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Remittances and temporary migration ☆

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ABSTRACT

In this paper we study the remittance behavior of immigrants and how it relates to temporary versus permanent migration plans. We use a unique data source that provides unusual detail on remittances and return plans, and follows the same household over time. Our data allows us also to distinguish between different purposes of remittances. We analyze the association between individual and household characteristics and the geographic location of the family as well as return plans, and remittances. The panel nature of our data allows us to condition on household fixed effects. To address measurement error and reverse causality, we use an instrumental variable estimator. Our results show that changes in return plans are related to large changes in remittance flows.

1. Introduction

The amount of remittances sent by immigrants back to their home countries has increased steadily over the last decades. Currently, the volume of remittances to developing countries using formal channels is estimated to be over $240 billion (Ratha et al., 2007). Their level is higher than official development aid and close to foreign direct investment and other capital inflows for developing countries. Remittances help economic development and are a major factor in poverty reduction[1]. In addition, remittances are now one of the primary sources of foreign exchange for many receiving countries.

For immigration countries, remittances constitute a non-negligible outflow of capital. Recent figures suggest that the outflow of remittances from high income OECD countries is over $136 billion (Ratha et al., 2007). For instance, in Germany the volume of remittances was about 0.31% of GDP in 2003 (Bundesbank, 2006).[2] This was equivalent to 150% of Germany's total budget for official development aid in that year.[3]

It is therefore not surprising that a large literature has developed on the subject, see Rapoport and Docquier (2006) for an excellent survey. Key issues to understand are which migrant populations remit, for which purpose, and what determines the amount of remittances. Answers to these questions may help to create migration schemes that affect the way remittances are channeled into different purposes, thus supporting their optimal efficiency for economic development, and raising awareness about how different policies will lead to different incentives to remit.

A number of papers develop models for the different motives that may trigger remittances, and explore some of their empirical implications.[4] This research has provided us with a wealth of insight. Yet, on the empirical level we still know relatively little about the determinants of remittances, the various forms remittances may take, and how these interact with migrant behavior and the forms of migration. One particular aspect, which is in our view important, is the way the permanency of a migration affects the magnitude and purpose of remittance flows.

We address these questions in this paper. We analyze how remittance flows are related to the permanency of migration, and to the residential location of the family. Our empirical analysis is based on a panel data set of immigrants over the period from 1984–1994. This data contains repeated information about whether, and what amount of remittances is sent. It also distinguishes between remittances for family support, savings, and for a residual category "other purposes". Due to the information our data provides us about the return plans of immigrants, we are able to distinguish between individuals who consider their migration as temporary, and who

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[1] See e.g. Adams and Page (2005), Adams (2006) and Acosta et al. (2006) for analysis.

[2] Germany is the third largest source country of remittances payments, after United States and Saudi Arabia, see Ratha (2003).

[3] Official Development Assistance accounted for 0.21% of GDP in Germany in 2003, see OECD (2006b).

[4] See e.g. Lucas and Stark (1985, 1988), Hoddinott (1994), Funkhouser (1995), Poirine (1997), Agarwal and Horowitz (2002), de la Briere et al (2002), Faini (2006), Osili (2007), Amuedo-Dorantes and Pozo (2006) and Hanson (2007).

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consider their migration as permanent. The panel nature of our data, and repeated information on remittances as well as return intentions, allow us to explore and isolate the way the permanence of migration, as well as the locational distribution of the family, affect remittance flows, conditional on observed characteristics and unobserved fixed differences across households in their remittance propensity. We address measurement error problems and possible feedback of past remittances on current return plans by combining a fixed effects estimator with a IV strategy.

The structure of the paper is as follows: in section 2 we discuss the way remittances may be affected by return plans, and introduce our estimation strategy. In section 3 we provide some background information and discuss the data and our sample. In section 4 we show our estimation results, and section 5 concludes.

2. Remittances and return migration

A difficulty with remittances is its measurement and exact definition. If we define remittances as all transfers from the immigration country to the immigrant's home country (a definition which we will follow below), then remittance flows consist of both transfers to support family and kinship in the origin country, as well as savings or investments for future consumption at home. The motivation for both types of transfers is different. While the first requires altruistic behavior and/or influence through the social reference group, the second can be modeled in a simple life cycle model (see e.g. Dustmann, 1997).

Transfers for both family support and savings purposes may differ according to whether the migration is considered as temporary or as permanent. Remittances to support family and kinship can be viewed as intra-family transfers across national borders.[5] Thus, if temporary migrants have more of their (extended) family living abroad, they may remit more. Further, remittances may also respond to expectations about fulfillment of family and social commitments. Satisfying these expectations can be seen as a price to be paid for the option to return back home at a later stage, or as an "insurance" to be welcomed in the home community after returning. Also this motive would result in higher remittances of temporary migrants.[6]

Remittance flows may further be motivated by the wish to hold assets or savings in the home country. These may take the form of housing stock, capital investments, or simply savings. Thus, remittances motivated in this way are not different from an intertemporal allocation of consumption, or investment into durable consumption goods across national borders.[7] A positive probability of return may affect these transactions either by inducing a preference to holding assets and savings in the home country, or by inducing immigrants to shift more consumption from the present to the future, or both.

