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Migrants' beliefs and investment

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Abstract

Migration increases sending households' capacity to invest but introduces additional information asymmetry between household members. In this paper, I establish a new stylized fact: Migrants systematically overestimate assets that they typically invest in and that are held by their households. This is shown using novel data with matched reports from Senegalese migrants and their own households of origin. I find empirical support for a self-selection mechanism, whereby migrants who are more optimistic about their households' trustworthiness are more likely to sort into investment, and reject alternative interpretations based on behavioral biases. This mechanism suggests important economic consequences, such as inhibited migration and underinvestment in public goods.

Keywords: Asymmetric information; International migration; Intrahousehold allocation.

JEL codes: D82, D83, O15, D13.

*University of Bristol, Paris School of Economics, DIAL, Institut Convergences Migrations. E-mail: marlon.seror@bristol.ac.uk. I am grateful to Cátia Batista, François Bourguignon, Marshall Burke, Sylvie Démurger, Marcel Fafchamps, Richard B. Freeman, Garance Genicot, Flore Gubert, Marc Gurgand, Clément Imbert, Sylvie Lambert, Marion Mercier, Alice Mesnard, Ted Miguel, Jean-Noël Senne, Muhamet Yildiz, Roberta Ziparo, and Yanos Zylberberg for useful discussions and comments. I also thank participants at INED, Leibnitz Universität Hannover, the Hong Kong Polytechnic University, Lingnan University, the AFSE and CSAE conferences, and the AEA meeting in Boston for helpful comments. All errors are mine.

1 Introduction

Remittances are a major opportunity for sending households. Migrants send a high share of their income to support an extended family. In the short run, remittances allow for consumption smoothing, reducing the risk of food shortages. In the long run, migration alleviates capital constraints and allows migrants to invest in durable or productive assets used by their households back home.

The distance between migrants at destination and the relatives who implement their investments at origin is however likely to generate information asymmetry, and remittance recipients may favor private consumption over the public good agreed on with the prospective migrants. Their relationship can be captured by a principal-agent framework. If principals and agents differ in their preferences, the latter may make the most of information asymmetry and deviate from the principal's instructions, leading to underinvestment in public goods *ex ante* and potentially an inefficient allocation of resources *ex post*.

In this paper, I establish a new stylized fact that reveals sending households' strategic behavior. I find that migrants systematically overestimate investment asset holdings by their households of origin. Discrepancies in reports are large: They represent about 7% of the annual remittances sent by Senegalese migrants. This finding, which is robust to potential survey artifacts, is made possible by novel data on transnational households: I exploit unique data on Senegalese migrants in France, Italy, and Mauritania, and on their own households of origin, with matched reports on assets that migrants typically invest in and that are held by their households in Senegal.¹

This paper is the first to provide evidence that migrants overestimate their investments on average, but this finding is not easily reconciled with rational behavior. Even if information manipulation and deviations from their instructions were pervasive, rational migrants should anticipate them and factor them into their survey responses. Based on testable predictions from a theoretical discussion, I show that overinvestment is consistent with the self-selection of optimistic migrants into investment and cannot be explained by information asymmetry alone. Intuitively, migrants who are too skeptical of their households of origin select out of investment, whereas migrants who hold more positive beliefs about their households' trustworthiness do invest. Since migrants who invest are on average more optimistic, they expect a higher degree of realization of their investments, hence the systematic discrepancies that I observe on average between migrants' and households' reports. I

¹See the summary of the socio-anthropological literature (and in particular [Dia, 2007](#)) in Appendix [B](#) for assets typical of migrants' investments in housing and businesses.

also provide evidence of (limited) learning: Discrepancies between reports do become smaller with time and communication, but at a slow rate.² A back-of-the-envelope exercise finally allows me to shed light on the misallocation entailed by biased beliefs. I estimate that 23% of counterfactual investments in assets are lost, as pessimistic migrants select out although they could profitably invest.

An alternative interpretation is that migrants form posterior beliefs thanks to information gathered from the households and fail to “de-bias” this information. I use heterogeneity among assets to reduce concerns. According to the selection story, there is no bias when the principal’s and agent’s preferences are aligned, as all principals invest and hold the correct beliefs on average. Conversely, if the principal suffers from a cognitive bias, idiosyncratic differences between the agent’s preferences and her own lead to a systematic bias regardless of average preference alignment. The economic literature has mostly focused on public goods that give rise to preference divergence between husbands and wives, such as children’s services, housing, education, food, and health (Manser and Brown, 1980; Thomas, 1993; Hoddinott and Haddad, 1995; Duflo and Udry, 2004; Ashraf, 2009). Following the socio-anthropological literature on the Senegalese diaspora (see Appendix B) and based on evidence from the data, I contrast discrepancies about assets such as TV sets, for which preferences do not differ, with assets that can be used productively, e.g., automobiles and refrigerators, favored by migrants. This placebo check shows that selection comes only from assets that give rise to preference divergence between migrants and their households, which leads me to reject the cognitive bias hypothesis.

The main contribution of this paper is to show for the first time that migrants overestimate *on average* the realization of their investments in their countries of origin. This stylized fact has two implications: First, it provides evidence of information asymmetry in transnational households, which limits the gains from migration. Second, I show that migrants select into investment based on heterogeneous prior beliefs, which inhibits remittances *ex ante*. I provide evidence of this rational interpretation against alternative interpretations that assume non-rational behavior.

By contrasting migrants’ and households’ survey reports on assets that the former typically invest in, this paper constitutes one of the first quantitative assessments of the extent of information asymmetry in transnational households and shows large, sustained gaps in information sets. The closest papers to mine are Seshan and

²My analysis cannot definitively shed light on the effect of time or monitoring on the convergence of beliefs. Exogenous variation in these variables would be needed, whereas the rest of the argument (overestimation of asset holdings on average and rejection of alternative interpretations) simply relies on contrasting migrants’ and their households’ survey reports and thus does not require us to estimate a causal relationship.

Zubrickas (2015) and De Weerdt et al. (2018). In contrast to these papers, I provide evidence that remittance *recipients* manipulate information, while they focus on *migrants'* use of private information to avoid remitting.³ The recipients' strategic behavior may however have large efficiency implications if migrants are aware of manipulations and refrain from remitting to their households and investing with their help.

More generally, this paper sheds light on the economy of (transnational) households. Information manipulation indeed relies upon three ingredients: (i) Households do not follow a collective model of resource allocation (Udry, 1996; Dercon and Krishnan, 2000; Goldstein et al., 2005; Dubois and Ligon, 2011);⁴ (ii) migrants and households disagree over the use of remittances, which relates to the literature on preference differences among relatives (Manser and Brown, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 1993); and (iii) household members have imperfect information about each other's actions, which affects intra-household resource allocation and is detrimental to investment in public goods (Ashraf, 2009; Castilla and Walker, 2013; Ziparo, 2014; Jakiela and Ozier, 2015), and distance facilitates strategic behavior (Azam and Gubert, 2005; Chen, 2006; De Laat, 2014; Ambler, 2015; Ashraf et al., 2015; Batista et al., 2015; Batista and Narciso, 2016; Joseph et al., 2018).

The second original feature of this paper is to rationalize the systematic overestimation of realized investment. Beyond providing evidence of information asymmetry, it highlights that for large discrepancies to be observed on average migrants must either hold heterogeneous prior beliefs—and select into investment based on those beliefs,—or display some behavioral bias. This paper offers empirical support for theoretical contributions on heterogeneous beliefs such as Van den Steen (2004, 2011), Izmalkov and Yildiz (2010), Yildiz (2011), Sethi and Yildiz (2012, 2016), and Acemoglu et al. (2016). The evidence leads me to reject behavioral interpretations of the observed discrepancies (cognitive biases) and shows that the mechanism put forward in particular in Van den Steen (2004)—self-selection by rational individuals based on their beliefs—is observed in a highly relevant development context.

The remainder of this paper is organized as follows. Section 2 presents the

³Seshan and Zubrickas (2015) use matched reports to show that Qatar-based migrants manipulate information about their earnings to their wives in Kerala. De Weerdt et al. (2018) do not find evidence of systematic discrepancies between assessments by internal migrants in Tanzania and the actual living standards of their remittance recipients. McKenzie et al. (2013) also suggest that Tongan migrants to New Zealand misrepresent their earnings to their transfer recipients.

⁴Qualitative evidence from the socio-anthropological literature on Senegalese migrants (Dia and Adamou, 2003; Fall, 2003; Marfaing, 2003; Dia, 2007; Boltz-Laemmel and Villar, 2014), summarized in Appendix B, supports the idea that households of origin behave non-cooperatively—by manipulating information to deviate from the migrant's investment instructions.

data and establishes the stylized fact. Section 3 investigates two necessary ingredients to explain the systematic overestimation by migrants of realized investments: preference divergence and imperfect observability. Section 4 finally reconciles the stylized fact with rational behavior by deriving testable predictions from a theoretical framework and providing empirical evidence of the self-selection of migrants into investment based on optimism. Section 5 concludes.

2 Stylized fact

In this section, I first describe the data and provide descriptive statistics on the average migrant and the relationship between observed assets and investment. I then present the stylized fact of systematic discrepancies between migrant and household reports, along with robustness checks to establish the presence of information asymmetry about the realization of migrants' investments and of strategic behavior by origin households.

2.1 Data and methodology

Method and representativeness This paper uses the data collected as part of the MIDDAS project (2009–2010).⁵ These data exhibit two original features: (i) They consist of matched migrant and household surveys; the same questions about assets were asked to migrants and their own households of origin. (ii) The same survey design was implemented in three different destination countries.

Data collection was implemented in two steps. First, MIDDAS enumerators contacted Senegalese migrants in France, Italy and Mauritania. Contact points, e.g., subway stations and markets, were selected based on population census data to maximize the probability of encountering Senegalese migrants and reflect their spatial distribution within host countries.⁶ This survey design was dictated by the lack of a sampling frame that would have allowed for the random sampling of migrant households. While such a design could in principle have impaired representativeness, Chort and Senne (2018) show that MIDDAS provides a faithful picture of the Senegalese diaspora in France and Italy.

Second, the migrants interviewed in the first step were asked to put the survey team in touch with their households of origin, who were then presented with a

⁵MIDDAS stands for “Migration and development in Senegal: an empirical analysis using matched data on Senegalese migrants and their origin households.” For a detailed presentation of the project, see <http://www.dial.ird.fr/projets-de-recherche/projets-anr/middas>.

⁶Qualitative information on the spatial distribution of the diaspora was used in Mauritania, for lack of census data on Senegalese migrants.

thorough questionnaire that follows the complex structure of Senegalese households, made up of several subgroups or “cells.” Whereas migrants were usually interviewed in public places, their households of origin were systematically interviewed at home in Senegal. Another difference between the migrant and household surveys is that the latter gave rise to much longer interviews.

