40.75	0.286	0.011	0.857	7	2
Hungary	1.904	271.44	14478.74	296.15	0.439	0.091	0.227	139	47
Bolivia	2.562	8.95	375.25	406.03	0.750	0.090	0.250	8	3
Portugal	1.379	1.00	70.67	294.29	0.426	0.088	0.288	54	17
Bulgaria	2.482	1.86	86.84	94.90	0.171	0.031	0.148	181	90
Czech Republic	2.379	31.90	1307.65	411.32	0.585	0.160	0.237	130	27
Mexico	1.717	17.13	1032.53	121.01	0.500	0.025	0.750	4	2
Argentina	1.559	7.98	549.41	84.08	0.429	0.069	1.000	7	5
Philippines	3.014	54.49	1807.59	79.36	0.341	0.038	0.389	41	8
Israel	1.058	4.64	435.68	0.00	0.000	0.000	0.500	6	2
India	3.536	73.53	2195.06	591.57	0.595	0.126	0.333	37	20
Afghanistan	3.426	66.31	2052.27	0.00	0.000	0.000	0.200	21	7
Thailand	2.529	40.35	1697.01	74.13	0.214	0.020	0.214	14	5
Ethiopia	3.609	13.08	401.51	61.51	0.286	0.021	0.000	14	4
Columbia	2.332	2127.68	91771.30	0.00	0.000	0.000	0.500	4	2
Ghana	3.024	2.08	97.69	116.39	0.175	0.041	0.297	40	14
Bangladesh	2.955	103.11	3721.50	0.00	0.000	0.000	0.000	1	1
Venezuela	1.206	7.77	698.73	193.55	0.400	0.032	0.000	5	4
Tunisia	2.666	2.21	87.83	20.29	0.163	0.010	0.095	43	20
Nigeria	2.147	214.75	10864.44	10.52	0.125	0.011	0.250	24	9
New Zealand	0.857	1.61	197.44	15.77	0.333	0.006	1.000	3	2
Tanzania	7.663	699.34	7280.75	315.91	0.500	0.296	1.000	2	1
Iraq	3.279	1545.46	53400.00	1.52	0.029	0.001	0.057	35	11
Brazil	1.354	2.92	225.11	37.24	0.214	0.016	0.286	14	8
Peru	1.857	3.63	206.89	182.47	0.615	0.048	0.333	13	6
Sri Lanka	3.719	141.80	4244.80	7.18	0.133	0.004	0.000	15	6
Nepal	3.270	126.08	4135.65	0.00	0.000	0.000	0.667	3	3
Morocco	2.389	11.05	485.00	17.60	0.093	0.008	0.165	86	41
China	2.202	8.56	413.42	420.65	0.688	0.126	0.442	48	18
Moldavia	3.240	16.59	613.88	407.48	0.529	0.094	0.129	34	11
Kazakhstan	4.070	164.60	5153.23	113.78	0.389	0.047	0.016	517	95
Albania	3.094	131.41	4531.47	307.01	0.373	0.060	0.333	51	9
Lebanon	1.686	1750.23	105241.90	25.74	0.106	0.009	0.174	47	16
Kyrgyzstan	3.862	54.59	1600.98	104.12	0.306	0.041	0.063	49	14
Ukraine	3.180	12.03	438.92	114.52	0.281	0.032	0.060	192	61
Algeria	3.240	94.27	2933.98	61.32	0.600	0.043	0.800	5	2
Mozambique	1.955	41.60	2268.87	0.00	0.000	0.000	0.000	1	1
Egypt	4.069	7.23	208.49	13.83	0.087	0.008	0.227	46	15
Tajikistan	2.515	6.26	261.95	168.07	0.500	0.045	0.000	4	2
Vietnam	3.374	24243.36	796765.80	31.31	0.172	0.020	0.259	29	10
Pakistan	3.787	110.82	3294.72	0.00	0.000	0.000	0.125	34	13
South Africa	1.907	10.54	575.89	455.94	0.600	0.145	0.375	10	5
El Salvador	2.469	1.12	39.50	568.73	0.700	0.149	1.000	10	1
Eritrea	5.395	19.81	346.90	0.00	0.000	0.000	0.000	3	1
Jordan	2.306	0.90	41.02	770.60	0.692	0.196	0.231	13	6
Burkina Faso	3.804	673.19	14092.66	0.00	0.000	0.000	1.000	3	2
Ecuador	2.068	1.32	67.11	0.00	0.000	0.000	0.500	4	2
Uzbekistan	2.723	2791.38	109327.60	3.43	0.071	0.001	0.286	14	6
Laos	2.783	9662.72	368877.30	0.00	0.000	0.000	1.000	2	1
Angola	1.431	139.74	10305.59	0.00	0.000	0.000	0.000	9	2
Latvia	1.573	1.00	66.33	148.88	0.300	0.047	0.100	20	11
Namibia	2.333	7.90	296.23	51.23	0.333	0.076	0.429	9	2
Dominican Rep	2.279	39.41	1610.64	0.00	0.000	0.000	0.500	2	1
Nicaragua	2.439	31.88	1396.35	0.00	0.000	0.000	0.000	5	1
Kenya	2.289	112.75	5267.99	70.58	0.250	0.070	0.400	12	7
Libya	1.948	1.62	86.67	0.00	0.000	0.000	1.000	1	1
Croatia	1.668	7.47	445.41	101.74	0.283	0.033	0.337	92	25
Slovenia	1.301	1.00	81.43	121.02	0.167	0.036	0.294	18	9
Slovakia	1.705	1.00	60.11	592.08	0.578	0.154	0.244	45	17
Paraguay	3.815	4208.56	107103.30	320.18	0.667	0.188	0.000	18	3
Guinea	2.525	9334.05	392527.50	0.00	0.000	0.000	0.600	5	2
Malaysia	2.332	4.34	198.58	562.59	1.000	0.104	0.000	1	1
Azerbaijan	3.053	1.15	41.43	0.00	0.000	0.000	0.190	21	5
Belarus	2.862	0.98	40.20	133.33	0.410	0.034	0.051	39	14
Mali	3.684	655.96	15417.23	0.00	0.000	0.000	0.500	2	1
Cameroon	2.241	655.96	30723.23	21.70	0.182	0.010	1.000	11	5
Kosovo-Albania	2.371	1.00	44.58	43.61	0.198	0.016	0.117	96	38
Georgia	2.068	2.31	118.09	136.05	0.417	0.052	0.143	24	13
Togo	2.381	655.96	29084.59	188.87	0.667	0.071	1.000	3	1
Mongolia	2.926	2411.92	87923.09	375.06	1.000	0.085	0.000	1	1
Lithuania	1.736	1.00	61.51	114.04	0.231	0.034	0.231	26	12
Chad	3.324	655.97	18736.14	24.81	0.111	0.018	1.000	9	1
Armenia	2.112	532.13	26684.62	0.00	0.000	0.000	0.111	9	4
Turkmenistan	1.940	3.78	207.82	0.00	0.000	0.000	0.000	1	1
Serbia	2.292	116.64	5393.89	44.00	0.158	0.015	0.196	57	30
Gambia	3.911	55.37	1509.88	0.00	0.000	0.000	0.000	1	1
Montenegro	2.142	1.00	49.63	0.00	0.000	0.000	0.000	7	2
Surinam	1.878	5.17	287.70	619.86	1.000	0.151	0.667	3	1
Rwanda	2.307	789.28	35623.13	0.00	0.000	0.000	1.000	1	1

Notes: The cell for the return intention variable is empty for some countries due to missing observations for this variable.