2.1. Empirical specification

Our main interest is in determining how the level of remittances is affected by household characteristics, and by immigrants' return plans. We estimate regressions of the following type:

$$Y_{it} = a_0 + a_1 X_{it} + \xi R_{it} + \epsilon_i + u_{it}\,, \tag{1}$$

where Y_{it} measures remittances, and the indices i and t denote households and time. The key variable of interest is R_{it}, which is a measure of the temporariness of the migration. As we explain below in more detail, we obtain this variable from survey questions on the migrant's intention to return home, which we observe in every wave of the panel that we use. These intentions may change over the migration history, and they may not always correspond to whether the migration has finally been permanent. But it is exactly these *plans* about a future return that determine remittance behavior.

The vector X_{it} collects characteristics of the household and the head of household. We include here the log of disposable household income, the number of adults and the number of children (below the age of 16) living in the household, and the number of employed household members. We also include characteristics of the head of household, like the gender, the employment status, the years since migration and its square, the number of years of education, and whether the partner is native born or the household head is single. Further, we include variables about whether the spouse or children are living abroad, and an indicator variable whether the head of household grew up in a rural area.

2.2. Identification

There are a number of problems with the estimation of Eq. (1). First, individuals who tend to return may at the same time have a higher propensity to send remittances. In this case, our estimate of ξ will be (possibly upward) biased, as the individual effect ε_i will be correlated with return intentions R_{it}, so that $E(\epsilon_i|X,R) \neq 0$.[8] Some of this bias is likely to be eliminated by conditioning on the variables in X.

A further problem is that return intentions are likely to be measured with (possibly considerable) measurement error, thus creating an attenuation bias. In this case the "observed" return intention equals $R^*_{it} = R_{it} + M_{it}$. We assume here that the measurement error M_{it} has the "classical" properties of being uncorrelated with the true intention and being serially uncorrelated ($E(R_{it},M_{it}) = 0$, E $(M_{it},M_{is}) = 0, t \neq s$). The downward bias is greatly exacerbated when estimating the model in differences or using fixed effects (see e.g. Hsiao, 1986 for a detailed discussion).

Finally, remittances in previous periods may affect later return plans. For instance, past remittances, invested into assets or durable consumption goods, may have created returns that lead immigrants to change their current return intentions. This would imply that

$$R_{it} = b_0 + b_1 X_{it} + \sum_{s=1}^{t-1} d_s Y_{is} + \phi\,\epsilon_i + v_{it}\,. \tag{2}$$

If a positive shock to past remittances positively affects present return plans ($d_s > 0$), then this would lead to a downward bias when using a difference or a fixed effects estimator. We deal with these problems by combining a fixed effect type estimation strategy (using within household variation for estimation only) with an instrumental variable estimator. The idea of our estimation strategy is as follows. In a first step, we eliminate the fixed effects by using a "forward orthogonal deviations" transformation (Arellano, 2003). This transformation removes the fixed effects by subtracting from each observation $t = 1,\ldots T-1$ the mean of the remaining future observations (rather than the mean of all observations, as does the standard FE estimator) in the sample. The forward orthogonal deviations transformation of a variable X_{it} is defined as $X^0_{it} = \sqrt{(T-1)/(T-t+1)}\left(X_{it} - \frac{1}{T-1}\sum_{s=t+1}^{T} X_{is}\right)$ (see Arellano, 2003 and

[5] See Lucas and Stark (1985) for an early discussion. See Cox (1987), Cox et al. (1998) for empirical analysis of altruistic motives for private transfers. For a recent survey on the private transfer literature see Laferrere and Wolff (2000).

[6] Azam and Gubert (2006) stress the role of the extended family and the village in migration and remittance decisions. Amuedo-Dorantes and Pozo (2006) investigate this motive empirically.

[7] As Durand et al (1996) recognize, "sending monthly remittances (…) and returning home with savings are interrelated behaviors that represent different ways of accomplishing the same thing: repatriating earnings".

[8] If on the other hand these individuals tend to save more in the host country rather than to remit, then the bias may be downwards.

Arellano and Bover, 1995 for more details), so that Eq. (1) is transformed into

$$Y_{it}^0 = a_1 X_{it}^0 + \xi R_{it}^{*0} + \eta_{it}^0 ; \quad \eta_{it}^0 = u_{it}^0 - \xi M_{it}^0 \tag{3}$$

This transformation eliminates the fixed effect, but not the measurement error problem and the problem that past levels of remittances may affect future return intentions, so that pooled estimation of (3) would still lead to biased and inconsistent estimates. We therefore instrument the forward deviations using *past* return intentions of other household members as instruments. If the measurement error has the "classical" properties we describe above, and if future shocks to remittances are not correlated with past return intentions (as in (2)), then past values of return intentions are appropriate instrumental variables.

The estimator could be implemented by using pooled 2SLS estimation. However, this estimator is inefficient as it does not use all instrumental variables available in each period. More efficient is a GMM type estimator as in Arellano and Bond (1991), which makes use of all instruments available in each period. We use here the orthogonal deviations GMM estimator as suggested by Arellano and Bover (1995) (see also Arellano, 2003; Roodman, 2006).

We should mention that, although our estimation strategy eliminates the main problems in estimating the effects of return plans on remittances, other processes of feedback between return intentions and remittances may be present. For instance, our estimator is invalid if *future* remittances affect *current* return plans of other household members, conditional on observables. While we believe that the mechanism in (2) (where past remittances affect current return plans), addressed by our estimation strategy, is plausible, we find it difficult to make a case for why future remittances should affect current return intentions.