The two-step procedure entails a risk of introducing a bias as migrants choose whether to include the origin household in the matched survey. Appendix Table A1 investigates selection into the matched sample.⁷ Panel A shows the matched sample does not differ from the total migrant sample in terms of asset values and investment plans (both in productive ventures and real estate). Actual productive investment does exhibit some imbalance, but the effect is very small. Panel B looks at selection in terms of migration experience and the relationship between the migrant and her household of origin—whether the migrant is the son or daughter of the household’s head, whether she has a spouse living with the household and whether she has children living with them in Senegal. No significant selection is found. Panel C finally looks at selection along migrant characteristics, and does find significant—but limited—sorting in terms of age, income and total remittances. This must be borne in mind when assessing the external validity of the findings. Note that we would moreover expect a better (unobserved) relationship between migrants and their origin households to enhance the probability of entering the matched sample. Information asymmetry and manipulation should thus be less of an issue in the matched sample than in the general migrant population.⁸

Investment and beliefs As highlighted in the socio-anthropological literature,⁹ Senegalese migrants typically plan to invest in their country of origin, mostly in housing and businesses, and they earmark remittances for the purchase of assets needed for those investments. These assets may serve two different purposes: They may be consumption durable goods (e.g., TV sets) or productive assets (e.g., means of transportation such as automobiles and motorbikes).

The main benefit of this study resides in identical modules in matched migrant and household surveys on a wide variety of assets typically financed by the migrant. The surveys suffer from very few missing asset data. Only 0.62% of migrants in

⁷Table A1 records the results of separate regressions of a binary indicator equal to 1 if the household of origin was successfully interviewed and 0 otherwise on characteristics of the migrant-household pair (elicited from the migrant) and variables that are key to the analysis. All regressions control for migration destination (Europe or Mauritania).

⁸Chort and Senne (2018) further find that matched migrant households are similar to the average migrant household in Senegal.

⁹See Appendix B for a detailed account of Senegalese migrants’ investment behavior.

the matched sample and 1.9% of matched households failed to answer the asset module. There is no partial non-response. This allows me to contrast migrants’ and households’ reports (denoted A^m and A^h , respectively) of the number of investment assets A held by the household of origin, and to measure discrepancies $\Delta \equiv A^m - A^h$ that reflect gaps between migrants’ beliefs and the realization of their investments.¹⁰

The household survey also collected data on the price of the assets. This information can be used to value the discrepancies and aggregate them into a synthetic measure of biased belief: $\sum_i p_i \Delta_i$, where i denotes an asset and p its average price.¹¹ The household survey additionally included a detailed module on expenditures, ranging from private goods such as “personal care” to public goods closely related to the investment assets favored by migrants, e.g., maintenance of assets and appliances.

Another benefit of the data is that the migrant survey was carried out in three major destination countries of the Senegalese diaspora: France, Italy and Mauritania. This offers variation in distance that can be used as a proxy for the observability of the household’s actions by the migrant, and thus of information asymmetry. Senegalese migrants in Mauritania however earn much lower incomes and are selected, possibly along their beliefs and relationship with their households of origin. I shall thus always control for destination or present results separately for Europe- and Mauritania-based migrants. When discussing the role of observability, extensive controls will need to be included to alleviate identification concerns. Detailed variables on migration experience, at the individual (migration duration) and household (number of emigrants) levels, will also be instrumental in exploring the role of learning in the distribution of beliefs.

Descriptive statistics I first provide some descriptive statistics about the characteristics of the average migrant and her origin household, by destination. I then show the mean holdings across assets and finally discuss the relationship between the assets observed and investment.

Table 1 displays key descriptive statistics of the matched sample, for Europe-

¹⁰Discrepancies can be built in several ways depending on the underlying model of migrants’ beliefs about their households’ behavior. If migrants believe that households have preferences about the *level* of A , discrepancies should be defined as $\Delta \equiv A^m - A^h$. Conversely, if they think of a lack of trustworthiness as a tax, then it is more natural to express Δ as A^h/A^m . Given the left-censored distribution of A , I prefer the difference definition of Δ but show in Appendix Table A6 that the results are robust to using the ratio definition.

¹¹I use the average price reported by households of origin who do hold the asset to value discrepancies when $A^m > 0$ and $A^h = 0$. Note that prices allow me to aggregate assets but need not correspond to the weights in the migrant’s utility function: Inexpensive assets could indeed be crucial to the realization of the migrant’s project. It is however unlikely that the migrant puts little weight on expensive assets, such as automobiles.

and Mauritania-based migrants.¹² Migrants come from households with an average (and median) of approximately 5 emigrants, which implies that they can exchange information about their households' behavior with other migrants. While the large number of emigrants may give rise to complex strategic interactions, I will assume in this paper that emigrants from the same household behave as one principal, i.e., they perfectly coordinate their investments and share the same preferences. I will test for this assumption in Section 4. Table 1 also shows that migrants have strong relationships with their households of origin: The migrant is typically the daughter or son of the household head, and 28% (resp., 46%) of the migrants based in Europe (resp., Mauritania) have at least one child living with their families in Senegal.

Migrants and their households vary significantly by destination. Table 1 shows that a sizable share (26%) of migrants in Europe had productive investment plans at the time of the survey, as against 4% of their counterparts in Mauritania. Similarly, for the migrants who do invest, the invested amount is much lower in Mauritania, which may reflect lower income. It is also interesting to note that invested amount displays a much larger coefficient of variation in the Mauritanian sample. Migrants living in Mauritania are found to visit their origin households more frequently, which is expected given their geographical proximity to Senegal and may enhance the observability of the household's actions. They also send a larger share of remittances in kind, which probably owes to (i) lower transportation costs and (ii) smaller remittances in absolute terms (€307 annually as against €2,127 for Europe-based migrants), and again should help migrants ensure that earmarking is followed. Importantly, they earn and remit significantly less (although the share of remittances is slightly higher), which may directly affect the size of the discrepancies. The large differences between migrants in Europe and in Mauritania call for studying them separately or systematically controlling for destination.

Table 2 shows variation in holding levels across assets, for the whole sample, the households of Europe-based migrants and those of Mauritania-based migrants. Panel A displays for each asset the average number of items held by the household of origin and associated standard deviation, and Panel B displays the fraction of households that report holding at least one item and its standard deviation. We can see from Panel A that for some assets, i.e., electric fans, radios and TV sets, the average holding is in excess of 1, while it reaches 0.50 for none of the other assets. Panel B confirms that while some assets are commonly owned, others are highly selective. TV sets, and to a lesser extent radios and electric fans, again stand out as

¹²As only 4% of migrants remit to more than one household, all the following analyses focus on the migrant's household of origin, her main—and usually only—investment partner.

particularly widespread. At the other end of the spectrum, only 11% of households report an automobile.

A limitation of the MIDDAS data is their cross-sectional nature. This implies that information on how remittances are allocated between (intended or actual) uses is lacking. Based on the literature (see Appendix B), investment remittances can however be expected to be spent mostly on housing expansion or refurbishment and household businesses.¹³ Appendix Table A2 provides suggestive evidence that the assets on which matched data are available are positively related to migrants' productive investments in Senegal, as put forward by the socio-anthropological literature. Migrants who report productive investments report much higher total assets, even controlling for key migrant characteristics and migration experience, and keeping income constant. The relationship with real estate investment is less strong and robust, but also positive.

2.2 Evidence of information asymmetry

I now turn to the stylized fact that motivates this paper. I show a systematic bias in migrants' estimation of assets held by their households of origin and highlight three dimensions of this bias: (i) There is a positive average bias in migrants' estimation of assets; (ii) the distribution of biases is asymmetric; and (iii) the distribution depends on distance. I then confirm the information asymmetry interpretation through robustness checks that allow me to reject measurement error and survey artifacts.

Stylized fact First, I estimate average biases by regressing the discrepancy for each asset on a constant.¹⁴ The discrepancies are normalized by the average household report.¹⁵ Table 3 displays the results from those regressions in the whole sample (column 1), among migrants based in Europe (column 2) and among those living in Mauritania (column 3). As obvious from Column 1, the discrepancies are positive and significant for the vast majority of assets. They are also very large, with a maximum of 0.92 for motorcycles, which means that the migrant's report of the number of motorcycles held in Senegal is on average 92% higher than her own household's. Some assets however do not follow the general pattern of positive and significant

¹³Education and health expenditures might be another important use of transfers, but the data do not allow me to isolate education- or health-related remittances.

¹⁴Since no controls are included, the constant can be straightforwardly interpreted as the average bias. Regressions are used to accommodate the controls later incorporated into the model.

¹⁵The results are similar when I use the raw discrepancies, not normalized by A^h (Appendix Table A3) or when I winsorize the migrants' and households' reports at 10% (Appendix Table A4). I also find similar results when I define the discrepancies as ratios rather than differences—see Appendix Table A6.

discrepancies: TV sets and electric fans display negative (and significant for the former) discrepancies, and the number of radios is not significantly overestimated.

Focusing on discrepancies expressed as the number of items masks heterogeneity in monetary value, both across assets and across households. Table 4 performs the same exercise as Table 3, but uses discrepancies valued (in 1,000 CFA francs) by households of origin.¹⁶ A similar pattern obtains: Migrants systematically overestimate asset holdings back home. Automobiles are the most expensive asset and display an average discrepancy of FCFA 311,000 (or €475).¹⁷

Valuing discrepancies further allows me to aggregate assets, and discrepancies are large too in monetary terms: Migrants overestimate asset holdings by an average of FCFA 455,000 (\approx €693), or 59% of a year’s worth of remittances. If we divide the sum of discrepancies at the time of the survey by average migration duration (see Table 1), we can approximate a flow definition of discrepancies, which then represent 7% of remittances every year.

Second, the distribution of biases is not only positive on average, it is also asymmetric. This is shown in Figure 1; Table 5 reports standardized coefficients of skewness for each asset.¹⁸ Three points are worth noting. (i) Assets that are overestimated on average display large standardized coefficients of skewness. (ii) These coefficients are distributed over a wide range—from 0.14 to 1.32. (iii) There is a positive correlation between skewness and average bias: Moderately overestimated assets (such as refrigerators) display a lower coefficient of skewness than assets with larger discrepancies (e.g., motorbikes or bicycles).¹⁹ Assets that do not exhibit a positive average bias—TV sets, electric fans and radios—display coefficients of skewness that are negative or close to zero.

Third, the distribution of discrepancies varies strongly with distance. The average bias revealed by Table 3 is particularly striking in distant Europe, while the discrepancies are still positive and often significant, but smaller, in nearby Maurita-

¹⁶Investment assets could also be seen as a way for migrants to save. Following this interpretation, $\sum_i p_i \Delta_i$ is the quantity that migrants intend to maximize.

¹⁷Note that the prices elicited from households are meant to reflect current sale value and thus mechanically underestimate purchase value through depreciation. The data however distinguish assets acquired more than and less than 5 years ago. Appendix Table A7 focuses on the latter category, for which depreciation is less of a concern, and yields the same conclusion as Table 4, as well as very similar point estimates.

¹⁸The coefficient of skewness is very sensitive to outliers. I winsorize the asset distributions at 10% to compute the coefficients displayed in Table 5. The average bias is similar when calculating the discrepancies based on the winsorized distributions—see Tables A4 and A5.

¹⁹Table 5, Column 2 provides standardized coefficients of skewness for valued discrepancies and provides a similar ranking of assets by skewness. The correlation between skewness and average bias is however less obvious when looking at valued discrepancies, because the rankings in terms of prices and preferences need not coincide.

nia. The median discrepancy is 1 unit in Europe as against 0 in Mauritania. Figure 1 shows graphically the distributions of the sums of valued discrepancies for Europe- and Mauritania-based migrants. We can note that the distribution of discrepancies is symmetric and much more concentrated around 0 in Mauritania, while it is more dispersed and exhibits a clear asymmetry in the European sample, with a mass of observations in its positive half.