Table B3: Effects of Other Control Variables

	Dependent Variable: 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	1.164*** [0.099]	1.162*** [0.093]	1.212*** [0.078]	1.212*** [0.076]	1.241*** [0.064]	1.236*** [0.065]	1.282*** [0.078]	1.276*** [0.080]	1.217*** [0.060]	1.212*** [0.067]
Log Household Size	-0.371** [0.162]	-0.388** [0.162]	-0.405* [0.212]	-0.429** [0.217]	-0.334* [0.198]	-0.360* [0.208]	-0.373*** [0.141]	-0.423*** [0.143]	-0.452*** [0.162]	-0.543*** [0.150]
Employed (H. Head)	0.094 [0.057]	0.106 [0.069]	0.135 [0.085]	0.131 [0.105]	0.124 [0.094]	0.118 [0.116]	0.083 [0.123]	0.062 [0.129]	0.137 [0.170]	0.107 [0.166]
Number Employed	0.038 [0.039]	0.044 [0.039]	0.042 [0.037]	0.044 [0.035]	0.042 [0.035]	0.044 [0.034]	0.022 [0.030]	0.031 [0.033]	0.031 [0.052]	0.045 [0.057]
Married (H. Head)	0.211 [0.143]	0.222 [0.145]	0.319* [0.183]	0.301 [0.184]	0.241 [0.151]	0.219 [0.148]	0.334* [0.189]	0.324* [0.187]	0.310** [0.123]	0.330*** [0.118]
Spouse Abroad (H. Head)	0.161 [0.270]	0.044 [0.230]	0.178 [0.233]	0.107 [0.212]	0.169 [0.222]	0.122 [0.206]	0.145 [0.199]	0.092 [0.188]	0.154 [0.173]	0.110 [0.172]
Child Abroad (H. Head)	0.148 [0.153]	0.160 [0.149]	0.097 [0.180]	0.104 [0.170]	0.127 [0.184]	0.135 [0.175]	0.111 [0.195]	0.133 [0.192]	0.098 [0.204]	0.118 [0.201]
German Partner (H. Head)	0.000 [0.000]	-0.009 [0.149]	0.020 [0.310]	0.008 [0.313]	-0.125 [0.448]	-0.133 [0.453]	-0.678 [0.529]	-0.712 [0.534]	-0.876 [0.570]	-0.921 [0.576]
Log GDP per capita	-0.064 [0.351]	-0.617 [0.403]	-0.555 [0.416]	-1.031** [0.497]	-0.670 [0.442]	-1.005** [0.498]	-0.990** [0.471]	-1.327*** [0.490]	-1.192 [0.965]	-1.462 [0.945]
Political Conflict Index	0.014 [0.029]	0.019 [0.028]	-0.005 [0.032]	0.007 [0.031]	0.047 [0.029]	0.051* [0.030]	0.122*** [0.034]	0.115*** [0.035]	0.186*** [0.047]	0.177*** [0.049]
Duration of Residence										
5-7 years	-0.082 [0.167]	-0.071 [0.161]	-0.166 [0.153]	-0.180 [0.134]	-0.205 [0.162]	-0.227 [0.146]	-0.265 [0.214]	-0.304 [0.213]	-0.361* [0.207]	-0.430* [0.236]
8-11 years	0.053 [0.219]	0.030 [0.199]	0.103 [0.261]	0.060 [0.260]	0.115 [0.219]	0.046 [0.259]	0.197 [0.253]	0.113 [0.280]	0.107 [0.222]	-0.006 [0.274]
12-15 years	0.092 [0.301]	0.077 [0.249]	0.109 [0.339]	0.042 [0.304]	0.101 [0.263]	0.003 [0.285]	0.051 [0.215]	-0.057 [0.245]	-0.103 [0.186]	-0.244 [0.288]
16-20 years	0.180 [0.376]	0.160 [0.345]	-0.005 [0.413]	-0.114 [0.365]	0.004 [0.321]	-0.133 [0.341]	-0.174 [0.266]	-0.329 [0.262]	-0.241 [0.235]	-0.441 [0.345]
21-25 years	0.102 [0.455]	0.101 [0.414]	-0.094 [0.514]	-0.216 [0.434]	-0.098 [0.419]	-0.240 [0.382]	-0.386 [0.369]	-0.541 [0.350]	-0.460 [0.352]	-0.667 [0.462]
26-31 years	0.102 [0.475]	0.083 [0.431]	-0.022 [0.528]	-0.164 [0.451]	-0.058 [0.422]	-0.207 [0.386]	-0.359 [0.380]	-0.516 [0.361]	-0.454 [0.341]	-0.652 [0.439]
32+ years	0.273 [0.550]	0.236 [0.504]	0.111 [0.607]	-0.023 [0.529]	0.069 [0.501]	-0.064 [0.455]	-0.224 [0.474]	-0.356 [0.451]	-0.266 [0.409]	-0.422 [0.487]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the variables listed above, the specifications also include year dummies and the key variables of interest as shown in Table 3. 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 B4: Tests of Propositions I and II by Return Intentions, OLS Estimates

	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	0.396 [0.268]	1.078*** [0.261]	0.904** [0.395]	1.291*** [0.478]	0.967** [0.442]	1.051** [0.444]	1.024** [0.487]	1.644*** [0.429]	0.671 [0.642]	1.346** [0.590]
Log Exchange Rate * YTR		-0.033*** [0.009]		-0.021 [0.015]		-0.006 [0.017]		-0.038** [0.014]		-0.038 [0.025]
Log Home C. Price	-0.330 [0.260]	-1.020*** [0.263]	-0.822** [0.377]	-1.262*** [0.438]	-0.850** [0.417]	-1.041** [0.406]	-0.879* [0.479]	-1.617*** [0.417]	-0.530 [0.610]	-1.302** [0.570]
Log Home C. Price * YTR		0.034*** [0.009]		0.024* [0.014]		0.012 [0.015]		0.045*** [0.013]		0.044* [0.023]
Log Host C. Price * YTR		-0.029*** [0.009]		-0.023 [0.014]		-0.013 [0.015]		-0.046*** [0.012]		-0.036* [0.021]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	0.282	0.284	0.263	0.264	0.257	0.259	0.250	0.255	0.255	0.260
B) PPP as Key Variable of Interest										
Log PPP	0.267 [0.265]	0.832*** [0.283]	0.666* [0.378]	1.205*** [0.360]	0.596 [0.425]	1.013*** [0.363]	0.607 [0.573]	1.581*** [0.484]	0.205 [0.653]	1.101* [0.624]
Log PPP * YTR		-0.028*** [0.009]		-0.027** [0.012]		-0.023* [0.014]		-0.056*** [0.012]		-0.050** [0.022]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	0.282	0.283	0.262	0.263	0.257	0.257	0.249	0.253	0.255	0.257

Notes: The sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel. The sample excludes ethnic Germans and refugees. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. OLS regressions are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 B5: Tests of Propositions I and II by Return Intentions, OLS Fixed-Effects Estimates