2.3. Selection through return migration

A remaining problem with the interpretation of the parameters is that our sample is selected —over the course of the panel, we observe more households who have a higher propensity to stay permanently. This selection may be correlated with our measure for a return migration intention: those with a higher intention to return will be less likely to be in the sample. If those who remain in the sample have different remittance behavior (conditional on all the variables we include in the model as well as the measure for the return intention), then this will bias our estimate for ξ.

This bias can be signed under some assumptions: it will be downward if the residuals in the selection equation and the remittance equation are positively correlated (indicating that those who remain in the sample remit less than those who drop out of the sample due to return, conditional on other regressors).[9] In that case we can interpret the coefficients on the temporary migration measure as a lower bound.

When conditioning on individual effects, this problem will disappear if selection is based on "permanent" characteristics, as in this case the selection term is constant over time and is eliminated.

3. Background, data and descriptive evidence

3.1. Background

Between the mid 1950s and 1973, the strong economic development in Northern Europe and the resulting demand for labor led to a large inflow of immigrants mainly from the periphery countries of Europe, but also from Turkey, North Africa, South America and Asia. The main receiving countries were Belgium, France, Germany, the Netherlands, Switzerland, and the Scandinavian countries.

The West-German economy experienced a strong upward swing after 1955, accompanied by a sharp fall in the unemployment rate (between 1955 and 1960, the unemployment rate fell from 5.6% to 1.3%) and an increase in labor demand. This generated a large immigration of workers from Southern European countries and Turkey into Germany. The percentage of foreign-born workers employed in West Germany increased from 0.6% in 1957 to 5.5% in 1965, to 11.2% in 1973. Bilateral recruitment agreements were set up between Germany and Italy, Spain, Greece, Turkey, Portugal and Yugoslavia in the 1950s and 1960s.

Labor migration over this period was initially considered as temporary by both the immigration countries and the emigration countries. Individuals were not expected to settle permanently. The German recruitment policy was based on the assumption that foreign workers would after some years return to their home countries. Still, although return migration has been quite considerable (see Bohning, 1987), a fraction of foreign-born workers settled more permanently.[10]

3.2. The data and sample

We use for this analysis 12 waves of the German Socio-Economic panel (GSOEP 1984–1995). The GSOEP is a household-based panel survey, similar to the US Panel Study of Income Dynamics (PSID) or the British Household Panel Study (BHPS). Initiated in 1984, the GSOEP oversamples the then resident immigrant population in Germany, which stems from the migration movement we have described above. In the first wave, about 4500 households with a German-born household head were interviewed, and about 1500 households with a foreign-born household head. The data are unique in providing repeated information on a boost sample of immigrants over a long period of time. For our analysis, we use observations for the foreign-born from the over-sample, as well as from the standard sample.

Each individual in a household and over the age of 16 is interviewed. The household head provides information about all other individuals in the household and below the interviewing age. Individuals who leave households and form their own households are included in the panel.

The GSOEP data provides a rich set of survey questions on remittances and savings. It distinguishes between remittances for family support, remittances for saving purposes in the home country, and remittances for other motives. The data on remittances is both qualitative and quantitative. Immigrants are asked whether they remit for each of the above purposes. They are further asked to quantify the amount of money they sent back home for each of these purposes during the previous calendar year. Information on remittances is available for the years 1984–1994, with the exception of the years 1991 and 1993.[11] All monetary variables (including remittances and savings) are measured at the household level in real amounts, where the reference year is 2002.

A further unique feature of our data is that immigrants provide information in each wave of the panel on whether they intend to

[9] More formally, suppose that the latent index for being selected into the sample, s^* is linear in RI, the return intention, with $s_i^* = \alpha_0 + \alpha RI_i + e_i$, and that an individual is in the sample if $s_i^* > 0$. Suppose that the outcome equation is given by $y_i = \gamma_0 + \gamma RI_i + f_i$, and assume that e_i and f_i are jointly normally distributed, with variances 1 and σ_v^2 and correlation coefficient ρ. Then selection could be accounted for by adding the generalized residual $E(f_i|s_i^* > 0) = \lambda(c_i)$ to the estimation equation, where $\lambda(c_i) = \phi(c_i)/\Phi(c_i)$, with ϕ and Φ being the density and distribution function of the standard normal, and $c_i = \alpha_0 + \alpha RI_i$. We obtain the estimation equation $y_i = \gamma_0 + \gamma RI_i + \sigma_v \rho \lambda(c_i) + \zeta_i$. Omission of $\lambda(c_i)$ results in a biased estimate for γ. The expectation of the error term when omitting λ, conditional on RI_i, is $\rho\sigma_v E(\lambda(c_i)|RI_i)$. Since λ decreases in c_i, the bias is downward for $\rho < 0$ and $\alpha < 0$.

[10] The stock of foreign labor in Germany in 2004 was 3.7 million people, of which around 60% originated from the sending countries considered here (OECD (2006a)).

[11] See Table A1 in the Appendix for an exact description of the variables as well as data availability.

Table 1
Summary statistics — 1984–1994.