Robustness checks The finding of systematic and positive discrepancies suggests that households of origin behave non-cooperatively and use private information to deviate from the migrants’ investment instructions. This interpretation however assumes that positive discrepancies signal that the migrant overestimates rather than overstates her investments. It also assumes away any measurement error issues that might mechanically create gaps in reports.

In order to establish that the observed discrepancies are evidence of information asymmetry and manipulation, I perform a number of robustness checks. I investigate two sources of bias in the estimates of average discrepancies: survey biases and non-classical measurement.

First, I investigate three potential sources of bias due to the survey design and implementation.²⁰ (i) As migrants and their households could not be surveyed simultaneously, the gap in survey timings could generate spurious discrepancies in asset reports. I test for this confounding factor by controlling for the time gap between the surveys. (ii) Another issue pertains to the structure of the household questionnaire. Households of origin may have been asked to review the possessions of each household “cell,” and some might have been more easily overlooked than in the migrant survey. If such were the case, we would however expect the number of members in the household to be trimmed in a similar way in the household’s report.²¹ Hence, I use the discrepancy in household size as a control. (iii) The interaction between migrants and enumerators might have led to a social desirability bias. Remitting norms are particularly strong in the Senegalese diaspora. I test for such a social desirability bias by controlling for whether the migrant was interviewed by a Senegalese enumerator. Table A9 provides evidence of the discrepancies controlling for these three sources of bias. Since the controls are arguably orthogonal to the error

²⁰These sources of bias are denoted δ_O in the measurement error model of Appendix C.

²¹Appendix Table A8 shows that migrants overstate the size of their household of origin by 1.9 person on average in the European sample. The discrepancy is not statistically significantly different from 0 among Mauritania-based migrants. Table A8 also controls for the other two sources of survey bias: The positive discrepancy in household size is not due to the time gap between surveys (column 2), the social norms conveyed by Senegalese enumerators (column 3) or household size as reported by the household of origin (column 4).

term, we should not fear introducing a bias through “bad” controls. The F statistics show that the controls are jointly significant.²² The estimated discrepancies are remarkably robust.

Second, migrants could provide random responses when asked about the number of assets held by their households of origin. If the random response, which I assume uncorrelated with A^h , is higher (lower) than the average A^h , this response behavior can lead to artificially positive (negative) discrepancies.²³ To gauge the meaningfulness of the stylized fact, I compute for each asset the propensity c of migrants to provide a random answer that we *would have* to assume to account for the observed discrepancies. Put differently, we are looking for the hypothetical c that would balance perfectly informed ($A^m = A^h$) and random answers. For simplicity, I dichotomize A^h and A^m , so that $\Delta \in \{-1, 0, 1\}$.²⁴ An intuitive random response behavior is to “toss a coin” and randomly answer that the household has or does not have the asset. Migrants may respond in such a way because they are “clueless” about A^h or because they do not want to provide the information requested. Estimates of c are displayed in Table A11: The higher the estimated c , the more unlikely it is that the observed discrepancy is due to random answers. Random responses are not a sufficiently serious concern to jeopardize the stylized fact. Table A11 shows that for all assets (except TV sets) one would have to assume a share of migrants who answer randomly in excess of 50% to account for observed discrepancies in the European sample, which is unrealistic given the regular contacts between migrants and their households, and the importance of homeward investments for migrants. Interestingly, TV sets are found to require a much lower share to explain non-zero discrepancies: The negative discrepancies for TV sets, which are a commonly held asset and thus have a high A^h on average, are most likely zeros pulled downwards by measurement error.²⁵

²²Their effects (available upon request) also go in the expected direction.

²³I incorporate this source of (non-classical) measurement error in the measurement error model in Appendix C.

²⁴The procedure is explained in greater detail in Appendix C.2. Appendix Table A10 shows that the finding of systematic overestimation by the migrant on average holds when dichotomizing A^h and A^m .

²⁵Note that random responses should be more of a concern in the European sample if this behavior is motivated by cluelessness. The discrepancy in terms of TV sets is indeed negative in Europe, where the level of c needed to account for negative discrepancies is low (equivalently, cluelessness is likely to explain the non-zero discrepancies). In Mauritania, the dichotomized discrepancy is close to 0 and random responses found to be less of an issue.

3 Information asymmetry within the household

The interpretation of the average bias as reflecting information asymmetry calls for evidence of two necessary ingredients, which I now investigate: (i) differences between households' and migrants' preferred uses of investment remittances, and (ii) imperfect observability of the households' actions by migrants.

Preference differences A natural question that arises after showing significant and systematic discrepancies is the following: How do they relate to differences in preferences?

The household survey includes a detailed expenditure module that allows me to shed light on household preferences. The module contains information on 30 items, which I aggregate into three groups: private goods, public goods and other. The private goods category consists of food and beverages consumed outside of home, clothing and shoes, personal care, personal effects and recreational activities.²⁶ The public good category contains maintenance products, housing maintenance expenses, household appliances, furniture and household utensils, maintenance expenses on furniture and appliances, means of transportation, fuel and maintenance of means of transportation, and other assets and appliances including DVD players, CD players, etc. The items identified as public goods fit nicely with the investment assets promoted by the migrant. They also include maintenance expenditures, which according to the socio-anthropological literature (see Appendix B) origin households are responsible for and the lack of which may result in faster depreciation of the assets and explain part of the observed discrepancies.²⁷

I quantify the correlation between asset discrepancies and these two dimensions of household investment in Table 6. All regressions control for destination and the level of total expenditures reported by the household, and I also provide specifications controlling for key migrant characteristics to limit omitted variable biases. I find a positive relationship between private goods and the observed discrepancies. The results are very robust to the inclusion of controls, and the coefficient on private goods is large: It is approximately equal to the average of the sum of valued discrepancies—see Table 4, column 1.²⁸

²⁶See Appendix B for evidence of clothing in particular as one of the uses of remittances favored by household members and frowned upon by migrants.

²⁷The remaining items include utilities such as water and electricity, education-related expenditures such as school supplies and private tutoring, and expenses that cannot be easily classified as leisure or productive, such as travel.

²⁸The results show a strong negative relationship between household investment in public goods and the discrepancies, which is quite intuitive given the close correspondence between the assets and expenditure items from the household survey. The coefficients are of approximately the same

These results suggest that the private goods listed in the module capture a large share of the households’ preferred expenditures. They also support the interpretation of the discrepancies as evidence of strategic behavior: Migrants send money for investment in public goods, but this money is diverted by households and spent on private goods.

Observability The different host countries included in this study offer variation in distance between migrants’ destinations and their homes. This allows for a test of the observability channel. The finding of a much smaller bias in Mauritania-based migrants’ reports may indeed reflect lower observability of households’ actions for Europe-based migrants. It may however also follow from the much lower living standards (and therefore investment capacity) in Mauritania, and it may be affected by migrants’ selection into destinations based on fears of information manipulation.

A first approach to reduce these concerns is to look at the distribution of discrepancies. Beyond a difference in means, which could be due to the gap in living standards, discrepancies are symmetrically and tightly distributed around 0 in the Mauritanian sample, while Europe-based migrants display a much more dispersed and asymmetric distribution—see Figure 1. We can quantify this difference in distributions: Discrepancies lie within half a standard deviation of the mean for the vast majority of Mauritania-based migrants (89%), as against slightly more than half of Europe-based migrants (58%). This does not follow from the distributions of migrants’ incomes or remittances, which are both more dispersed in Mauritania than in Europe—see Table 1.

Second, we can attempt to isolate the causal effect of distance through control variables. Table 7 implements such a strategy. The dependent variable is discrepancies normalized by the level of assets reported by the household, and aggregated across assets. All regressions keep migration duration constant, as Senegalese migration to Mauritania is a more recent phenomenon. Additional controls—most importantly, the migrant’s income and total remittances—are included to mitigate endogeneity. The results provide suggestive evidence that distance exacerbates the bias in migrants’ reports: (i) Table 7 confirms that migrants systematically overestimate asset holdings, and (ii) it shows that Europe-based migrants display much larger discrepancies than Mauritania-based migrants. The effect of distance is statistically significant, robust across specifications and large: The average bias is twice as large among Europe- than Mauritania-based migrants.

These results support the interpretation of the positive discrepancies as evidence

magnitude for public and private goods.

of information asymmetry. Migrants earmark money for investment in public goods, but households of origin can avail themselves of imperfect observability to reallocate remittances to their preferred uses. Such strategic behavior is facilitated by distance and the reduction in observability that it implies, hence larger discrepancies on average in the European sample.

4 Self-selection based on beliefs

Evidence of migrants overestimating *on average* the degree of realization of their investments is puzzling. Information asymmetry alone cannot explain that migrants fail to adjust their expectations for likely deviations from their instructions.

In this section, I hypothesize that migrants hold heterogeneous beliefs and select into investment based on optimism, which accounts for the stylized fact while preserving the common rationality assumption. I first present the theoretical framework and derive testable predictions about self-selection based on heterogeneous beliefs. I then provide empirical evidence consistent with the predictions and assess the misallocation of resources due to pessimism. Finally, I discuss alternative interpretations of the stylized fact.

4.1 Theoretical framework: Selection mechanism

In the empirical framework, we observe two players: the migrant (principal) and her household of origin (agent). The principal can take two actions: invest in her home country or not. Her decision relies on her belief about the agent’s trustworthiness. Several principals may engage with one agent, but each principal has only one agent.

Following the theoretical literature, I assume that the principal holds a belief about the agent that determines whether she will select into the action, and that the principals’ beliefs are on average unbiased.²⁹ I further assume that beliefs are symmetrically distributed around the “truth.” Importantly, if we introduce updating and therefore a distinction between prior and posterior beliefs, principals’ beliefs can be common knowledge and remain heterogeneous.³⁰

Despite being on average unbiased, heterogeneous beliefs may have important economic consequences if agents select into an action based on those beliefs: “random

²⁹More precisely, the principal’s beliefs are independently drawn from a symmetric distribution of beliefs centered on the true characteristic of the agent. [Sethi and Yildiz \(2012\)](#) study the implications of allowing for a positive correlation between agents’ beliefs on the persistence of disagreement.

³⁰Each principal interprets the distribution of beliefs not as evidence of different information sets about the agent, which would lead posterior beliefs to converge, but as the distribution of how wrong (other) principals are. In [Aumann’s \(1976\)](#) words, they “agree to disagree.”

variation [in prior beliefs] plus systematic choice lead to a systematic bias” (Van den Steen, 2004). The key mechanism is that agents are more likely to choose the action about which they are the most optimistic.³¹ This mechanism yields a first testable prediction: As agents self-select based on their beliefs, those who do take the action are systematically more optimistic than those who do not (**Prediction 1**).³² A second important prediction is that actions that are not governed by beliefs, e.g., because preferences are aligned, do give rise to self-selection into investment (**Prediction 2**).

4.2 Evidence of heterogeneous beliefs and misallocation

The stylized fact is already consistent with the selection mechanism: Positive average discrepancies arise as optimistic migrants invest, while more pessimistic ones select out (Prediction 1), and discrepancies concentrate on the investment assets that migrants favor relative to their households, while there is no bias on average when preferences are aligned (Prediction 2).