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	0.602**	1.340***	0.804**	1.823***	1.068**	2.066***	1.362***	2.997***	1.567***	3.184***
	[0.292]	[0.509]	[0.396]	[0.628]	[0.406]	[0.685]	[0.403]	[0.766]	[0.522]	[0.676]
Log Exchange Rate * YTR		-0.037*		-0.057***		-0.063***		-0.109***		-0.107***
		[0.019]		[0.021]		[0.022]		[0.031]		[0.032]
Log Home C. Price	-0.570**	-1.296***	-0.736**	-1.681***	-0.998***	-2.047***	-1.231***	-2.994***	-1.445***	-3.238***
	[0.252]	[0.448]	[0.350]	[0.536]	[0.352]	[0.611]	[0.360]	[0.731]	[0.490]	[0.682]
Log Home C. Price * YTR		0.035*		0.051***		0.062***		0.109***		0.110***
		[0.019]		[0.018]		[0.020]		[0.029]		[0.029]
Log Host C. Price * YTR		-0.110		0.068		0.094		0.080		0.046
		[0.105]		[0.096]		[0.094]		[0.123]		[0.093]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.535**	1.169**	0.618*	1.646***	0.882***	2.110***	1.011***	3.101***	1.227**	3.276***
	[0.222]	[0.488]	[0.311]	[0.607]	[0.315]	[0.651]	[0.371]	[0.714]	[0.519]	[0.648]
Log PPP * YTR		-0.031		-0.053**		-0.062***		-0.110***		-0.108***
		[0.020]		[0.023]		[0.023]		[0.026]		[0.021]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel. The sample excludes ethnic Germans and refugees. The data are in person-age format where age is less than 65. 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 year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 B6: Tests of Propositions I and II by Return Intentions, Tobit Estimates

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	1.054*	2.557***	1.950**	2.109*	1.788*	1.154	1.949*	2.782***	1.338	2.461*
	[0.617]	[0.556]	[0.969]	[1.086]	[1.022]	[0.913]	[1.126]	[1.028]	[1.529]	[1.453]
Log Exchange Rate * YTR		-0.075***		-0.012		0.038		-0.055		-0.063
		[0.019]		[0.035]		[0.041]		[0.037]		[0.065]
Log Home C. Price	-1.108*	-2.686***	-1.952**	-2.353**	-1.730*	-1.495*	-1.842*	-3.075***	-1.261	-2.727**
	[0.603]	[0.533]	[0.937]	[0.983]	[0.973]	[0.817]	[1.112]	[0.976]	[1.461]	[1.381]
Log Home C. Price * YTR		0.081***		0.026		-0.014		0.080**		0.084
		[0.018]		[0.031]		[0.036]		[0.032]		[0.060]
Log Host C. Price * YTR		-0.066***		-0.027		0.009		-0.082***		-0.062
		[0.017]		[0.031]		[0.034]		[0.030]		[0.051]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	1.168**	2.499***	1.954**	2.830***	1.609*	2.147**	1.634	3.658***	1.088	3.012**
	[0.588]	[0.573]	[0.884]	[0.842]	[0.916]	[0.880]	[1.183]	[1.192]	[1.391]	[1.474]
Log PPP * YTR		-0.068***		-0.047		-0.031		-0.123***		-0.110**
		[0.019]		[0.031]		[0.035]		[0.035]		[0.056]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel. The sample excludes ethnic Germans and refugees. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Tobit regressions are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 B7: Tests of Propositions I and II by Return Intentions, Honore Tobit Fixed Effects Estimates

	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	0.614 [0.799]	1.745 [1.214]	1.071 [1.148]	2.650 [1.900]	1.550 [1.240]	3.075 [2.966]	1.967 [1.381]	5.013*** [1.806]	2.648 [2.804]	6.388* [3.334]
Log Exchange Rate * YTR		-0.052 [0.053]		-0.088 [0.079]		-0.095 [0.097]		-0.204*** [0.077]		-0.238*** [0.090]
Log Home C. Price	-0.772 [0.712]	-1.898* [1.126]	-1.194 [1.123]	-2.685 [2.067]	-1.658 [1.173]	-3.364 [3.039]	-1.922 [1.247]	-5.308*** [1.973]	-2.608 [2.596]	-6.846* [3.527]
Log Home C. Price * YTR		0.050 [0.052]		0.079 [0.080]		0.099 [0.101]		0.208*** [0.074]		0.249*** [0.091]
Log Host C. Price * YTR		-0.426 [0.280]		-0.044 [0.304]		-0.034 [0.583]		-0.025 [0.609]		-0.060 [0.311]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2524	2524	1075	1075	1014	1014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.951 [0.687]	1.197 [1.143]	1.419 [1.049]	2.166 [1.815]	1.850* [1.049]	2.960 [2.030]	1.841 [1.197]	4.951** [2.047]	2.539 [2.342]	6.460** [3.239]
Log PPP * YTR		-0.012 [0.057]		-0.037 [0.074]		-0.056 [0.084]		-0.164* [0.091]		-0.202*** [0.078]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2524	2524	1075	1075	1014	1014	872	872	708	708

Notes: The sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel. The sample excludes ethnic Germans and refugees. The data are in person-age format where age is less than 65. 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 year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 B8: Tests of Propositions I and II by Return Intentions, Poisson Estimates

	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	0.782*** [0.228]	1.198*** [0.266]	1.111*** [0.199]	1.522*** [0.222]	1.172*** [0.170]	1.449*** [0.233]	1.209*** [0.174]	1.575*** [0.239]	1.368*** [0.292]	1.709*** [0.300]
Log Exchange Rate * YTR		-0.024*** [0.007]		-0.024*** [0.009]		-0.017* [0.010]		-0.024** [0.011]		-0.022* [0.013]
Log Home C. Price	-0.821*** [0.213]	-1.226*** [0.245]	-1.109*** [0.183]	-1.500*** [0.198]	-1.151*** [0.156]	-1.429*** [0.204]	-1.151*** [0.168]	-1.529*** [0.207]	-1.279*** [0.271]	-1.623*** [0.261]
Log Home C. Price * YTR		0.024*** [0.006]		0.023*** [0.008]		0.017* [0.009]		0.024*** [0.009]		0.022** [0.011]
Log Host C. Price * YTR		-0.024*** [0.007]		-0.024** [0.010]		-0.018* [0.011]		-0.024** [0.010]		-0.020* [0.012]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.854*** [0.205]	1.254*** [0.238]	1.107*** [0.173]	1.461*** [0.166]	1.133*** [0.160]	1.424*** [0.165]	1.118*** [0.212]	1.524*** [0.162]	1.203*** [0.337]	1.537*** [0.243]
Log PPP * YTR		-0.024*** [0.007]		-0.021*** [0.008]		-0.018** [0.008]		-0.026*** [0.007]		-0.022** [0.010]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel. The sample excludes ethnic Germans and refugees. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson regressions are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 B9: Robustness Check: Alternative Samples

Dependent Variable: Savings										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(7)	(8)
	Main Sample		Main Sample + Rich Countries (that fail PPP and wage restrictions)		Main Sample + Rich Countries + Ethnic Germans + Refugees		Main Sample excluding Euro Area Countries after 1999		Main Sample Until 2014	
A) Three Elements of PPP as Key Variables of Interest										
Log Exchange Rate	0.434**	1.276***	0.424**	1.083***	0.361**	1.014***	0.493**	1.115***	0.487**	1.254***
	[0.215]	[0.308]	[0.205]	[0.291]	[0.182]	[0.260]	[0.233]	[0.303]	[0.197]	[0.324]
Log Exchange Rate * YTR		-0.041***		-0.031**		-0.033***		-0.032*		-0.037**
		[0.016]		[0.014]		[0.011]		[0.017]		[0.017]
Log Home C. Price	-0.455**	-1.267***	-0.473**	-1.084***	-0.375**	-1.041***	-0.562**	-1.194***	-0.505***	-1.219***
	[0.207]	[0.276]	[0.193]	[0.267]	[0.170]	[0.243]	[0.222]	[0.290]	[0.190]	[0.290]
Log Home C. Price * YTR		0.038**		0.027**		0.031***		0.031*		0.032**
		[0.015]		[0.014]		[0.011]		[0.016]		[0.016]
Log Host C. Price * YTR		-0.079		-0.050		-0.119*		-0.149**		-0.079
		[0.073]		[0.057]		[0.069]		[0.067]		[0.077]
Observations	10,035	10,035	10,892	10,892	13,843	13,843	8,497	8,497	8,138	8,138
No. of households	2,524	2,524	2,735	2,735	3,477	3,477	2,187	2,187	1,895	1,895
B) PPP as Key Variable of Interest										
Log PPP	0.468**	1.094***	0.505***	0.853***	0.387**	0.827***	0.564***	0.928***	0.517***	1.055***
	[0.206]	[0.274]	[0.188]	[0.269]	[0.169]	[0.273]	[0.209]	[0.250]	[0.190]	[0.299]
Log PPP * YTR		-0.031**		-0.017		-0.021*		-0.019		-0.027*
		[0.015]		[0.014]		[0.011]		[0.014]		[0.016]
Observations	10,035	10,035	10,892	10,892	13,843	13,843	8,497	8,497	8,138	8,138
No. of households	2,524	2,524	2,735	2,735	3,477	3,477	2,187	2,187	1,895	1,895