	Mean	Std. Dev.
Sex	0.834	0.371
Age	45.210	12.210
Age at arrival	25.178	8.587
Years since migration	19.026	6.270
Number years education	9.588	1.925
Household income	22030	12922
Number children in household	0.853	1.093
Number adults in household	2.203	1.031
Number employed individuals in household	1.395	0.903
Employed	0.769	
Non single	0.877	
Native partner	0.058	
Spouse abroad	0.093	
Children abroad	0.137	
Rural childhood	0.418	
Temporary	0.517	

Note: Calculations based on GSOEP data, 1984–1990, 1992, 1994. Individual information corresponds to the head of household. Household Income in 2002 Euros.

remain permanently in Germany, or whether they wish to return home at some stage in the future. We use this information to construct a binary variable that measures the return plan of the immigrant. As we discuss above, return plans may change over the migration history, and may deviate from the final return decision; however, remittances (as other behavior) are based on current plans rather than future realizations.

In addition, we have individual and household characteristics in the host country, as well as information on family members who are living in the country of origin. There is no information on the use of remittances by the family members in the origin country, or of other household characteristics or income in the home country.

We provide summary statistics of the variables we use in Table 1. We account for the individual characteristics of the head of household as well as for the number of adults, children and employed individuals on the household. Entries in Table 1 show that the average age of household heads in our sample is 45 years, and that migrants resided slightly less than 20 years on average in Germany. More than 83% of the head of households are male, and 77% are employed. The average net household income is 22000 Euros (in 2002 prices). Around 6% of household heads are married with a native partner. With respect to members of the family living abroad, around 9% of heads of households report that their partner lives abroad. The percentage of head of households that have children under the age of 16 in another country (different from the host country) is 14%. Around 42% of all heads of households report that they grew up in a rural area up to age 15 ("rural childhood"). Finally, on average, more than half of the household heads in our sample report that they would wish to return to their home country at some point in the future.

4. Results

4.1. Descriptive evidence

In Table 2 we report in the first three columns the percentage of households that remit, and the amount of remittances both per household, and as a percentage of household disposable income. About 46% of households report that they have sent remittances during the last year. On average households remit more than 1700 Euros (in 2002 prices) per year, which corresponds to 8.2% of disposable household income. Our data distinguishes between different types of remittances, and overlap is possible. These are reported in the last three columns of the table. The largest fraction of remittances is for the purpose of family support: around one-third of households report to remit for that reason. Around 7% of households transfer remittances to be saved in the home country, while almost 10% sent remittances for other non-specified purposes.

The next row distinguishes between households where the head has a permanent or temporary migration intention. Households with permanent intentions have a 25 percentage points higher probability to remit, and the total amount (and the amount as percentage of disposable income) is more than twice the magnitude. The breakdown of remittances in its different purposes in the last three columns shows also differences for each single category.

The next rows draw distinction between remittances of households with different characteristics. The difference between remittances for households where the spouse lives abroad as opposed to single households or households where the spouse lives in the host country is again large, with around two-thirds of households in the first category sending remittances, compared to only 42% in the latter one. In addition, the average amount remitted for households where the spouse lives abroad is 2988 Euros, two times larger than for those households whose head is single or where the spouse lives in the host country. There are also large differences in remittance probabilities and the overall amounts remitted according to whether children are living abroad or not. Not surprisingly, the largest differences are in the category "remittances for family support", while "remittances for savings for later" and "remittances for other purposes" are more similar.

4.2. Remittances and return plans

The descriptive evidence we present in the last section suggests large differences in remittance behavior between households with permanent and temporary migration plans. Some of these differences may be due to differences in household composition and individual characteristics of household members; they may also be due to differences in the family's residential allocation. We now turn to regression results that hold background characteristics constant.

We commence with an analysis of whether or not the household sends remittances, and of which type. In the upper panel of Table 3, we

Table 2
Remittances by household characteristics.

	Percent households remitting	Total amount (in 2002 Euros)	Total amount as percentage of HH disposable income	Percent households remitting to family	Percent households remitting for savings	Percent households remitting for other purposes
Total migrant	46.22%	1,730	8.26%	33.63%	6.61%	9.99%
Permanent	25.97%	824	4.04%	18.84%	2.76%	5.80%
Temporary	51.09%	2,056	9.87%	37.05%	8.26%	11.65%
No spouse abroad	41.59%	1,501	6.68%	29.55%	6.34%	9.91%
Spouse abroad	66.23%	2,988	19.09%	55%	5.37%	5.72%
No children abroad	41.75%	1,455	6.59%	29.36%	6.44%	9.97%
Children abroad	69.66%	3,281	18.32%	57.87%	7.23%	9.07%

Note: Calculations based on GSOEP data (1984–1990,1992,1994), on household level, using household weights. Information on temporary intention, spouse and children abroad corresponds to the head of household. "No Spouse Abroad" includes single heads of household. "No children abroad" includes heads of household with children in the host country and without children.

Table 3
Probability to remit and amount remitted — OLS.

Household sent remittances (=1 Yes, =0 No)								
	Total		Family support		Savings for later		Other purposes	
Temporary	0.134**	0.096**	0.101**	0.057**	0.029**	0.030**	0.033**	0.043**
	(0.020)	(0.020)	(0.020)	(0.020)	(0.008)	(0.008)	(0.013)	(0.013)
Spouse abroad		0.097*		0.1		−0.026		−0.022
		(0.046)		(0.054)		(0.017)		(0.024)
Children abroad		0.141**		0.177**		0		−0.005
		(0.031)		(0.031)		(0.014)		(0.016)
R-squared	0.162	0.172	0.122	0.141	0.033	0.034	0.032	0.034
Logarithm (amount remitted + 1)								
Temporary	1.114**	0.837**	0.819**	0.483**	0.222**	0.235**	0.250*	0.337**
	(0.163)	(0.162)	(0.160)	(0.155)	(0.062)	(0.064)	(0.098)	(0.100)
Spouse abroad		0.899*		0.925*		−0.219		−0.204
		(0.376)		(0.410)		(0.132)		(0.170)
Children abroad		1.256**		1.565**		−0.008		−0.051
		(0.257)		(0.251)		(0.109)		(0.119)
R-squared	0.177	0.193	0.135	0.162	0.033	0.034	0.033	0.036
Observations	8,917	7,709	8,917	7,709	8,917	7,709	8,917	7,709