This section provides further evidence of the selection mechanism. Based on the assumptions laid out in the theoretical framework, I generate a counterfactual distribution of discrepancies in the absence of selection to (i) show and characterize the asymmetry in the actual distribution of discrepancies and (ii) estimate the “loss” due to pessimism.

Selection and asymmetry To generate counterfactual discrepancies, I rely on the assumption that the original distribution of beliefs, i.e., before selection into investment, is symmetric. I further assume monotone selection of migrants based on their beliefs. For simplicity, I additionally assume that optimistic migrants never select out.

I proceed in the following way. The empirical counterpart of the simplifying assumption that optimistic migrants never select out is that $\Delta^* = \Delta, \forall \Delta > 0$, where Δ^* is the unobservable pre-selection discrepancy. This allows me to determine who among the migrants who display $\Delta = 0$ selected out of investment by “mirroring” the distribution: I randomly pick values of discrepancies from the optimistic half of the discrepancy distribution ($\Delta > 0$, equivalently: $\Delta^* > 0$) and assign them to migrants in the pessimistic half ($\Delta \leq 0$) until there are as many migrants with $\Delta > 0$

³¹The principal is said to be “optimistic” (“pessimistic”) if her belief about the agent is in excess (falls short of) the truth.

³²Note that under Prediction 1 some pessimistic principals may select into the action, provided their belief is higher than their break-even point. For simplicity, I assume that principals select monotonically out of the action.

and $\Delta < 0$. The resulting distribution of counterfactual discrepancies is symmetric by construction.³³

Observed and counterfactual distributions of discrepancies are shown graphically in Figure 2. Panel (a) graphs the probability density functions, and Panel (b) the corresponding cumulative density functions, of observed and counterfactual (valued) discrepancies. Panel (c) plots a local weighted regression of the gap between the observed and counterfactual CDFs (normalized by the former) and the valued discrepancies. Panel (a) first allows us to compare the actual and counterfactual discrepancy distributions: The latter is symmetric as the one assumed in Section 4.1, while the former is strongly positively skewed.³⁴ Second, Panels (a) and (b) reveal a mass of observations with $\Delta < 0$ in the counterfactual distributions that disappears from the observed ones. Panel (b) further shows that the counterfactual CDF first-order stochastically dominates the observed one. Third, Panel (c) shows that the normalized gap between observed and counterfactual CDFs is very large for pessimistic migrants and decreases monotonically as migrants' beliefs get closer to the truth. This implies that, quite intuitively, the more pessimistic a migrant, the higher her probability to select out of investment. Panel (c) thus provides empirical support for the assumption of monotone selection.

Consistent with self-selection based on beliefs, Figure 2 shows that the observed distribution of discrepancies is heavily skewed, even though beliefs are assumed unbiased ex ante. Comparing actual and counterfactual distributions, I find a larger gap for very negative discrepancies, which could reflect the effect of pessimism on the probability to select out of investment and thus lends further support to Prediction 1.

Misallocation Evidence of discrepancies between migrants' beliefs and their households' true level of trustworthiness suggests that resources are not efficiently allocated. I now shed light on this misallocation by estimating the share of lost investment and discussing the extent of overinvestment. I define as lost investment the value of the investment assets that migrants who selected out of investment *would have* sent, had their beliefs been aligned with the truth.

I quantify "lost" investment using the counterfactual discrepancies. The share of lost investment can be calculated using the difference between the amounts actually sent by optimistic and pessimistic investors.³⁵ I compute the average $\sum_i p_i A_i^m$ for

³³Note that relaxing the assumption $\Delta^* = \Delta, \forall \Delta > 0$ would enhance the gap between actual and counterfactual discrepancies. This is thus a conservative assumption.

³⁴In Appendix Figure A1, I provide the actual and counterfactual distributions of investment ($\sum_i p_i A_i^m$).

³⁵This follows from assuming an unbiased distribution of beliefs and no selection of optimistic principals. Since some optimistic migrants do select out of investment (those whose beliefs fall

migrants with $\Delta > 0$ and with $\Delta \leq 0$, take the difference between the two, and multiply it by the number of migrants who selected out of investment, defined as those with $\Delta^* > \Delta$.³⁶ I then express this amount as a share of total observed investment assets. The results of this exercise are displayed in Table 8. We can see that the increase in investment asset value that would obtain if pessimistic migrants did not select based on their beliefs is substantial: In the sample as a whole, total investment asset value would increase by 23%. Splitting the data by migrant destination shows that the share of lost investment is much lower in Mauritania (15%) than in Europe (31%).

Besides “lost” investment due to pessimism, heterogeneous beliefs may also entail a misallocation of resources because optimistic migrants overinvest. This can be investigated by delving deeper into valued discrepancies. I have so far used the value of discrepancies to sum them across assets and assess their size. But value also carries information about the degree of optimism and pessimism that migrants display. Table 9 reports median valued discrepancies as a share of median households’ reports for optimistic migrants ($\sum_i p_i \Delta_i > 0$). We can see that optimistic investors overestimate assets massively: The median discrepancy represents 345% of the median A^h in Europe and 221% in Mauritania.

While quantitatively large, we might argue that overinvestment is a second-order issue for development compared to the selection of pessimistic migrants out of investment. In the former case, investment funds are indeed channeled to the country of origin, and whether it improves or harms allocative efficiency depends on the relative welfare improvement due to the migrant’s and her household’s preferred money uses. Whereas I find suggestive evidence that households divert investment resources to private goods (see Table 6), migrants’ investment decisions may still be less optimal if, for instance, their information about business opportunities is out of date. Embezzlement by households may then improve allocative efficiency.³⁷ However, selection out of investment means that migrants who would have found it worthwhile to invest refrain from investing, and instead redirect their money to uses that they themselves would find suboptimal, should they hold unbiased beliefs.

short of the minimum level of trustworthiness they require for investment), this provides us with a lower bound on (pessimistic migrants’) lost investment. This lower-bound interpretation holds whenever we assume monotone selection.

³⁶Well-informed migrants are expected to exhibit $\Delta = 0$, just as those who selected out of investment. The share of well-informed investors ($\sum_i p_i \Delta_i = 0$ and $\sum_i p_i A_i^m > 0$) is extremely low in the data (2%) and is thus ignored in this counterfactual exercise.

³⁷The socio-anthropological literature, summarized in Appendix B, also suggests that prestige plays an important role in Senegalese migrants real estate investments.

4.3 Alternative interpretations and sanity check

While the results are consistent with selection based on heterogeneous beliefs, alternative interpretations are possible. I here briefly assess alternative interpretations and then investigate learning as a sanity check of the self-selection story.

Cognitive bias There is a large literature in economics and psychology that offers alternative interpretations for optimistic investors. Most explanations revolve around a cognitive bias (Tversky and Kahneman, 1974; Rabin and Schrag, 1999, among others). In our setting, such a cognitive bias would mean that migrants fail to “de-bias” the information elicited from their households, i.e., they fail to factor into their reports the likelihood (even if no deviation is detected) that they did not follow the migrant’s investment instructions. Different types of cognitive bias may account for the stylized fact. For instance, migrants could blindly believe their households’ reports, or they could perfectly understand the model of their behavior and yet find it computationally demanding to evaluate the actual asset holding A^h based on the information collected from h and on their estimate of h ’s trustworthiness. They would then know that $A^h \leq A^m$ but report A^m to the enumerator unless they have hard evidence.³⁸

I use Prediction 2 to distinguish this interpretation from the self-selection mechanism in a placebo test. By Prediction 2, we would expect to find $\Delta = 0$ when the principal’s and agent’s preferences are aligned, and $\Delta > 0$ when they differ.³⁹ Preference alignment implies that the agent’s trustworthiness is irrelevant and the principal invests without fear of a diversion of funds; as principals hold the correct beliefs on average, the absence of selection out of investment means that there is no bias in beliefs on average. Conversely, if the principal fails to “de-bias” the information received from the agent, idiosyncratic differences in preferences lead to the same average bias, regardless of preference alignment.

As evident from Table 5, the assets held by the households of origin vary widely in terms of preference alignment: Assets such as TV sets are equally appreciated by the migrants and their households, while others, e.g., automobiles and bicycles, are strongly preferred by the migrants. Such differences, captured by the standardized

³⁸A second set of interpretations assumes that agents can manipulate their own beliefs to maximize utility (Taylor and Brown, 1988; Benabou and Tirole, 2002; Compte and Postlewaite, 2004; Brunnermeier and Parker, 2005). Migrants, realizing that their households of origin deviated from their instructions, would prefer to “lie to themselves” and, for instance, blame their imperfect monitoring technology (asking neighbors, etc.). Delusion would be self-serving if the migrants’ well-being rested upon good relations with their relatives or upon having a positive image of them.

³⁹Aligned preferences may also lead to $\Delta < 0$ because of non-classical measurement error—see the discussion in Section 2.2.

coefficient of skewness, would not affect the average discrepancies under the cognitive bias story. The consistent mapping that we find between skewness and average bias is however consistent with the selection mechanism.⁴⁰

Learning The cognitive bias story does not lend itself to clear dynamic predictions. Conversely, beyond rationalizing heterogeneous beliefs at one point in time, the literature on beliefs is interested in their convergence or divergence through communication and experience, usually modeled as Bayesian updating.⁴¹ Testing for the speed of convergence thus offers an indirect test of the heterogeneous beliefs, as well as a sanity check: Gaps in information sets could not be sustained on average if principals learnt and beliefs converged quickly.⁴²

I test for learning by regressing the aggregated discrepancies on the experience proxies and controls:

$$\Sigma_i p_i \Delta_i = \beta_0 + \mathbf{E}_m \beta_1 + \mathbf{X}_m \beta_m + \varepsilon,$$

where E_m contains the proxies for learning and X_m is a vector of migrant characteristics. X_m includes the migrant’s destination (nearby Mauritania vs. distant Europe), age, gender and income, as well as a control for the relationship between the migrant and interviewer (whether the enumerator was Senegalese), as suggested by the discussion of measurement error—see Section 2.2.

I use two proxies for experience. The first proxy is time spent since emigration. This directly mirrors the passage of time as modeled in the literature: Migrants and their households play a series of games, whereby the migrant gathers informa-

⁴⁰Under the self-serving bias hypothesis, we would expect no correlation between discrepancies and investment behavior. Appendix Table A12 regresses various measures of realized investment on the valued discrepancies. It shows that the overestimation of assets is significantly and positively associated with investment, both on the extensive and intensive margin. Note that I find nonlinear effects on the extensive margin (negative discrepancies do not affect investment probability), while the effect on investment amounts is linear. Discrepancies are strongly associated with productive investments: An increase in overestimation of 1 standard deviation is associated with an increase in investment amount of 10% of a standard deviation. The effect on real estate investment is less robust. Evidence from Table A12 also lends support to the selection mechanisms against a cognitive bias story.

⁴¹To account for persistence in heterogeneous beliefs, the literature proposed different assumptions about the way additional information is treated. Asymptotic divergence can occur with infinitely many signal values (Freedman, 1963), optimal overweighting of signals, the precision of which is overestimated (Van den Steen, 2011), uncertainty about the informativeness of signals (Acemoglu et al., 2016) or bounded memory (Wilson, 2014). In this section, I will not be able to pin down a specific mechanism, but I will test whether beliefs converge or diverge over time and as principals share information about the truth, and estimate the speed of the process.