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The definitions of the four alternative samples are given in the column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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.

C Appendix C: Further Robustness Checks

C.1 Alternative Sets of Controls

When we interpret equation (16) in 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 to our main specification.³¹ As can be seen in Table C1, even with this demanding specification, evidence for Proposition 1 remains with all samples (A) through (E). In fact, the elasticity of savings with respect to the exchange rate and with respect to the home-country prices becomes higher. The evidence for Proposition 2 remains with samples (B) to (E), although with our main sample the estimates are just marginally statistically insignificant at the 10% level. The patterns are exactly the same in panel (B) where the key variable of interest is PPP. In essence, our main findings are robust even with this very flexible specification.

The effects of our key variables of interest on savings could 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, while Nguyen and Duncan (2017) find that male immigrants in Australia work fewer hours when the local currency appreciates, but not female immigrants. Hence, household income might be endogenous to our key variables of interest. Similar issues might arise with our other household-level covariates as well. For instance, the key variables of interest might affect whether the spouse and children live in Germany or in the source country via their effect on return intentions.

In light of this, we examine in Table C2 the sensitivity of our findings to the exclusion of household-level covariates on labor market outcomes and household composition. We observe that the results in Table C2 are quite similar to the main results in Table 2. Only the exchange rate variable with the main sample loses its statistical significance; however, its coefficient magnitude is very similar to that in Table 2. Moreover, the home-country price variable, as well as the PPP variable, is still statistically significant with the main sample. In addition, all the results persist with samples (B) to (E). Hence, we can conclude that potential endogeneity of household-level covariates to our key variables of interest does not influence our results. As a further check, we directly examine whether household income responds to our key variables of interest. The estimation results are given in Table C3, where the set of control variables is the same as that in Table 2 except for household income (which is now the dependent variable). These results do not indicate a notable response of household income to the key variables of interest; only the exchange rate variable with the main sample is statistically significant.

³¹This specification check has been ignored by the previous literature on the link between PPP and migrants' economic behavior.

C.2 Alternative Dependent Variables

We now examine the robustness of our findings to the use of alternative definitions of the dependent variable. Table C4 presents OLS estimation results when the dependent variable is a dummy variable for positive savings. Overall, the patterns in Table C4 are highly similar to those in Table 2. Propositions 1 and 2 hold with all samples (B) to (E). With the full sample, the results are mixed. Evidence exists for a negative effect of home country prices, as well as a positive effect of PPP, on the dependent variable. However, the effect of the exchange rate on the dependent variable is marginally statistically insignificant. The interaction terms in column (2) are also not statistically significant with the full sample. Quantitatively, the results imply the 36% increase in the PPP between Germany and Turkey during the 1994 economic crisis in Turkey would increase the probability of saving by 2.7 percentage points—which is equal to a 7.4% increase in the probability of saving, given the baseline level in Table 1. This response would be twice as big for immigrant households who express an intention to return to their home country at least 40% of the time.

In another robustness check, we use the saving rate as the dependent variable. The estimation results with this dependent variable, presented in Table C5, show that our key findings hold. Evidence for Proposition 2 exists for all samples,³² whereas evidence for Proposition 1 is limited to samples (B) to (E). With sample (A), both the exchange rate and home-country price variables are just marginally insignificant; however, the PPP variable is statistically significant. Quantitatively, with the full sample, a 36% increase in the PPP—as in the 2001 economic crisis in Turkey—brings about roughly a 10 percentage-point increase in the saving rate, which is equivalent to a 28% rise. Again, the magnitudes of the coefficients become much larger as we restrict the samples by return intentions.

We present the results when no correction is made for saving rate values above one in Table C6. Here, the evidence becomes stronger in terms of statistical significance. Evidence for both propositions exists with all samples. We also check the robustness of our findings in Table 2 to the outlier values of the savings variable. For this purpose, we use the adjusted savings based on the minimum consumption approach outlined earlier, which ensures that savings do not exceed household income minus the minimum consumption needs. The estimation results, given in Table C7, show that the results in Table 2 are not sensitive to the exclusion of the outlier values of savings. Evidence for Proposition 2 holds for all samples whereas evidence for Proposition 1 remains for samples (B) to (E).

³²In fact, with the main sample, the interaction term with host-country prices is also statistically significant and has the coefficient in the expected direction.

C.3 Missing Observations

Conditional on the restrictions in our main sample definition, some observations do not enter our main sample of 10,035 observations because at least one variable in our specification is missing for them. For instance, the dependent variable (the amount of savings) is missing for 17.7% of the potential observations. When we account for all variables, including the control variables on country-level and household-level characteristics, we are missing 26.5% of the potential observations conditional on our sample definition. The fraction of missing observations drops to 21.7% with data until 2014—which we used for a robustness check in Table 5—as data after 2015 have more missing observations due to the change in the questionnaire.

In another robustness check, we examine whether potential non-randomness of missing observations could cause a bias. For this purpose, we generate a missing-variable dummy, which takes the value of one if any of the variables in our main specification—other than the three key macro-level variables—is missing and zero otherwise. We check whether this dummy variable is related to our key macro-level variables. The results of OLS estimation of this variable on the key variables of interest, given in Table C8, show that this missing-variable dummy does not depend on the key variables of interest for samples (A) and (D). Statistical evidence at the 10% level of an association between home country prices and the missing-variable dummy exists only with sample (E).³³

C.4 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 the 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 in which an individual is in the sample and the value of one only for the first year he/she is not in the sample, and estimate equation (16) with this dummy as the dependent variable. The results

³³Here, the definitions of samples (A) to (E) are the same; however, obviously the number of observations are different as the main sample is different.

of this estimation are given in Table C9.³⁴ Across all five samples, only with sample (E) do we find evidence that attrition is affected by the key variables of interest.

In another approach to assess the effects of potential nonrandom panel attrition, we redo our main estimation in Table 2 with restrictions on duration of residence. We place four alternative restrictions on duration of residence: (i) 25 or fewer years (lower 75 percentile of the sample), (ii) 20 or fewer years (lower 62.5 percentile), (iii) 15 or fewer years (lower half), (iv) 11 or fewer years (lower 37.5 percentile). The estimation results are provided in Table C10. The evidence for Proposition 2 holds, even with the smallest samples; however, the evidence for Proposition 1 is less robust with smaller samples.

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 (Kirdar, 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.

³⁴This regression has fewer observations because the attrition dummy variable cannot be defined for the last year or for the last age (age 65) in the sample.