*Significant at 5%; **Significant at 1%.
Note: GSOEP data (1984–1990, 1992, 1994). Household level, weighted regression using household weights. All specifications include time and country dummies and condition on age, years since migration (and its square), education, gender, marital status, childhood in a rural area in the home country and employment status of the head of household as well as household income, employment status other members of the household, number of adults and children in the host country household. Standard errors are clustered by household.

report estimation results of linear probability models.[12] We report in the first specification estimates of an indicator variable as to whether the head of household considers the migration as permanent or temporary. In the second specification we add information about the whereabouts of the spouse and the children in the home country. All specifications include time and country of origin dummies, and condition on age, years since migration (and its square), education, gender, marital status and employment status of the head of household as well as disposable household income, the number of adults and the number of children in the household, and whether the head of household grew up in a rural area. Standard errors, reported below the coefficients, are clustered by households. We report the full set of estimation results in Table A2 in the Appendix A.

Results in the first pair of columns refer to whether the household sends remittances. Unconditional on the residential location of the family, temporary migration plans are associated with a 13.4 percentage point higher probability to remit (remember that only 46% of households remit in our sample, so that this estimate corresponds to a 29% difference); conditional on family location, the estimate only drops slightly, and suggests a difference of 10 percentage points. The coefficients on the family location decisions, reported in the second column, suggest a sizeable association between remittance propensities and whether spouse or children live abroad. Households where the spouse is living abroad are associated with a 10 percentage point higher probability to remit; if children live abroad, this probability is a further 14 percentage points higher. This suggests that remittance behavior is strongly affected by the location of the family. But even conditional on family location, temporary migration plans remain strongly related to remittances: those with temporary plans still have a 10 percentage points higher probability to remit.

The next three pairs of columns report results distinguishing between the three different purposes of remittances that are reported in our survey: remittances to support the family, to accumulate savings in the home country, and for other purposes. Temporary migration plans are strongly related to remittances sent for family support (although the estimate has nearly halved), even conditional on the location of the immediate family. One reason may be that migrants with temporary migration plans have commitments towards family members other than the spouse and children, compared with migrants with permanent intentions. This could be either because a larger fraction of the extended family is still living abroad (which we do not measure), or because the temporary nature of their intended migration induces a larger response to expectations from, and commitments to family and kinship. Not surprisingly, remittances for family support are strongly associated with the locational choice of the immediate family, as suggested by the coefficients on the spouse and children variables. On the other hand, having family members abroad slightly decreases remittances for other purposes as well as savings in the home country. The coefficient estimates for savings in the home country and "other" remittances are smaller, and hardly affected by adding the location of the immediate family.

Table A2 in the Appendix A reports results for the full set of parameter estimates. We briefly discuss here estimates of the income and education variables, for the specification in the first two columns. The probability of sending remittances increases with disposable household income, which is compatible with previous empirical findings.[13] The magnitude of this association is quite considerable: an increase in household income by 1 log point is related to an increase in the probability to remit of about 11 percentage points. Remittances also decrease with educational attainments of the household head, conditional on household income. This is in line with Faini (2006) who finds that remittances are lower for the highly skilled. He suggests as an explanation that skilled immigrants have longer migration periods, and a higher probability of re-uniting with their families. Our results show that the coefficient on the education variable is still negative and significant even conditional on location of spouse and children and the temporary migration variable (column 2 in Table A1). One explanation is that households where the head is better educated may enjoy more favorable conditions in the home country, thus reducing the need for remittances. The better educated may also be less affected by social pressure to remit.

In the lower panel of Table 3, we show results for the same specifications, where we use the logarithm of the reported amounts of remittances as the dependent variable. For zero observations, we set remittances equal to 1.[14] Again, we report only the coefficients on the temporary measure of migration, and the location of the immediate family; the full set of results is reported in Table A3 in the Appendix A.

[12] Marginal effects from probit models are almost identical.

[13] Lucas and Stark (1985), Hoddinott (1994) and Funkhouser (1995) also report a positive association between remittance behavior and migrant's income.

[14] The dependent variable is thus $ln(Z+1)$, where Z is total remittances in 2002 Euros. Alternatively, we have estimated Tobit specifications; results are very similar.

Overall, the qualitative results are similar to those we discuss above. The magnitude of the coefficient estimates are large: total remittances are more than one log point higher when the migration is intended to be temporary. The coefficient drops to 0.84 when we condition on the location of the family. As before, most of the difference between temporary and permanent households is due to family support, as column 2 suggests. However, savings in the home country and "other" remittances are also significantly larger for households with temporary migration plans. While the coefficient estimate decreases when we condition on family location for family remittances, it increases for the other two purposes.