⁴²Following Savage (1954), two Bayesian agents, provided they assign a non-zero probability to the truth and observe the same signals informative about it, will eventually agree, even if they start with different priors.

tion on and updates her beliefs about the household’s trustworthiness. The second proxy closely reflects the modeling of beliefs adopted in the literature and in this paper: Beliefs of migrant members of the same household are drawn from the same distribution, centered on the household’s trustworthiness. Communication between them should thus help their posterior beliefs converge, as long as the information they share is informative about the truth, even if their priors differ (Savage, 1954). I proxy communication of beliefs about h using the number of emigrants from the same household.

An important caveat is that despite the controls identification may be jeopardized by migrants’ selective return. Former migrants were not included in the population of interest. This is a concern because the probability to return may be correlated with both information manipulation by households and the time that a migrant has spent abroad (the link to the second proxy—number of fellow emigrants—is not obvious). As the bias such a selection entails is difficult to sign, evidence of or against learning should be taken cautiously.⁴³

Appendix Table A13 regresses the sum of discrepancies (valued in FCFA) on the two proxies. The table provides suggestive evidence that migrants do learn, over time and through communication with fellow migrants from the same household. The effects are robust to various controls. Learning is however slow: For discrepancies (mean = 455, in FCFA 1,000) to disappear completely, migrants would need to have been abroad for 2 standard deviations ($455/233 \approx 2$, using the coefficient in column 4) more than on average or to have at least 13 migrant relatives ($455/35 \approx 13$). Only about 8% of migrants meet any of these conditions.⁴⁴

5 Conclusion

Migrants and their relatives lived under the same roof prior to migration and will have repeated interactions in the future. Three ingredients however jeopardize an efficient allocation of resources in transnational households. First, migrants and

⁴³Another caveat pertains to the interpretation of the communication proxy. If emigrants from the same household of origin can exchange information about h ’s behavior, they can also coordinate their investments. Selection into investment may thus appear less severe in households with more emigrants, as the migrant surveyed may not be responsible for investing. Column 5 in Appendix Table A13 explores the impact of coordination. I control for the interaction of the number of emigrants from h with an indicator variable equal to 1 if the migrant reports coordinating her investments with others, and 0 otherwise. The coefficient on the communication proxy in Table A13 does not change when introducing this control in \mathbf{X}_m , which suggests that the effect does go through the convergence of beliefs.

⁴⁴Evidence of learning through communication regardless of explicit coordination—see Appendix Table A13, column 5—supports the assumption that emigrants from the same household behave as one principal.

their households of origin may have different preferences over the use of remittances. Second, distance means that migrant principals cannot fully observe their agents' actions, which may give rise to strategic behavior. Third, migrants' beliefs need not align with their households' true behavior, which implies that some migrants with worthwhile investment opportunities and trustworthy households may fail to invest.

This paper establishes a new stylized fact, the interpretation of which leads to some of the first empirical evidence of differing preferences, information asymmetry and heterogeneous beliefs in the context of migrant's homeward investments. This stylized fact relies on matched data on Senegalese migrants and their own households of origin—usually their only intermediaries for investment. I compare migrants' and their households' survey reports of assets that migrants typically invest in, as highlighted by the socio-anthropological literature on the Senegalese diaspora, and find that migrants systematically overestimate those asset holdings *on average*.

A framework derived from the theoretical literature suggests that the most optimistic migrants should select into investment, while some pessimistic ones with worthwhile opportunities fail to invest. I show that migrants' systematic overestimation of the degree of realization of their investments is consistent with differing prior beliefs and investment decisions driven by these beliefs. I assess the misallocation that this selection mechanism entails, and the effect is large: 23% of investment remittances are forgone because of pessimistic migrants who fail to invest. The framework also suggests tests for alternative theories that may account for systematically positive discrepancies. I conclude that the data lend support to heterogeneous beliefs and selection into investment rather than alternative behavioral interpretations.

The large effects of migrants' rational selection out of investment may have important policy implications, which I leave for future research. First, as migrants' productive ventures are meant to ensure their livelihoods back home, strategic behavior by households may lead to failed investments and thus failed return. Second, migrants may be willing to pay to reduce information asymmetry, which may also have consequences on remitted amounts. New transfer operators relying on ICTs (such as Afrimarket or Niokobok) may reduce the cost of in-kind remittances and help migrants check their households' strategic behavior. Such individual solutions to information asymmetry are however unlikely to reduce selection based on pessimistic beliefs. Third, migrants' selection would be less severe if they diversified their potential investment intermediaries. For instance, hometown associations may offer a suitable medium for (larger, pooled) investments, and banks may seem more trustworthy to some migrants (for investments in real estate, for instance).

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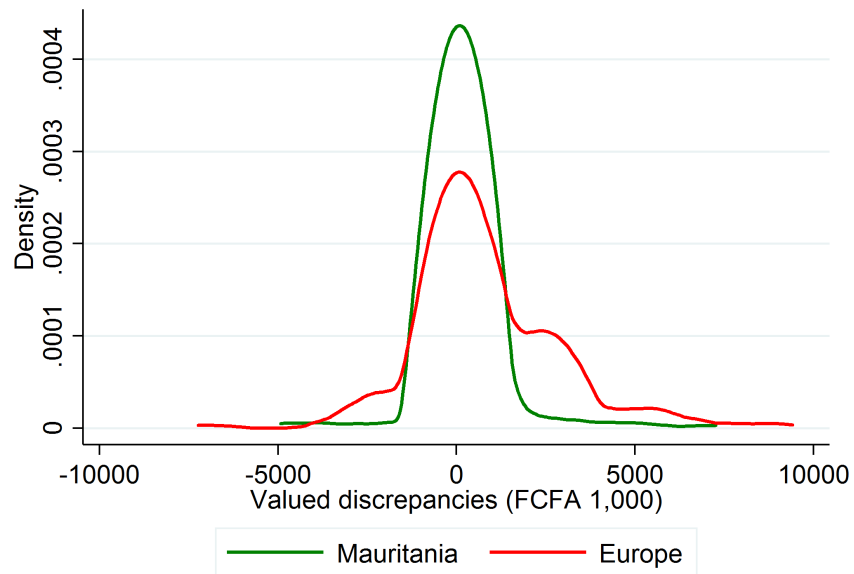
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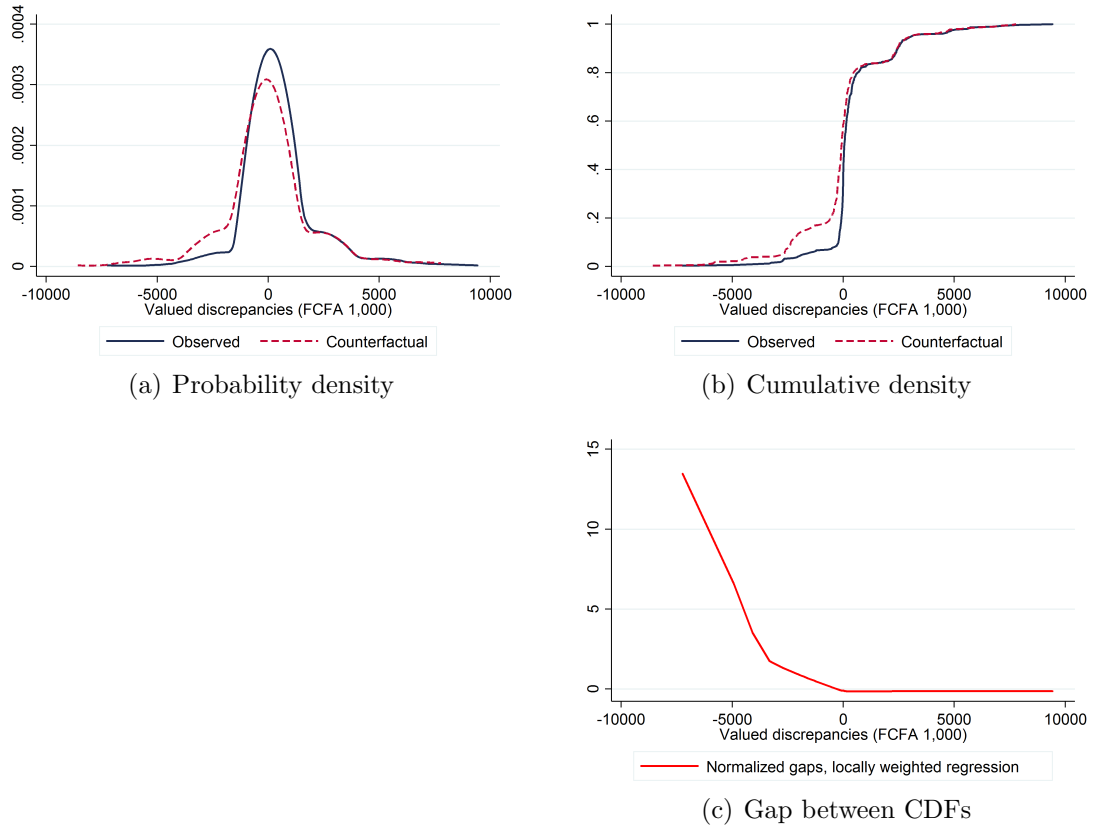
Figures and tables

Figure 1. Distribution of discrepancies for Europe- and Mauritania-based migrants (in FCFA 1,000).



Notes: This figure represents the kernel density function of discrepancies for migrants based in Europe and in Mauritania. The discrepancies are valued with the prices stated by h or the average price stated by the households of origin when $A^h = 0$. The Epanechnikov kernel is used. The sample consists of all matched migrants and households.

Figure 2. Distribution of actual and counterfactual discrepancies (in FCFA 1,000).



Notes: This figure compares the distributions of actual and counterfactual discrepancies, following the procedure explained in Section 4.2. Panel (a) shows the probability density functions (PDFs), and Panel (b) the cumulative density functions (CDFs), of the observed and counterfactual discrepancies. Panel (a) uses the Epanechnikov kernel to represent the PDFs. Panel (c) plots the gap between the observed and counterfactual CDFs (normalized by the observed CDF) and represents the relationship between observed discrepancies and the gap using locally weighted regression. The discrepancies are valued with the prices stated by h or the average price stated by the households of origin when $A^h = 0$. The sample consists of all matched migrants and households.

Table 1. Descriptive statistics—matched sample.