Table C1: Country-Specific Time Trends as Additional Control Variables

	Dependent Variable: Savings									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Main 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	0.505***	0.876***	0.548***	1.225***	0.586***	1.329***	0.646***	1.384***	0.862***	1.671***
	[0.125]	[0.284]	[0.132]	[0.233]	[0.134]	[0.265]	[0.126]	[0.230]	[0.222]	[0.376]
Log Exchange Rate * YTR		-0.023		-0.044***		-0.049***		-0.056***		-0.060***
		[0.017]		[0.009]		[0.012]		[0.012]		[0.018]
Log Home C. Price	-0.587***	-0.994***	-0.535***	-1.170***	-0.607***	-1.315***	-0.760***	-1.549***	-1.063***	-1.932***
	[0.152]	[0.256]	[0.140]	[0.200]	[0.166]	[0.228]	[0.167]	[0.238]	[0.217]	[0.363]
Log Home C. Price * YTR		0.023		0.042***		0.048***		0.057***		0.062***
		[0.016]		[0.008]		[0.009]		[0.010]		[0.016]
Log Host C. Price * YTR		-0.118		-0.059		-0.060		-0.108		-0.085
		[0.084]		[0.078]		[0.091]		[0.080]		[0.080]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.553***	0.939***	0.542***	1.138***	0.595***	1.270***	0.693***	1.500***	0.926***	1.831***
	[0.140]	[0.257]	[0.132]	[0.157]	[0.145]	[0.203]	[0.133]	[0.226]	[0.203]	[0.338]
Log PPP * YTR		-0.024		-0.040***		-0.046***		-0.060***		-0.065***
		[0.016]		[0.006]		[0.005]		[0.008]		[0.013]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include year dummies, source-country-specific time trends, additional source-country level covariates, and several individual-level covariates. 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. 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 C2: Exclusion of Household-Level Covariates on Labor Market Outcomes and Household Composition

	Dependent Variable: 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	0.349	1.413***	0.799***	1.750***	0.875***	1.684***	0.941***	1.711***	1.122***	1.850***
	[0.270]	[0.337]	[0.248]	[0.274]	[0.224]	[0.264]	[0.179]	[0.300]	[0.205]	[0.390]
Log Exchange Rate * YTR		-0.057***		-0.062***		-0.056***		-0.058***		-0.052*
		[0.018]		[0.016]		[0.017]		[0.022]		[0.029]
Log Home C. Price	-0.436*	-1.482***	-0.864***	-1.794***	-0.928***	-1.755***	-0.933***	-1.777***	-1.094***	-1.951***
	[0.259]	[0.321]	[0.245]	[0.248]	[0.225]	[0.253]	[0.181]	[0.296]	[0.185]	[0.380]
Log Home C. Price * YTR		0.053***		0.058***		0.054***		0.059***		0.056**
		[0.018]		[0.014]		[0.016]		[0.020]		[0.026]
Log Host C. Price * YTR		0.066		0.132**		0.156*		0.132		0.116
		[0.063]		[0.057]		[0.082]		[0.089]		[0.090]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.488*	1.203***	0.917***	1.409***	0.963***	1.420***	0.929***	1.590***	1.074***	1.861***
	[0.260]	[0.295]	[0.242]	[0.205]	[0.228]	[0.182]	[0.186]	[0.227]	[0.188]	[0.350]
Log PPP * YTR		-0.036**		-0.027**		-0.026*		-0.040**		-0.044**
		[0.015]		[0.014]		[0.015]		[0.017]		[0.022]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables interest, the specifications include year and duration of residence dummies, and source-country level covariates -- which are the logarithm of GDP per capita and a political conflict index. 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 C3: Effects of Key Variables of Interest on Household Income

	Dependent Variable: Log Household Income				
	(1)	(2)	(3)	(4)	(5)
	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	-0.068** [0.032]	-0.059 [0.045]	-0.044 [0.041]	-0.007 [0.044]	0.003 [0.052]
Log Home C. Price	0.053 [0.032]	0.043 [0.044]	0.030 [0.040]	-0.009 [0.044]	-0.019 [0.054]
Observations	10,035	5,772	5,154	4,234	3,117
No. of households	0.341	0.411	0.419	0.400	0.424
B) PPP as Key Variable of Interest					
Log PPP	-0.036 [0.036]	-0.014 [0.048]	-0.008 [0.044]	0.036 [0.047]	0.047 [0.063]
Observations	10,035	5,772	5,154	4,234	3,117
No. of households	0.340	0.410	0.418	0.399	0.424

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. 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 year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 C4: 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 (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	0.079 [0.048]	0.170** [0.083]	0.112* [0.058]	0.247** [0.099]	0.157** [0.061]	0.304*** [0.113]	0.198*** [0.060]	0.454*** [0.128]	0.233*** [0.077]	0.511*** [0.118]
Log Exchange Rate * YTR		-0.004 [0.003]		-0.007** [0.003]		-0.009** [0.004]		-0.017*** [0.005]		-0.018*** [0.005]
Log Home C. Price	-0.077* [0.042]	-0.165** [0.075]	-0.105** [0.052]	-0.226** [0.086]	-0.150*** [0.053]	-0.305*** [0.103]	-0.182*** [0.054]	-0.459*** [0.124]	-0.218*** [0.074]	-0.526*** [0.122]
Log Home C. Price * YTR		0.004 [0.003]		0.006** [0.003]		0.009** [0.003]		0.017*** [0.005]		0.019*** [0.005]
Log Host C. Price * YTR		-0.021 [0.017]		0.011 [0.017]		0.014 [0.016]		0.012 [0.022]		0.007 [0.018]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	0.058	0.059	0.070	0.071	0.081	0.083	0.083	0.087	0.092	0.096
B) PPP as Key Variable of Interest										
Log PPP	0.075* [0.038]	0.137* [0.082]	0.093** [0.044]	0.217** [0.095]	0.138*** [0.046]	0.308*** [0.103]	0.154*** [0.055]	0.469*** [0.116]	0.191** [0.079]	0.524*** [0.110]
Log PPP * YTR		-0.003 [0.003]		-0.006* [0.003]		-0.009** [0.004]		-0.017*** [0.004]		-0.018*** [0.003]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	0.058	0.059	0.070	0.071	0.081	0.082	0.083	0.086	0.092	0.095

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. 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 covariates. 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. 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 C5: 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)
	Main 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	0.192 [0.176]	0.843*** [0.266]	0.426** [0.167]	1.059*** [0.282]	0.451** [0.176]	1.059*** [0.291]	0.498*** [0.157]	1.290*** [0.329]	0.728*** [0.173]	1.702*** [0.329]
Log Exchange Rate * YTR		-0.032*** [0.012]		-0.037*** [0.013]		-0.037*** [0.012]		-0.053*** [0.017]		-0.062*** [0.021]
Log Home C. Price	-0.244 [0.160]	-0.912*** [0.233]	-0.459*** [0.157]	-1.102*** [0.244]	-0.486*** [0.159]	-1.151*** [0.263]	-0.484*** [0.145]	-1.372*** [0.313]	-0.709*** [0.145]	-1.823*** [0.306]
Log Home C. Price * YTR		0.031*** [0.012]		0.036*** [0.011]		0.038*** [0.011]		0.055*** [0.016]		0.065*** [0.019]
Log Host C. Price * YTR		-0.123* [0.074]		-0.032 [0.065]		-0.035 [0.073]		-0.046 [0.058]		-0.041 [0.044]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	0.058	0.059	0.070	0.071	0.081	0.083	0.083	0.087	0.092	0.096
B) PPP as Key Variable of Interest										
Log PPP	0.284* [0.159]	0.695*** [0.254]	0.495*** [0.155]	0.904*** [0.212]	0.520*** [0.151]	0.939*** [0.220]	0.472*** [0.145]	1.218*** [0.257]	0.696*** [0.136]	1.640*** [0.268]
Log PPP * YTR		-0.020* [0.011]		-0.022** [0.011]		-0.022** [0.009]		-0.042*** [0.012]		-0.051*** [0.014]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	0.058	0.059	0.070	0.071	0.081	0.083	0.083	0.087	0.092	0.096