4.3. Fixed effects, measurement error and reverse causality

The estimates we report in the last section can not be interpreted as causal, as we discuss in section 2.1. The estimated association between the temporary character of migration and remittances may partly reflect that those immigrants who are intending to return home are also more inclined to remit. Two further problems we discuss are that the return intention variable is likely to be measured with considerable error, and that past remittances may affect current return plans. These are likely to lead to a downward bias in a fixed effects regression. In this section, we attempt to address these issues, by using the GMM type estimator we explain in section 2.1.

In Table 4 we report estimation results both for the probability to remit (Panel A) and for the amount of remittances (Panel B). Specifications are identical to specification 2 in Table 3, and we report as a benchmark (column 1) results from that specification. Columns 2 and 3 report conventional fixed effects (FE) estimates and fixed effects estimates using forward orthogonal deviations. The results show that estimates for the two specifications are very similar, but that conditioning on fixed effects reduces the temporary migration coefficient considerably. As we discuss above, this could be due to unobserved factors that affect remittance behavior as well as temporary migration intentions, but it could also be due to measurement error in the intention variables, or the feedback mechanisms in Eq. (3). In column 4 we report GMM estimates, using past levels of return plans of other household members as instruments, as described above. These are considerably larger than the FE estimates, and slightly larger than the OLS estimates. They suggest a 16.2 percentage point higher probability of sending remittances for immigrants with temporary migration plans.[15] Comparing FE estimates with GMM estimates suggests that both measurement error and/or feedback lead to a downward bias in FE estimates.

In the lower panel of the table we assess the magnitude of these effects, using the logarithm of the total amount of remittances (plus one) as a regressor. The coefficient estimate on temporary migration drops in the fixed effects specification, but is still significant, suggesting that temporary migration plans increase remittances overall by 28%. GMM estimates in column 4 are again larger than the OLS estimates, showing that temporary vs permanent migration plans increase total remittances by 1.3 log points.[16]

Table 4
Probability to remit and amount remitted — Fixed effects and GMM.

Household sent remittances (=1 Yes, =0 No)	OLS	FE	FE orthogonal deviations	GMM
	(1)	(2)	(3)	(4)
Temporary	0.096**	0.032*	0.034**	0.162* [a]
	(0.020)	(0.015)	(0.0145)	(0.069)
Logarithm (amount remitted + 1)				
Temporary	0.837**	0.244*	0.253**	1.396** [b]
	(0.162)	(0.121)	(0.115)	(0.542)
Observations	7,709	7,984	6,574	6,473
Number of never changing person id		1,411	1,173	1,170

*Significant at 5%; **Significant at 1%.
Note: GSOEP data (1984–1990,1992,1994). Household level, using household weights. All specifications include time dummies and condition on marital status and employment status of the head of the household, as well as household income, employment status of the rest of the members of the household, number of adults and children in the host country household and indicator variables for spouse and children in the home country. OLS specification includes in addition country dummies, age, years since migration (and its square), education, gender and childhood in a rural area in the home country. Standard errors are clustered by household. Instrumental variables used in GMM: lags in average intention to return (t-1, …, 1) of other household members.
[a] AR(1) Test: $z=-10.42$ P-Value = 0 AR(2) Test: $z=-0112$ P-Value = 0.911 Hansen Test = 31.88 P-Value = 0.619.
[b] AR(1) Test: $z=-10.469$ P-Value = 0 AR(2) Test: $z=-0.14$ P-Value = 0.888 Hansen Test = 32.34 P-Value = 0.597.

5. Discussion and conclusion

To obtain an idea of the magnitude of the relationship between remittance flows and permanent versus temporary migration plans, we provide some simple estimates based on the GMM results in Table 4. Over the period we consider, the average yearly flow of remittances sent home by the immigrants in our sample amounts to 1736 Euros per household, or 504 Euros per individual.[17] This corresponds to an aggregate of more than 2 billion Euros in 1995 (equivalent to 0.12% of the German GDP in that year), for the population of immigrants that are represented in our sample.[18] Now consider an increase in permanent migration plans of 10 percentage points (over the ten-year period, permanent migration intentions of households have increased by 30 percentage points). This change is equivalent to a drop in remittances sent of 15% of the total amount remitted, corresponding to around 300 million Euros, or around 0.018% of the German GDP in 1995.

The drop in remittances is even more important for receiving countries. To put this number into perspective, consider Turkey. In 1994, remittance flows corresponded to 2.1% of the Turkish GDP, much higher than foreign direct investment (0.51%) or aid (0.18%).[19] An increase in permanent intentions to stay in Germany of Turkish immigrants by 10 percentage points corresponds to a decrease in remittance flows of 138 million Euros, using our GMM estimates in Table 4. This is equivalent to around 0.28% of Turkish GDP in 1994, an amount equivalent to more than half of foreign direct investment received by Turkey in 1994 and much higher than the total amount of aid received. Although these are rough calculations, they highlight the magnitude of the effects of temporary vs permanent migration on remittance behaviour.

[15] The Arellano and Bond (1991) test for second-order autocorrelation on the residuals in differences does not reject the null of no serial correlation (p-value 0.9), implying that using lags as instruments is a valid strategy. In addition, the Hansen test for joint validity of the instruments has a P-value of 0.91, showing that the overidentifying restrictions are comfortably accepted.

[16] We have also estimated the model using as instruments past return intentions of both the head of household and other household members, or the head of household only. Estimates are similar to those reported.