	Europe	Mauritania
<i>Panel A: Migrants' investment behavior</i>		
Total value of assets (€)	1652.74 (1918.64)	384.43 (862.29)
Productive investment plan ^d	0.27 (0.44)	0.04 (0.19)
Real estate investment plan ^d	0.26 (0.44)	0.01 (0.11)
Realized productive investment amount (€)	1758.92 (8346.80)	14.20 (177.46)
Realized real estate investment amount (€)	5058.05 (14238.35)	7.40 (47.59)
<i>Panel B: Relationship to origin household</i>		
Migration duration (years)	11.72 (8.70)	6.31 (7.29)
m is daughter/son of household head ^d	0.67 (0.47)	0.57 (0.50)
m has at least one child living with h ^d	0.29 (0.45)	0.46 (0.50)
m has a spouse living with h ^d	0.18 (0.39)	0.25 (0.44)
Number of m 's visits to h per year	0.98 (1.54)	1.72 (2.51)
Number of emigrants from h	5.43 (4.63)	5.95 (5.14)
<i>Panel C: Migrant characteristics</i>		
m is female ^d	0.21 (0.41)	0.35 (0.48)
m has no formal schooling ^d	0.15 (0.36)	0.38 (0.48)
m has a university degree ^d	0.28 (0.45)	0.01 (0.11)
m 's age	37.48 (9.76)	36.86 (11.19)
m 's monthly income (€)	1071.74 (661.65)	126.71 (119.78)
m 's total yearly remittances to h (€)	2123.26 (2101.59)	318.00 (470.62)
Value of m 's yearly in-kind remittances to h (€)	94.16 (404.79)	26.71 (56.62)
Share of remittances in total income	0.18 (0.21)	0.24 (0.41)
Observations	149	166

Notes: This table displays means and standard deviations (in parentheses) in the matched sample (h successfully interviewed), for migrants living in Europe (column 1) and Mauritania (column 2). Variables denoted by ^d are dichotomized.

Table 2. Descriptive statistics—asset holdings.

	Asset holdings, h 's report					
	All		Europe		Mauritania	
	Mean (1)	St. dev. (2)	Mean (3)	St. dev. (4)	Mean (5)	St. dev. (6)
<i>Panel A: Number of items</i>						
Automobile	0.14	0.49	0.25	0.64	0.04	0.28
Bicycle	0.17	0.68	0.28	0.87	0.08	0.41
CD-player	0.34	0.86	0.43	0.81	0.26	0.90
DVD-player	0.40	0.72	0.60	0.85	0.22	0.53
Electric fan	1.45	1.99	2.03	2.17	0.93	1.65
Freezer	0.14	0.42	0.22	0.53	0.07	0.26
Motorcycle	0.03	0.25	0.06	0.35	0.01	0.08
Radio	1.33	1.52	1.48	1.66	1.19	1.37
Refrigerator	0.50	0.78	0.80	0.94	0.22	0.46
TV set	1.53	1.48	1.94	1.46	1.16	1.39
<i>Panel B: Any item</i>						
Automobile	0.11	0.32	0.21	0.41	0.03	0.17
Bicycle	0.09	0.29	0.14	0.35	0.05	0.21
CD-player	0.23	0.42	0.30	0.46	0.17	0.38
DVD-player	0.30	0.46	0.44	0.50	0.17	0.38
Electric fan	0.56	0.50	0.71	0.45	0.43	0.50
Freezer	0.13	0.33	0.19	0.39	0.07	0.26
Motorcycle	0.02	0.14	0.03	0.18	0.01	0.08
Radio	0.70	0.46	0.72	0.45	0.69	0.47
Refrigerator	0.40	0.49	0.62	0.49	0.20	0.40
TV set	0.84	0.37	0.93	0.26	0.76	0.43
Observations	315		149		166	

Notes: This table displays the means (odd-numbered columns) and standard deviations (even-numbered columns) of mean asset holdings, according to h 's report (A_i^h in the notation of Section 2, where i is an asset). The sample consists of all matched migrants and households. Columns 1 and 2 include the whole sample. Columns 3 and 4 focus on the households of migrants living in Europe and columns 5 and 6 on the households of migrants living in Mauritania. See Section 2.1 for precisions about the data.

Table 3. Evidence of discrepancies, normalized by the average household report.

	Mean discrepancy		
	All (1)	Europe (2)	Mauritania (3)
Automobile	0.381*** (0.118)	0.707*** (0.220)	0.088 (0.120)
Bicycle	0.686*** (0.124)	1.217*** (0.232)	0.210** (0.097)
CD-player	0.467*** (0.112)	0.853*** (0.169)	0.120 (0.143)
DVD-player	0.483*** (0.080)	0.436*** (0.138)	0.525*** (0.090)
Electric fan	-0.102 (0.113)	-0.075 (0.207)	-0.126 (0.109)
Freezer	0.577*** (0.096)	0.819*** (0.161)	0.360*** (0.110)
Motorcycle	0.920*** (0.136)	1.348*** (0.257)	0.536*** (0.109)
Radio	0.091 (0.095)	0.161 (0.159)	0.028 (0.110)
Refrigerator	0.184*** (0.066)	0.184 (0.119)	0.183*** (0.064)
TV set	-0.245*** (0.077)	-0.452*** (0.108)	-0.058 (0.107)
Observations	315	149	166

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset, held by h (Δ_i in the notation of Section 2.1, where i is an asset), normalized by the average household report. Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table 4. Evidence of discrepancies, valued in FCFA 1,000.

	Mean valued discrepancy (FCFA 1,000)		
	All (1)	Europe (2)	Mauritania (3)
Automobile	311.425*** (85.465)	581.067*** (160.460)	69.398 (69.977)
Bicycle	11.085*** (2.077)	19.609*** (3.844)	3.434** (1.710)
CD-player	6.528*** (1.324)	11.670*** (2.260)	1.913 (1.393)
DVD-player	7.204*** (1.118)	7.630*** (1.982)	6.822*** (1.161)
Electric fan	-1.330 (1.808)	-1.782 (3.475)	-0.924 (1.440)
Freezer	30.172*** (4.716)	41.153*** (7.493)	20.316*** (5.820)
Motorcycle	85.079*** (12.272)	117.450*** (22.405)	56.024*** (11.351)
Radio	6.171** (3.069)	9.552 (5.880)	2.461 (9.839)
Refrigerator	15.603*** (3.886)	20.836*** (7.066)	10.906*** (3.746)
TV set	-16.977*** (5.806)	-35.741*** (9.428)	-0.135 (6.822)
All assets	454.961*** (93.682)	771.443*** (173.424)	170.889** (80.276)
Observations	315	149	166

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset, held by h , valued with the prices stated by h , or the average price if $A^h = 0$ ($p_i \Delta_i$ in the notation of Section 2.1, where i is an asset). The mean valued discrepancy (coefficient on the constant) is expressed in FCFA 1,000 (€1 = FCFA 655.957). Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table 5. Skewness of the discrepancy distributions.

	Standardized coefficient of skewness	
	Discrepancies (1)	Valued discrepancies (2)
Automobile	0.378	0.284
Bicycle	1.316	1.375
CD-player	0.537	0.584
DVD-player	0.444	0.421
Electric fan	-0.349	-0.935
Freezer	0.269	0.061
Motorcycle	1.314	1.352
Radio	0.059	0.132
Refrigerator	0.142	-0.022
TV set	-0.049	-0.306
All assets		0.292
Observations	315	315

Notes: This table displays standardized coefficients of skewness. Column 1 shows the skewness of the distributions of discrepancies between m 's and h 's reports of the specified asset (winsorized at 10%), held by h (Δ_i in the notation of Section 2.1, where i is an asset), normalized by the average household report. Column 2 performs the same exercise but uses the discrepancies between m 's and h 's reports of the specified asset, held by h , valued with the prices stated by h , or the average price if $A^h = 0$ ($p_i \Delta_i$ in the notation of Section 2.1). The sample consists of all matched migrants and households.

Table 6. Household investment in public and private goods.

	Sum of valued discrepancies (FCFA 1,000)			
	(1)	(2)	(3)	(4)
Public goods	-0.386*** (0.116)		0.450** (0.201)	
Private goods		-0.400*** (0.118)		0.450** (0.207)
Observations	315	315	315	315
All controls	No	No	Yes	Yes

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. The dependent variable is the sum of the discrepancies between m 's and h 's reports of assets held by h , valued with the prices stated by h , or the average price if $A^h = 0$ ($p_i \Delta_i$ in the notation of Section 2.1, where i is an asset). The dependent variable is expressed in FCFA 1,000 (€1 = FCFA 655.957). The two main regressors are "Public goods" and "Private goods," which refer to the sum of expenses (in FCFA 1,000) relative to public and private goods, respectively, reported by the household of origin—see text for detail of items. Columns 1 and 3 controls for migrant destination and the (standardized) total expenses reported by the household of origin. Column 2 and 4 additionally controls for key migrant characteristics (age, gender, standardized income and a dummy equal to 1 if she was interviewed by a Senegalese enumerator, and 0 otherwise). See Section 2.1 for precisions about the data and construction of the dependent variables.

Table 7. Distance and observability.

	Sum of valued discrepancies (normalized)					
	(1)	(2)	(3)	(4)	(5)	(6)
Mauritania	-2.05*** (0.68)	-2.06*** (0.71)	-2.45*** (1.05)	-2.44*** (1.05)	-2.44*** (1.06)	-2.61** (1.05)
Constant	4.24*** (0.55)	4.24*** (0.56)	4.45*** (0.70)	4.59*** (1.35)	4.48*** (1.36)	4.59*** (1.34)
Observations	315	315	315	315	315	315
<i>Controls</i>						
Mig. duration	Yes	Yes	Yes	Yes	Yes	Yes
Total remit.	No	Yes	Yes	Yes	Yes	Yes
Income	No	No	Yes	Yes	Yes	Yes
Age	No	No	No	Yes	Yes	Yes
Sex	No	No	No	No	Yes	Yes
Enum. Origin	No	No	No	No	No	Yes

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. The dependent variable is the sum of the discrepancies between m 's and h 's reports of assets held by h , valued with the prices stated by h or the average price if $A^h = 0$, and normalized by the sum of valued assets reported by h ($\sum_i p_i \Delta_i / A_i^h$ in the notation of Section 2.1, where i is an asset). The regressor of interest is an indicator variable equal to 1 if the migrant lives in Mauritania and 0 if she lives in Europe. All regressions control for migration duration (standardized). Column 2 additionally controls for standardized total remittances from the migrant. Column 3 introduces m 's total income (standardized). Column 4 additionally controls for m 's age, column 5 includes for a dummy equal to 1 if the migrant is a woman and 0 otherwise, and column 6 finally controls for a dummy equal to 1 if she was interviewed by a Senegalese enumerator and 0 otherwise. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table 8. Counterfactual experiment—effect of pessimism on investment assets.

	Sum of assets, m 's report (FCFA 1,000)		
	All (1)	Europe (2)	Mauritania (3)
Actual	310,073.90	246,258.70	63,815.15
Counterfactual pessimistic	93,979.27	103,018.82	12,294.84
No pessimistic migrants	381,657.46	322,143.65	73,466.81
<i>% increase in counterfactual scenario</i>	<i>23.09%</i>	<i>30.82%</i>	<i>15.12%</i>

Notes: This table displays the sum of the assets held by h as reported by m , valued using the prices stated by h or the average price if no such asset is held ($\Sigma_i p_i A_i^m$, in the notation of Section 2.1, where i is an asset). The sum of assets is expressed in FCFA 1,000 (€1 = FCFA 655.957). *Actual* refers to the actual sum of assets observed in the data. *Counterfactual pessimistic* refers to the counterfactual sum of assets for pessimistic migrants. *No pessimistic migrants* refers to the sum of assets under the counterfactual scenario of no pessimistic migrants. Column 1 considers the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 4.2 for details about the counterfactual experiment.

Table 9. Overinvestment—average overestimation among optimistic migrants.