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 C6: Saving Rate as the Dependent Variable – No Adjustment by Minimum Consumption Needs

	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	0.396**	1.105***	0.733***	1.374***	0.860***	1.450***	0.901***	1.620***	1.182***	2.170***
	[0.193]	[0.294]	[0.176]	[0.234]	[0.192]	[0.245]	[0.172]	[0.286]	[0.241]	[0.329]
Log Exchange Rate * YTR		-0.035***		-0.037***		-0.036***		-0.049***		-0.064***
		[0.013]		[0.012]		[0.010]		[0.015]		[0.018]
Log Home C. Price	-0.428**	-1.150***	-0.737***	-1.371***	-0.860***	-1.491***	-0.851***	-1.662***	-1.125***	-2.271***
	[0.181]	[0.266]	[0.176]	[0.202]	[0.184]	[0.222]	[0.166]	[0.271]	[0.213]	[0.310]
Log Home C. Price * YTR		0.034***		0.035***		0.036***		0.050***		0.068***
		[0.012]		[0.011]		[0.009]		[0.013]		[0.016]
Log Host C. Price * YTR		-0.139*		-0.061		-0.054		-0.075		-0.087
		[0.079]		[0.074]		[0.077]		[0.073]		[0.071]
Observations	6,448	6,448	4,331	4,331	3,856	3,856	3,141	3,141	2,303	2,303
No. of households	1,014	1,014	579	579	534	534	457	457	353	353
B) PPP as Key Variable of Interest										
Log PPP	0.451***	0.966***	0.741***	1.252***	0.860***	1.376***	0.817***	1.648***	1.091***	2.222***
	[0.175]	[0.261]	[0.181]	[0.203]	[0.183]	[0.219]	[0.189]	[0.262]	[0.239]	[0.347]
Log PPP * YTR		-0.026**		-0.028**		-0.028***		-0.049***		-0.064***
		[0.012]		[0.013]		[0.010]		[0.013]		[0.014]
Observations	6,448	6,448	4,331	4,331	3,856	3,856	3,141	3,141	2,303	2,303
No. of households	1,014	1,014	579	579	534	534	457	457	353	353

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include time dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 C7: Savings Adjusted according to Minimum Consumption Needs

Dependent Variable: Savings (capped at: household income - household 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	0.146 [0.200]	0.890*** [0.312]	0.365** [0.173]	0.987*** [0.341]	0.392** [0.162]	0.877** [0.352]	0.424*** [0.150]	1.087*** [0.403]	0.656*** [0.162]	1.329*** [0.393]
Log Exchange Rate * YTR		-0.036** [0.015]		-0.036** [0.017]		-0.030* [0.017]		-0.044* [0.024]		-0.043 [0.027]
Log Home C. Price	-0.198 [0.189]	-0.911*** [0.274]	-0.394** [0.162]	-0.984*** [0.300]	-0.425*** [0.151]	-0.916*** [0.320]	-0.390*** [0.142]	-1.091*** [0.391]	-0.600*** [0.144]	-1.358*** [0.374]
Log Home C. Price * YTR		0.032** [0.014]		0.033** [0.015]		0.029* [0.015]		0.043** [0.022]		0.044* [0.024]
Log Host C. Price * YTR		-0.064 [0.062]		0.012 [0.055]		0.008 [0.063]		-0.005 [0.039]		-0.006 [0.035]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708
B) PPP as Key Variable of Interest										
Log PPP	0.236 [0.193]	0.694** [0.298]	0.423** [0.165]	0.772*** [0.277]	0.453*** [0.161]	0.711*** [0.268]	0.366*** [0.141]	1.013*** [0.314]	0.564*** [0.144]	1.363*** [0.329]
Log PPP * YTR		-0.022 [0.015]		-0.019 [0.015]		-0.014 [0.013]		-0.037** [0.017]		-0.044** [0.019]
Observations	10,035	10,035	5,772	5,772	5,154	5,154	4,234	4,234	3,117	3,117
No. of households	2,524	2,524	1,075	1,075	1,014	1,014	872	872	708	708

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. The dependent variable (savings) is capped at the level of household income - household minimum consumption needs (calculated according to German subsistence income program using household composition variables). In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 C8: Checking whether Missingness is Related to Key Variables of Interest

Dependent Variable: Any Missing Variable					
	(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	-0.016 [0.038]	-0.010 [0.059]	0.001 [0.066]	-0.033 [0.061]	-0.102 [0.066]
Log Home C. Price	0.024 [0.035]	0.019 [0.054]	0.008 [0.060]	0.038 [0.057]	0.107* [0.062]
Observations	13,606	7,226	6,474	5,374	3,996
No. of households	3,067	1,209	1,144	993	808
B) PPP as Key Variable of Interest					
Log PPP	-0.032 [0.032]	-0.043 [0.046]	-0.033 [0.049]	-0.054 [0.049]	-0.122** [0.055]
Observations	13,606	7,226	6,474	5,374	3,996
No. of households	3,067	1,209	1,144	993	808

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. The dependent variable takes the value of one if any the variables in the main specification is missing, and zero otherwise. In addition to the key variables of interest, the specifications include year dummies and dummies for years since migration. 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 C9: Attrition Check I – Effects of Key Variables of Interest on Panel Attrition

Dependent Variable: Attrition (=1 in first year not in the sample)					
	(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	-0.034 [0.033]	-0.051 [0.048]	-0.013 [0.050]	-0.081 [0.054]	-0.138** [0.061]
Log Home C. Price	0.034 [0.032]	0.042 [0.047]	0.007 [0.049]	0.069 [0.054]	0.127** [0.058]
Observations	9,240	5,435	4,842	3,982	2,928
No. of households	2,467	1,050	989	852	689
B) PPP as Key Variable of Interest					
Log PPP	-0.035 [0.033]	-0.027 [0.046]	0.003 [0.049]	-0.049 [0.051]	-0.108** [0.052]
Observations	9,240	5,435	4,842	3,982	2,928
No. of households	2,467	1,050	989	852	689

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. The dependent variable takes the value of one when the household is not in the sample this year but was in the sample last year, and zero otherwise. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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 C10: Attrition Check II – Duration of Residence Restrictions on the Sample