[17] We obtain this number by dividing the average remittances per household by the average household size for our sample during the years 1984–1994. This amount is in line with official aggregate statistics: total remittance flows in 1995 were 4.12 billion Euros (in 2002 prices) according to Bundesbank (2006), which corresponds to 574 Euros per immigrant, based on the total immigrant population.

[18] Immigrants from Turkey, Ex-Yugoslavia, Greece, Italy and Spain, who accounted for 60% of the total immigrant population in Germany in 1995 (OECD, 2006).

[19] OECD (2006b), Worldbank (2006).

Our results emphasize the importance of the particular form of migration for immigrant behavior. They suggest that migration policies that encourage temporary migration are likely to lead to higher remittance flows than migration policies that encourage permanent settlement. Thus, our analysis suggests that remittances need to be discussed in conjunction with the particular form of migration.

Appendix A. Data construction

We use data from the first 12 waves of the German Socio-Economic Panel (years 1984–1995). Our sample consists of migrant households whose head was born in Turkey, Greece, Yugoslavia, Italy or Spain.

Individuals are asked in each wave of the panel whether they intend to remain permanently in Germany, or whether they wish to return home at some stage in the future. We construct a binary variable that equals 1 if the head of household plans to return in the future.

Household income corresponds to the net monthly income of the household, in 2002 Euros and transformed to the yearly level. The exact wording of the question is "If everything is taken together: how high is the total monthly income of all the household members at present? Please give the monthly net amount, the amount after the deduction of tax and national insurance contributions. Regular payments such as rent subsidy, child benefit, government grants, subsistence allowances, etc., should be included. If not known exactly, please estimate the monthly amount."

Individuals declare each year the amount of remittances sent in the previous year (except for the surveys in 1992 and 1994). The wording of the question is "(Last year) did you personally send or take money to your homeland?". In case of an affirmative answer, individuals are asked for the overall amount and the purpose: "And how is this amount distributed between support for your family, savings for later and other". "Savings" correspond to the amount of savings in the home country. "Other" corresponds to any other purpose. We aggregate these amounts to the household level and lag them for one year to match them time-wise with the rest of observed variables.

Table A1
GSOEP data availability.

Variable name	Description	Availability
Total remittances	Total amount sent to home country	1984–1990,1992,1994
Family remittances	Amount sent to support the family	1984–1990,1992,1994
Savings at home country	Amount saved in the home country	1984–1990,1992,1994
Remittances for other purposes	Amount sent for other purposes	1984–1990,1992,1994
Savings at host country	Amount saved in the host country	1992–2003
Household income	Annual net household income	1984–2003
Return intention	Intention to return to the home country	1984–2003
Spouse abroad	Spouse in the home country	1984–1997
Children abroad	Under aged children in the home country	1984–1997
Number of adults	Number of adults host country household	1984–2003
Number of children	Number of children host country household	1984–2003

Note: German Socio Economic Panel (GSOEP) data.

Table A2
Probability to remit — full set of results.

	Total		Family support		Savings for later		Other purposes	
Age/10	0.028*	−0.001	0.032*	0.009	0.006	0.008	−0.004	−0.005
	(0.014)	(0.017)	(0.013)	(0.017)	(0.007)	(0.008)	(0.007)	(0.009)
Years since migration/10	0.165*	0.165	0.116	0.073	0.024	0.008	0.007	0.056
	(0.074)	(0.086)	(0.064)	(0.083)	(0.024)	(0.033)	(0.041)	(0.039)
YSM-squared/100	−0.064**	−0.049*	−0.050**	−0.032	−0.009	−0.004	−0.005	−0.012
	(0.017)	(0.021)	(0.015)	(0.021)	(0.006)	(0.008)	(0.009)	(0.010)
Log HH income	0.109**	0.106**	0.087**	0.077**	0.021**	0.029**	0.018	0.018
	(0.024)	(0.027)	(0.020)	(0.023)	(0.008)	(0.010)	(0.013)	(0.015)
Number adults HH host	−0.049**	−0.034*	−0.051**	−0.029	−0.008	−0.01	0.016	0.011
	(0.014)	(0.014)	(0.014)	(0.015)	(0.006)	(0.006)	(0.009)	(0.011)
Number children HH host	−0.024*	−0.017	−0.031**	−0.019	0.002	0.000	−0.001	−0.004
	(0.010)	(0.011)	(0.009)	(0.011)	(0.004)	(0.005)	(0.005)	(0.006)
Employment head HH	0.130**	0.121**	0.123**	0.116**	0.004	0.011	−0.005	−0.012
	(0.031)	(0.034)	(0.031)	(0.034)	(0.011)	(0.012)	(0.016)	(0.017)
Number employed HH	0.042**	0.044**	0.019	0.021	0.021**	0.018*	0.025*	0.029**
	(0.015)	(0.016)	(0.015)	(0.016)	(0.007)	(0.008)	(0.010)	(0.010)
Number years education	−0.017*	−0.019**	−0.013	−0.014*	−0.004	−0.005*	0.001	−0.002
	(0.007)	(0.007)	(0.007)	(0.007)	(0.002)	(0.003)	(0.003)	(0.003)
Male head HH	0.124**	0.164**	0.082*	0.134**	0.028**	0.031*	0.017	0.021
	(0.045)	(0.054)	(0.041)	(0.049)	(0.009)	(0.013)	(0.018)	(0.025)
Non single head HH	0.05	−0.019	0.055	−0.035	0.007	0.012	0	0.004
	(0.046)	(0.054)	(0.044)	(0.051)	(0.012)	(0.018)	(0.020)	(0.026)
Native partner	−0.110*	−0.091	−0.051	−0.034	−0.047**	−0.047**	−0.072**	−0.064**
	(0.054)	(0.064)	(0.046)	(0.055)	(0.010)	(0.012)	(0.016)	(0.019)
Temporary	0.134**	0.096**	0.101**	0.057**	0.029**	0.030**	0.033**	0.043**
	(0.020)	(0.020)	(0.020)	(0.020)	(0.008)	(0.008)	(0.013)	(0.013)