	Median (FCFA 1,000)		
	All (1)	Europe (2)	Mauritania (3)
Sum of discrepancies	282.97	801.32	141.39
Sum of assets, h 's report	130.00	232.29	63.98
<i>% overestimation</i>	<i>217.67%</i>	<i>344.97%</i>	<i>221.00%</i>

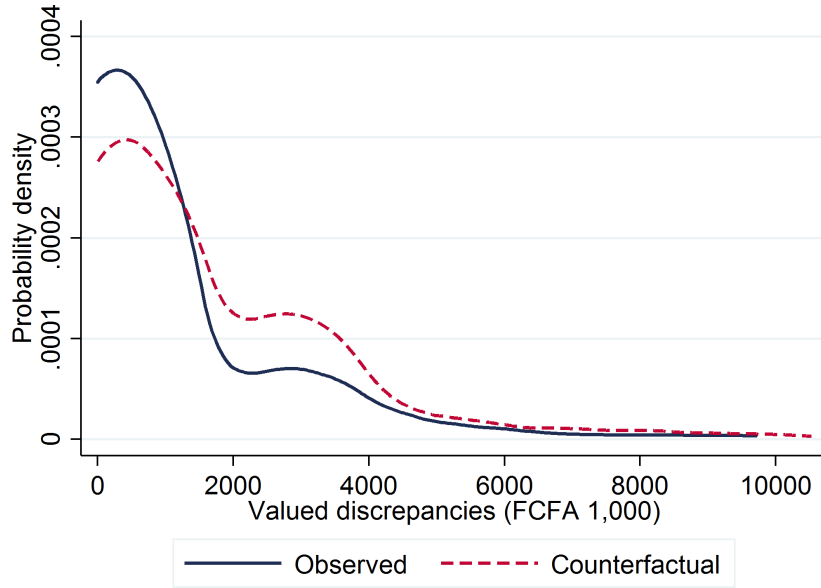
Notes: This table focuses on optimistic migrants ($\Sigma_i p_i \Delta_i > 0$). The first two rows display the median sum of discrepancies and the median sum of assets held by h as reported by h , valued using the prices stated by h or the average price if no such asset is held ($\Sigma_i p_i \Delta_i$ and $\Sigma_i p_i A_i^h$, respectively, in the notation of Section 2.1, where i is an asset). Both are expressed in FCFA 1,000 (€1 = FCFA 655.957). The last row (*% overestimation*) provides the ratio of the median sum of discrepancies and median sum of assets. Column 1 considers the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania.

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A Additional figures and tables

Figure A1. Distribution of actual and counterfactual investment (in FCFA 1,000).



Notes: This figure represents the kernel density function of actual and counterfactual total investment asset value, following the procedure explained in Section 4.2. Total investment asset value ($\sum_i p_i A_i^m$) is obtained using the prices stated by h or the average price stated by the households of origin when $A^h = 0$. The Epanechnikov kernel is used. The sample consists of all matched migrants and households.

Table A1. Selection into the matched sample.

	Inclusion in matched sample
<i>Panel A: Migrants' investment behavior</i>	
Total value of assets (S.D.)	0.0128 (0.0159)
Productive investment plan ^d	-0.0340 (0.0380)
Real estate investment plan ^d	-0.0149 (0.0404)
Realized productive investment amount (S.D.)	-0.0085* (0.0051)
Realized real estate investment amount (S.D.)	0.0232 (0.0156)
<i>Panel B: Migration experience and relationship to origin household</i>	
Migration duration	-0.0002 (0.0161)
m is daughter/son of household head ^d	0.0211 (0.0323)
m has at least one child living with h ^d	0.0341 (0.0333)
m has a spouse living with h ^d	-0.0038 (0.0361)
Number of m 's visits to h per year	0.0167* (0.0089)
<i>Panel C: Migrant characteristics</i>	
m is female ^d	-0.0336 (0.0345)
m has no formal schooling ^d	-0.0186 (0.0400)
m has a university degree ^d	0.0338 (0.0419)
m 's age	0.0042*** (0.0015)
m 's monthly income (S.D.)	0.0362** (0.0176)
m 's total yearly remittances to h (S.D.)	0.0423** (0.0180)
Value of m 's yearly in-kind remittances to h (S.D.)	0.0257 (0.0203)
Observations	888

Notes: Robust standard errors are reported between parentheses. The sample consists of all migrants interviewed at destination with non-missing assets and investment information. Each row reports the result of a separate regression. The dependent variable is a dummy equal to 1 if h could be successfully surveyed, and 0 otherwise. All regressions control for migration destination (1 for Mauritania and 0 otherwise). Variables denoted by ^d are dichotomized. Variables recording monetary amounts are demeaned and their unit is 1 standard deviation (S.D.).

Table A2. Correlation between realized investment and assets.

	Standardized sum of assets, migrant's report			
	(1)	(2)	(3)	(4)
Productive investment ^d	0.608*** (0.166)	0.602*** (0.167)	0.582*** (0.169)	0.589*** (0.170)
Productive investment amount	0.192*** (0.051)	0.191*** (0.052)	0.186*** (0.053)	0.186*** (0.053)
Real estate investment ^d	0.121 (0.126)	0.147 (0.129)	0.120 (0.131)	0.119 (0.132)
Real estate investment amount	0.122** (0.053)	0.124** (0.054)	0.114** (0.055)	0.115** (0.056)
Observations	315	315	315	315
Destination control	Yes	Yes	Yes	Yes
Migrant characteristics	No	Yes	Yes	Yes
<i>m</i> 's income	No	No	Yes	Yes
Enumerator Senegalese	No	No	No	Yes

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression. The dependent variable is the sum of all assets held by *h* according to *m*'s report, valued by the prices elicited from the households of origin. The explanatory variables refer to realized investment. Variables denoted by ^d are dichotomized. The dependent variable and investment amounts are standardized. All regressions control for migration destination (1 for Mauritania and 0 otherwise). Columns 2–4 additionally control for key migrant characteristics (age, gender and migration duration). Column 3 introduces *m*'s income (standardized). Column 4 controls for a binary indicator equal to one if *m*'s enumerator was Senegalese, and 0 otherwise—see Section 2.2 for an explanation.

Table A3. Evidence of discrepancies, raw differences.

	Mean discrepancy		
	All (1)	Europe (2)	Mauritania (3)
Automobile	0.130*** (0.040)	0.242*** (0.075)	0.030 (0.035)
Bicycle	0.413*** (0.075)	0.732*** (0.140)	0.127** (0.058)
CD-player	0.279*** (0.067)	0.510*** (0.101)	0.072 (0.086)
DVD-player	0.349*** (0.058)	0.315*** (0.099)	0.380*** (0.065)
Electric fan	-0.127 (0.141)	-0.094 (0.258)	-0.157 (0.135)
Freezer	0.213*** (0.036)	0.302*** (0.059)	0.133*** (0.041)
Motorcycle	0.321*** (0.047)	0.470*** (0.090)	0.187*** (0.038)
Radio	0.117 (0.123)	0.208 (0.206)	0.036 (0.143)
Refrigerator	0.127*** (0.046)	0.128 (0.083)	0.127*** (0.045)
TV set	-0.279*** (0.088)	-0.517*** (0.123)	-0.066 (0.122)
Observations	315	149	166

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset, held by h (Δ_i in the notation of Section 2.1, where i is an asset). Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table A4. Evidence of discrepancies, normalized by the average household report (winsorized at 10%).

	Mean discrepancy		
	All (1)	Europe (2)	Mauritania (3)
Automobile	0.446*** (0.124)	0.846*** (0.234)	0.088 (0.097)
Bicycle	1.000*** (0.093)	1.670*** (0.158)	0.399** (0.083)
CD-player	0.562*** (0.079)	0.901*** (0.123)	0.258 (0.094)
DVD-player	0.550*** (0.060)	0.521*** (0.095)	0.576*** (0.075)
Electric fan	-0.285*** (0.086)	-0.471*** (0.140)	-0.118 (0.103)
Freezer	0.592*** (0.092)	0.884*** (0.146)	0.329*** (0.112)
Motorcycle	1.000*** (0.105)	1.340*** (0.167)	0.695*** (0.126)
Radio	0.062 (0.061)	0.071 (0.094)	0.054 (0.079)
Refrigerator	0.235*** (0.056)	0.229*** (0.083)	0.240*** (0.076)
TV set	-0.135*** (0.048)	-0.326*** (0.070)	-0.036 (0.062)
Observations	315	149	166

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset (winsorized at 10%), held by h (Δ_i in the notation of Section 2.1, where i is an asset), normalized by the average household report. Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table A5. Evidence of discrepancies, valued in FCFA 1,000 (winsorized at 10%).

	Mean valued discrepancy (FCFA 1,000)		
	All (1)	Europe (2)	Mauritania (3)
Automobile	213.064*** (58.082)	408.557*** (110.975)	37.590 (43.272)
Bicycle	11.727*** (1.106)	19.360*** (1.858)	4.876*** (1.017)
CD-player	6.394*** (0.884)	10.644*** (1.456)	2.5796*** (0.964)
DVD-player	7.017*** (0.761)	7.141*** (1.268)	6.906*** (0.893)
Electric fan	-3.119*** (1.089)	-5.467*** (1.880)	-1.011 (1.176)
Freezer	25.142*** (3.745)	35.698*** (5.575)	15.668*** (4.947)
Motorcycle	60.477*** (6.360)	75.503*** (9.435)	46.988*** (8.488)
Radio	3.480** (1.726)	4.814 (3.092)	2.283 (1.744)
Refrigerator	12.242*** (2.709)	12.454*** (4.417)	12.052*** (3.287)
TV set	-9.075** (3.980)	-24.931*** (7.063)	-5.157 (3.799)
All assets	327.349*** (62.620)	543.775*** (117.269)	133.087** (51.037)
Observations	315	149	166

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset (winsorized at 10%), held by h , valued with the prices stated by h , or the average price if $A^h = 0$ ($p_i \Delta_i$ in the notation of Section 2.1, where i is an asset). The mean valued discrepancy (coefficient on the constant) is expressed in FCFA 1,000 (€1 = FCFA 655.957). Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table A6. Evidence of discrepancies as ratios.

	Mean ratio		
	All (1)	Europe (2)	Mauritania (3)
Automobile	0.333 (0.106) F = 39.380***	0.363 (0.120) F = 28.250***	0.125 (0.125) F = 49.000***
Bicycle	0.285 (0.092) F = 59.900***	0.346 (0.119) F = 30.390***	0.091 (0.063) F = 210.000***
CD-player	0.335 (0.052) F = 166.680***	0.392 (0.070) F = 75.930***	0.217 (0.063) F = 156.250***
DVD-player	0.482 (0.058) F = 80.460***	0.606 (0.086) F = 20.930***	0.335 (0.071) F = 86.410***
Electric fan	1.220 (0.123) F = 3.210*	1.383 (0.161) F = 5.640**	0.998 (0.187) F = 0.000
Freezer	0.254 (0.058) F = 164.650***	0.321 (0.078) F = 76.240***	0.089 (0.052) F = 309.370***
Motorcycle	0.056 (0.028) F = 1172.500***	0.067 (0.038) F = 616.000***	0.038 (0.038) F = 625.000***
Radio	1.038 (0.075) F = 0.260	1.076 (0.104) F = 0.540	0.999 (0.110) F = 0.000
Refrigerator	0.669 (0.064) F = 27.120***	0.802 (0.084) F = 5.490**	0.396 (0.077) F = 62.100***
TV set	1.258 (0.069) F = 14.020***	1.460 (0.084) F = 29.830***	1.066 (0.106) F = 0.380

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the ratio of h 's and m 's reports of the specified asset, held by h (A^h/A^m in the notation of Section 2.1, where $A^m > 0$). For each asset, the table displays the F statistic and corresponding p-value (in square brackets) from testing the null hypothesis that the mean discrepancy ratio is equal to 1. The significance stars correspond to the p-values (not reported) of the F statistics. Note that sample size varies between 64 for automobiles and 256 for TV sets. See Section 2.1 for precisions about the data and construction of the dependent variable.