Dependent Variable: Savings								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration of Residence <= 25 years (Lower 75 percentile of the sample)		Duration of Residence <= 20 years (Lower 62.5 percentile of the sample)		Duration of Residence <= 15 years (Lower 50 percentile of the sample)		Duration of Residence <= 11 years (Lower 37.5 percentile of the sample)	
A) Three Elements of PPP as Key Variables of Interest								
Log Exchange Rate	0.522 [0.321]	1.229*** [0.460]	0.502 [0.497]	1.957*** [0.741]	0.125 [0.523]	3.460*** [0.534]	-0.563 [0.554]	2.740*** [0.781]
Log Exchange Rate * YTR		-0.032 [0.021]		-0.059** [0.029]		-0.119*** [0.014]		-0.115*** [0.021]
Log Home C. Price	-0.626** [0.296]	-1.443*** [0.418]	-0.583 [0.447]	-2.286*** [0.795]	-0.331 [0.475]	-4.356*** [0.578]	0.404 [0.479]	-4.609*** [0.776]
Log Home C. Price * YTR		0.034* [0.020]		0.064** [0.030]		0.132*** [0.016]		0.153*** [0.021]
Log Host C. Price * YTR		-0.179 [0.124]		-0.335*** [0.097]		-0.641*** [0.055]		-0.592*** [0.222]
Observations	7,207	7,207	5,889	5,889	4,550	4,550	3,423	3,423
No. of households	2,271	2,271	2,061	2,061	1,745	1,745	1,483	1,483
B) PPP as Key Variable of Interest								
Log PPP	0.598* [0.308]	0.917** [0.448]	0.571 [0.449]	1.669** [0.678]	0.309 [0.498]	2.273*** [0.872]	-0.376 [0.492]	1.615 [1.723]
Log PPP * YTR		-0.014 [0.018]		-0.042* [0.023]		-0.067** [0.031]		-0.062 [0.057]
Observations	7,207	7,207	5,889	5,889	4,550	4,550	3,423	3,423
No. of households	2,271	2,271	2,061	2,061	1,745	1,745	1,483	1,483

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' duration of residence; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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. 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.

D Appendix D - Extensions

D.1 Heterogeneity

The estimated effects of the key variables of interest on the saving behavior reflect an "average effect" for a heterogeneous 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. Here, we 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. Specifically, we use the following model,

$$s_{i,t} = \beta_0 + \beta_1 d_{i,t} + \varphi_1 d_{i,t} * er_{i,t-1} + \varphi_2 (1 - d_{i,t}) * er_{i,t-1} + \gamma_1 d_{i,t} p_{i,t-1}^H + \gamma_2 (1 - d_{i,t}) p_{i,t-1}^H + \mathbf{x}'_{it} \boldsymbol{\delta} + \gamma_t + \tau_i + \eta_{i,t}, \quad (\text{A.20})$$

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 (A.20) are defined as in equation (16).

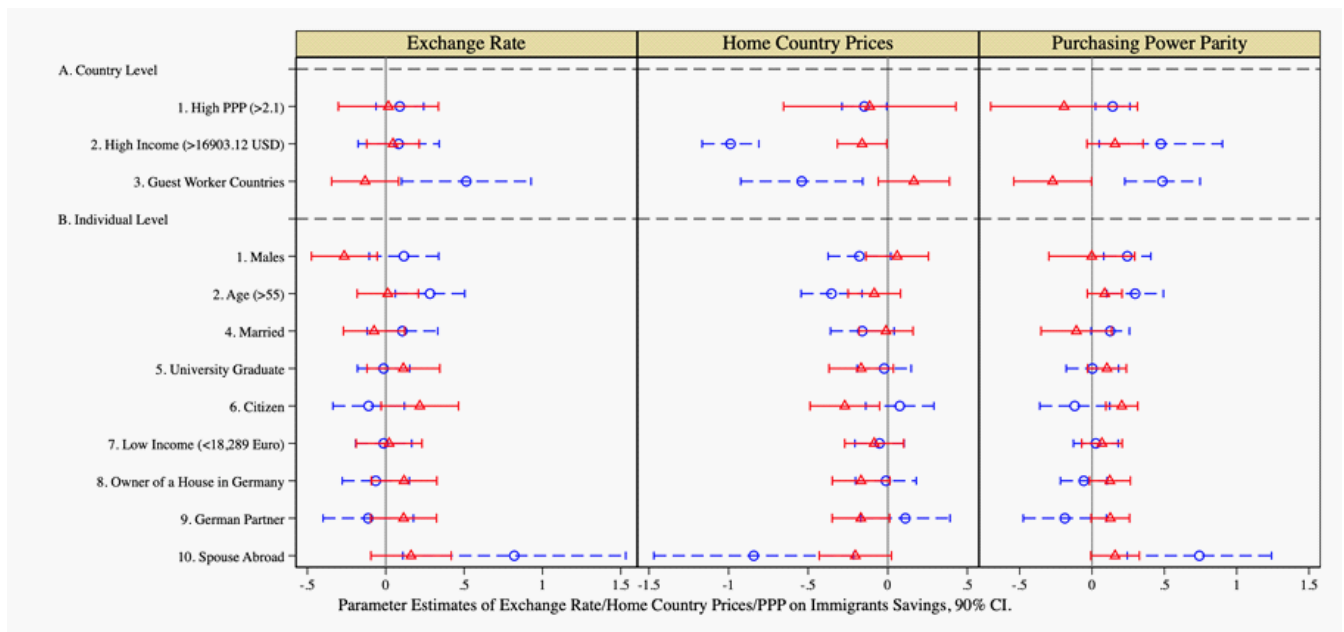
The results are presented in Figure D1, for the exchange rate variable in column (1) and for the source-country price level variable in column (2). The figure presents the estimates of φ_1 and γ_1 with a circle ($d_{i,t} = 1$) and the estimates of φ_2 and γ_2 are shown with a triangle ($d_{i,t} = 0$). 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 D1.

Figure D1 presents several distinct patterns for the country-level characteristics in the upper panel and for the individual-level characteristics in the lower panel. No evidence of heterogeneity in the effects of the key variables of interest is observed in terms of the PPP between Germany and the source countries. However, the effects of the key variables of interest are stronger for immigrants originating from wealthier source countries and guestworker countries. For immigrants originating from wealthier source countries, the effects of PPP and home-country prices are noticeably larger; however, only the latter is statistically significant at the 10% level. This result is consistent with the descriptive statistics in Table B1 of Appendix B, which show that the average source-country income rises as return intentions get stronger. For immigrants from guest-worker countries, the effects of all three key variables of interest are stronger (for

which statistical significance exists at the 10% level for each variable). While guestworkers indicate an intention to return in 49.6% of the observations in the full sample, other immigrants indicate an intention to return only in 17.0% of the observations.

The patterns in panel (B) of Figure D1 are also consistent with those in Table B1 of Appendix B, although statistical significance for heterogeneity does not exist for any of the household-head level characteristics. The effects of the key variables of interest are stronger for male, married, and older immigrant household heads who exhibit a higher intention to return. Similarly, the effects of the key variables of interest are substantially larger for household heads with a spouse abroad. At the same time, for household heads who have a German partner or a house in Germany or who are citizens of Germany—all of which increase their ties to Germany—the effects of the key variables of interest are weaker, as expected.

Figure D1: Heterogeneity Analysis according to Selected Country-level and Individual-level Characteristics



Notes: Results are obtained using the interaction model in equation (18), 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 75th percentile. In the panel for individual-level characteristics, a person belongs to the low income group if her income lies below the 25th percentile of this variable.

D.2 Saving and Remitting

Our GSOEP dataset provides us with i) the amount of savings of an immigrant household for the years after 1991 and ii) the amount savings sent to the source country for the years 1983-90, 92 and 94. This allows us to compute the proportion of savings remitted to the source country for the years 1992 and 1994. What we find is that the propensity for migrants to keep savings in their source country is rather small. Among those with positive savings, only 9.8% sent at least some of their savings back home. This amounted to an average of only 5.7% of their total savings, which is broadly consistent with our assumption that migrants hold their savings in the form of foreign currency.