Table A2 (*continued*)

Spouse abroad		0.097*		0.1		−0.026		−0.022
		(0.046)		(0.054)		(0.017)		(0.024)
Children abroad		0.141**		0.177**		0.000		−0.005
		(0.031)		(0.031)		(0.014)		(0.016)
Rural childhood		0.066*		0.041		0.000		0.008
		(0.027)		(0.026)		(0.010)		(0.013)
Observations	8,917	7,709	8,917	7,709	8,917	7,709	8,917	7,709
Pseudo R-sq	0.162	0.172	0.122	0.141	0.033	0.034	0.032	0.034

*Significant at 5%; **Significant at 1%.

Note: Dependent variable: household sent remittances (=1 Yes, =0 No). Weighted regression using household weights. All specifications include time and country dummies GSOEP data (1984–1990,1992,1994). Standard errors are clustered by household.

Table A3

Amount remitted — full set of results

	Total		Family support		Savings for later		Other purposes	
Age/10	0.269*	0.034	0.284**	0.104	0.045	0.058	−0.033	−0.032
	(0.113)	(0.139)	(0.101)	(0.134)	(0.057)	(0.062)	(0.053)	(0.067)
Years since migration/10	1.197*	1.26	0.808	0.48	0.172	0.049	0.013	0.385
	(0.605)	(0.684)	(0.508)	(0.642)	(0.198)	(0.270)	(0.319)	(0.297)
YSM-squared/100	−0.498**	−0.390*	−0.379**	−0.232	−0.066	−0.025	−0.034	−0.083
	(0.138)	(0.165)	(0.114)	(0.156)	(0.049)	(0.068)	(0.073)	(0.080)
Log HH income	0.981**	0.996**	0.749**	0.694**	0.192**	0.256**	0.153	0.16
	(0.205)	(0.239)	(0.159)	(0.185)	(0.069)	(0.084)	(0.104)	(0.119)
Number adults HH host	−0.503**	−0.358**	−0.492**	−0.300**	−0.071	−0.09	0.116	0.079
	(0.111)	(0.114)	(0.104)	(0.116)	(0.046)	(0.047)	(0.069)	(0.081)
Number children HH host	−0.246**	−0.180*	−0.303**	−0.190*	0.019	−0.004	−0.002	−0.022
	(0.076)	(0.083)	(0.072)	(0.082)	(0.036)	(0.040)	(0.040)	(0.046)
Employment head HH	1.012**	0.940**	0.954**	0.894**	0.021	0.068	−0.045	−0.091
	(0.237)	(0.256)	(0.232)	(0.255)	(0.083)	(0.092)	(0.123)	(0.133)
Number employed HH	0.393**	0.397**	0.172	0.183	0.171**	0.145*	0.201*	0.231**
	(0.123)	(0.128)	(0.114)	(0.121)	(0.057)	(0.060)	(0.078)	(0.080)
Number years education	−0.119*	−0.123*	−0.084	−0.087	−0.031	−0.041*	0.004	−0.01
	(0.057)	(0.058)	(0.055)	(0.053)	(0.019)	(0.020)	(0.022)	(0.024)
Male head HH	1.118**	1.460**	0.717*	1.135**	0.233**	0.253*	0.174	0.193
	(0.348)	(0.405)	(0.316)	(0.367)	(0.072)	(0.103)	(0.127)	(0.174)
Non single head HH	0.557	−0.042	0.598	−0.161	0.048	0.096	−0.029	0.013
	(0.351)	(0.407)	(0.331)	(0.382)	(0.097)	(0.144)	(0.154)	(0.199)
Native partner	−1.069**	−0.921*	−0.536	−0.394	−0.376**	−0.376**	−0.570**	−0.509**
	(0.367)	(0.431)	(0.315)	(0.375)	(0.078)	(0.093)	(0.116)	(0.137)
Temporary	1.114**	0.837**	0.819**	0.483**	0.222**	0.235**	0.250*	0.337**
	(0.163)	(0.162)	(0.160)	(0.155)	(0.062)	(0.064)	(0.098)	(0.100)
Spouse abroad		0.899*		0.925*		−0.219		−0.204
		(0.376)		(0.410)		(0.132)		(0.170)
Children abroad		1.256**		1.565**		−0.008		−0.051
		(0.257)		(0.251)		(0.109)		(0.119)
Rural childhood		0.585**		0.351		−0.002		0.084
		(0.211)		(0.204)		(0.084)		(0.103)
Observations	8,917	7,709	8,917	7,709	8,917	7,709	8,917	7,709
Pseudo R−sq	0.177	0.193	0.135	0.162	0.033	0.034	0.033	0.036

*Significant at 5%; **Significant at 1%.

Note: Dependent variable: Logarithm (amount remitted + 1). GSOEP data (1984–1990,1992,1994). Weighted regression using household weights. All specifications include time and country dummies. Standard errors are clustered by household.

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