Saving is only one of many possible motives for sending funds back to the source country. Remittances, more broadly defined, are among the most important phenomena related to international migration. They support daily consumption of a migrant's family members remaining in the source country and help provide funding for their education, health services, and numerous other needs. For calendar years 1983-1990, 1992, and 1994, the GSOEP dataset offers information on the amount of remittances and the reason for remitting in three categories: i) remittances for family, ii) remittances for savings, and iii) remittances for others. From the perspective of our theoretical model, item (ii) is a part of savings, while items (i) and (iii) are parts of consumption.³⁵ For our main sample of 10,035 households, the amount remitted in 1992 (the first year of the data in our study), was 2,313 euros. Of this amount, 1,181 euros (51%) was for family consumption and 569 euros (25%) for others' consumption, whereas only 325 euros (14%) were remitted for the purpose of saving. Most of the remittances were therefore for family consumption.

After 1995, the GSOEP continues to elicit questions on the amount remitted for family members and others in the home country, but there is no question on the amount remitted for the purpose of saving. We can therefore generate a variable for the amount remitted for family members and others in the home country throughout the time period of our analysis (except for the years 1991 and 1993). Over all years in the data, mean annual remittances to anybody amount to 519 euros, while mean annual savings are 2,707 euros. Therefore, we can conclude that for migrants in our dataset, remittances (for consumption purposes) are much lower than savings (less than 20%). In addition, remittances exhibit a strong downward trend over time.³⁶

We also examine the robustness of our main findings to the inclusion of remittances to family members and others in the home country as an additional control variable. The results are given in Table D1. Our results are robust to the inclusion of this additional control variable. In addition, we examine the relationship between remittances and PPP in the same setup that

³⁵In the empirical part, we assume that when the household heads answer the question on monthly savings, they include the part they remit for the purpose of saving.

³⁶We observe a significant decline after 1992, when the mean level of remittances was 1,749 euros. The drop is to 1,045 euros in 1996, to 588 euros in 2000, to 301 euros in 2005, and to 187 euros in 2010, before rebounding to 312 euros in 2015.

we use for analyzing the relationship between savings and PPP. A priori, one might think that an increase in PPP (stemming from, say, a depreciation of home currency) reduces remittance flows because fewer euros now suffice to cover the cost of a given bundle of goods and services in the source country. At the same time, a standard consumption bundle at home is cheaper than the one abroad, suggesting that an altruistic migrant would wish to support a higher level of consumption for the family left behind. Our estimation results, given in Table D2, indicate that the former effect dominates: migrants in fact send fewer remittances, although this is marginally statistically insignificant at the conventional levels. A statistically significant negative effect of PPP on remittances emerges, however, when we restrict the sample to the groups of more recent immigrants in samples M1 and M2.

Table D1: Robustness of our Main Results to the Inclusion of Remittances as an Additional Control Variable

	Dependent Variable: Savings									
	(1)	(2)	(3) (4)		(5) (6)		(7)	(8)	(9)	(10)
	Main 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	0.529**	1.576***	0.797***	1.500***	0.866***	1.457***	0.860***	1.357***	1.462***	2.115***
	[0.270]	[0.338]	[0.212]	[0.348]	[0.163]	[0.364]	[0.166]	[0.469]	[0.298]	[0.473]
Log Exchange Rate * YTR		-0.052***		-0.041**		-0.037*		-0.034		-0.043
		[0.017]		[0.019]		[0.021]		[0.028]		[0.031]
Log Home C. Price	-0.541**	-1.527***	-0.775***	-1.431***	-0.865***	-1.451***	-0.819***	-1.393***	-1.336***	-2.165***
	[0.244]	[0.279]	[0.184]	[0.260]	[0.140]	[0.283]	[0.141]	[0.395]	[0.252]	[0.388]
Log Home C. Price * YTR		0.047***		0.036**		0.034**		0.036		0.050*
		[0.015]		[0.016]		[0.017]		[0.024]		[0.026]
Log Host C. Price * YTR		-0.071		-0.036		-0.047		-0.115**		-0.156**
		[0.062]		[0.087]		[0.097]		[0.050]		[0.069]
Observations	8939	8939	4864	4864	4320	4320	3537	3537	2582	2582
No. of households	2444	2444	1026	1026	966	966	827	827	673	673
B) PPP as Key Variable of Interest										
Log PPP	0.560**	1.393***	0.735***	1.293***	0.863***	1.319***	0.757***	1.367***	1.014***	2.283***
	[0.220]	[0.300]	[0.170]	[0.261]	[0.138]	[0.214]	[0.123]	[0.287]	[0.172]	[0.314]
Log PPP * YTR		-0.041**		-0.030*		-0.025*		-0.035**		-0.065***
		[0.017]		[0.017]		[0.013]		[0.017]		[0.019]
Observations	8939	8939	4864	4864	4320	4320	3537	3537	2582	2582
No. of households	2444	2444	1026	1026	966	966	827	827	673	673

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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, German spouse with reference to the household head and the amount of remittances sent to the home country – in addition to dummies for years since migration. 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 D2: Robustness of our Main Results to the Inclusion of Remittances as an Additional Control Variable

	Dependent Variable: Savings									
	(1)	(2)	(3) (4)		(5) (6)		(7)	(8)	(9)	(10)
	Main 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	0.529**	1.576***	0.797***	1.500***	0.866***	1.457***	0.860***	1.357***	1.462***	2.115***
	[0.270]	[0.338]	[0.212]	[0.348]	[0.163]	[0.364]	[0.166]	[0.469]	[0.298]	[0.473]
Log Exchange Rate * YTR		-0.052***		-0.041**		-0.037*		-0.034		-0.043
		[0.017]		[0.019]		[0.021]		[0.028]		[0.031]
Log Home C. Price	-0.541**	-1.527***	-0.775***	-1.431***	-0.865***	-1.451***	-0.819***	-1.393***	-1.336***	-2.165***
	[0.244]	[0.279]	[0.184]	[0.260]	[0.140]	[0.283]	[0.141]	[0.395]	[0.252]	[0.388]
Log Home C. Price * YTR		0.047***		0.036**		0.034**		0.036		0.050*
		[0.015]		[0.016]		[0.017]		[0.024]		[0.026]
Log Host C. Price * YTR		-0.071		-0.036		-0.047		-0.115**		-0.156**
		[0.062]		[0.087]		[0.097]		[0.050]		[0.069]
Observations	8939	8939	4864	4864	4320	4320	3537	3537	2582	2582
No. of households	2444	2444	1026	1026	966	966	827	827	673	673
B) PPP as Key Variable of Interest										
Log PPP	0.560**	1.393***	0.735***	1.293***	0.863***	1.319***	0.757***	1.367***	1.014***	2.283***
	[0.220]	[0.300]	[0.170]	[0.261]	[0.138]	[0.214]	[0.123]	[0.287]	[0.172]	[0.314]
Log PPP * YTR		-0.041**		-0.030*		-0.025*		-0.035**		-0.065***
		[0.017]		[0.017]		[0.013]		[0.017]		[0.019]
Observations	8939	8939	4864	4864	4320	4320	3537	3537	2582	2582
No. of households	2444	2444	1026	1026	966	966	827	827	673	673

Notes: The main sample includes all immigrant household heads (who arrived in Germany after age 18) from 88 source countries in the 1992-2017 waves of the German Socioeconomic Panel, excluding ethnic Germans and refugees. The other four samples make restrictions on the main sample based on immigrants' return intentions; these restrictions are specified in column headings. The data are in person-age format where age is less than 65. PPP stands for purchasing power parity and YTR stands for years till retirement. Poisson fixed effects regressions (PPML) are used. In addition to the key variables of interest, the specifications include year dummies, additional source-country level covariates, and several individual-level covariates. 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, German spouse with reference to the household head and the amount of remittances sent to the home country – in addition to dummies for years since migration. 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.