Table A7. Evidence of discrepancies (valued in FCFA 1,000), assets less than 5 years old.

	Mean valued discrepancy (FCFA 1,000)		
	All (1)	Europe (2)	Mauritania (3)
Automobile	325.000*** (99.600)	603.188*** (184.913)	75.301 (86.578)
Bicycle	11.338*** (2.079)	19.889*** (3.905)	3.663** (1.605)
CD-player	6.280*** (1.417)	11.594*** (2.321)	1.510 (1.668)
DVD-player	7.029*** (1.177)	7.096*** (2.129)	6.969*** (1.165)
Electric fan	-1.447 (1.807)	-1.330 (3.369)	-1.551 (1.627)
Freezer	34.482*** (5.479)	47.865*** (8.828)	22.470*** (6.620)
Motorcycle	74.336*** (12.085)	125.000*** (32.275)	56.024*** (11.351)
Radio	6.001* (3.419)	10.831* (6.438)	1.667 (2.932)
Refrigerator	14.730*** (5.130)	16.820* (9.808)	12.854*** (4.190)
TV set	-21.906*** (6.237)	-44.338*** (10.625)	-1.772 (6.662)
All assets	434.842 (106.826)	721.951 (196.770)	177.135 (95.847)
Observations	315	149	166

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset, held by h , valued with the prices stated by h , or the average price if $A^h = 0$ ($p_i \Delta_i$ in the notation of Section 2.1, where i is an asset). The mean valued discrepancy (coefficient on the constant) is expressed in FCFA 1,000 (€1 = FCFA 655.957). In this table, I consider only assets that were bought less than 5 years before the household survey. Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table A8. Evidence of discrepancies in household size reports.

	Mean discrepancy in household size			
	(1)	(2)	(3)	(4)
Mauritania	-2.557*** (0.826)	-2.494*** (0.832)	-2.439*** (0.833)	-3.370*** (0.724)
Constant	1.848*** (0.644)	1.965*** (0.645)	1.974*** (0.658)	2.277*** (0.582)
Observations	315	315	315	315
<i>Controls</i>				
Time gap	No	Yes	No	No
Enumerator Senegalese	No	No	Yes	No
Household size (<i>h</i> 's report)	No	No	No	Yes

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. The dependent variable is the discrepancy between *m*'s and *h*'s reports of *h*'s household size (number of persons). It is regressed on an indicator variable equal to 1 if the migrant lives in Mauritania and 0 if she lives in Europe, and on a constant. Column 2 controls for standardized time gap between the migrant and household surveys. Column 3 controls for an indicator variable equal to 1 if the migrant's enumerator was Senegalese and 0 otherwise.

Table A9. Robustness of discrepancies (normalized, and valued in FCFA 1,000) to survey artifacts.

	Mean discrepancy (1)	Mean valued discrepancy (2)
Automobile	0.430*** (0.141) F = 2.037 [0.089]	347.573*** (101.530) F = 1.950 [0.102]
Bicycle	0.596*** (0.130) F = 4.572 [0.001]	9.355*** (2.187) F = 4.705 [0.001]
CD-player	0.331** (0.134) F = 4.619 [0.001]	5.183*** (1.544) F = 4.233 [0.002]
DVD-player	0.367*** (0.093) F = 2.970 [0.020]	5.791*** (1.308) F = 3.278 [0.012]
Electric fan	-0.187 (0.136) F = 4.270 [0.002]	-2.500 (2.319) F = 3.426 [0.009]
Freezer	0.567*** (0.107) F = 0.251 [0.909]	29.216*** (5.288) F = 0.119 [0.976]
Motorcycle	0.679*** (0.126) F = 3.649 [0.006]	60.355*** (11.181) F = 4.042 [0.003]
Radio	0.041 (0.107) F = 4.695 [0.001]	6.153* (3.610) F = 5.257 [0.000]
Refrigerator	0.210*** (0.079) F = 0.517 [0.723]	18.399*** (4.705) F = 0.702 [0.591]
TV set	-0.329*** (0.095) F = 6.330 [0.000]	-23.042*** (6.887) F = 5.503 [0.000]
Observations	315	315

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable in Column 1 is the discrepancy (normalized by h 's report) between m 's and h 's reports of the specified asset, held by h (Δ_i in the notation of Section 2.1, where i is an asset). The dependent variable in Column 2 is the discrepancy between m 's and h 's reports of the specified asset, held by h , valued with the prices stated by h , or the average price if $A^h = 0$ ($p_i \Delta_i$ in the notation of Section 2.1, where i is an asset). The mean valued discrepancy (coefficient on the constant) is expressed in FCFA 1,000 (€1 = FCFA 655.957). All regressions control for the standardized time gap between the migrant and household surveys, a dummy equal to 1 if the migrant was interviewed by a Senegalese enumerator, and the discrepancy between m 's and h 's reports of the size of the household of origin. For each asset, the table displays the F statistic and corresponding p-value (in square brackets) from testing the null hypothesis that all controls are jointly 0. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table A10. Evidence of discrepancies based on dichotomized assets reports.

	Mean discrepancy		
	All (1)	Europe (2)	Mauritania (3)
Automobile	0.097*** (0.025)	0.185*** (0.048)	0.019 (0.020)
Bicycle	0.208*** (0.028)	0.342*** (0.045)	0.086*** (0.031)
CD-player	0.185*** (0.034)	0.295*** (0.051)	0.086* (0.044)
DVD-player	0.247*** (0.033)	0.185*** (0.051)	0.302*** (0.042)
Electric fan	-0.032 (0.032)	-0.062 (0.045)	-0.006 (0.046)
Freezer	0.192*** (0.029)	0.295*** (0.045)	0.099*** (0.035)
Motorcycle	0.214*** (0.024)	0.281*** (0.039)	0.154*** (0.028)
Radio	0.091*** (0.033)	0.130*** (0.047)	0.056 (0.047)
Refrigerator	0.120*** (0.030)	0.116*** (0.044)	0.123*** (0.041)
TV set	-0.006 (0.023)	-0.068** (0.030)	0.049 (0.034)
Observations	308	146	162

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression of the dependent variable on a constant. The dependent variable is the discrepancy between m 's and h 's reports of the specified asset (A^m and A^h , resp., in the notation of Section 2.1), held by h , where A^m and A^h have been dichotomized—see Section 2.2 on cluelessness. Column 1 includes the whole sample. Column 2 focuses on migrants living in Europe and column 3 on migrants living in Mauritania. See Section 2.1 for precisions about the data and construction of the dependent variables.

Table A11. Levels of random response needed to explain the discrepancies.

	Random response propensity (c)	
	Europe (1)	Mauritania (2)
Automobile	0.73 [0.57;0.88]	0.14 [0.06;0.21]
Bicycle	0.82 [0.66;0.98]	0.32 [0.21;0.44]
CD-player	0.92 [0.75;1.08]	0.64 [0.50;0.79]
DVD-player	0.81 [0.65;0.97]	0.75 [0.60;0.90]
Electric fan	0.59 [0.44;0.74]	0.68 [0.53;0.83]
Freezer	0.75 [0.59;0.91]	0.42 [0.29;0.55]
Motorcycle	0.59 [0.44;0.74]	0.31 [0.20;0.42]
Radio	0.67 [0.52;0.83]	0.73 [0.58;0.88]
Refrigerator	0.59 [0.44;0.74]	0.57 [0.43;0.71]
TV set	0.27 [0.16;0.39]	0.37 [0.25;0.49]
Observations	146	162

Notes: This table displays the estimated share of migrants who answer randomly (c , in the notation of Section 2.2) necessary to account for the observed discrepancies. The sample consists of all matched migrants and households. 95% confidence intervals are reported between parentheses. Column 1 focuses on migrants living in Europe and column 2 on migrants living in Mauritania. See Section 2.2 for details about the procedure and Appendix C.2 for a formal statement.

Table A12. Correlation between realized investment and discrepancies.

	Standardized sum of assets, migrant's report			
	(1)	(2)	(3)	(4)
<i>Panel A: Extensive margin, nonlinear effects</i>				
Productive investment ^d	0.103** (0.050)	0.102** (0.050)	0.095* (0.050)	0.103** (0.050)
Real estate investment ^d	0.002 (0.068)	-0.002 (0.067)	-0.011 (0.066)	-0.017 (0.066)
<i>Panel B: Intensive margin, linear effects</i>				
Productive investment amount	0.115** (0.057)	0.115* (0.057)	0.118** (0.055)	0.119** (0.055)
Real estate investment amount	0.102* (0.055)	0.105* (0.056)	0.108** (0.054)	0.108** (0.054)
Observations	315	315	315	315
Destination control	Yes	Yes	Yes	Yes
Migrant characteristics	No	Yes	Yes	Yes
m 's income	No	No	Yes	Yes
Enumerator Senegalese	No	No	No	Yes

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression. The dependent variables refer to realized investment and are listed in row headings. Variables denoted by ^d are dichotomized. The columns correspond to different sets of controls. The main explanatory variable is the sum of all assets held by h according to m 's report, valued by the prices elicited from the households of origin. The main explanatory variables and investment amounts are standardized. Panel A allows for nonlinear effects of discrepancies on investment at the extensive margins by interacting $\Sigma p\Delta$ with a dummy equal to 1 if $\Sigma p\Delta > 0$: The coefficient on the interaction (reported) is positive, while non-positive discrepancies are not significantly associated with investment probability and display coefficients close to 0 (not reported). Panel B shows the linear effect of discrepancies on the intensive margin. All regressions control for migration destination (1 for Mauritania and 0 otherwise). Columns 2–4 additionally control for key migrant characteristics (age, gender and migration duration). Column 3 introduces m 's income (standardized). Column 4 controls for a binary indicator equal to one if m 's enumerator was Senegalese, and 0 otherwise—see Section 2.2 for an explanation.

Table A13. Evidence of learning.

	Sum of asset discrepancies				
	(1)	(2)	(3)	(4)	(5)
Migration duration	-204.66* (107.96)	-239.81* (123.05)	-238.75* (122.73)	-233.12* (121.02)	-230.13* (124.17)
Number of emigrants	-34.06* (18.69)	-33.80* (19.06)	-33.73* (19.12)	-35.18* (19.83)	-36.36* (19.16)
Observations	315	315	315	315	315
<i>Controls</i>					
Mauritania	Yes	Yes	Yes	Yes	Yes
Age, gender	No	Yes	Yes	Yes	Yes
Income	No	No	Yes	Yes	Yes
Enumerator Senegalese	No	No	No	Yes	Yes
Coordination	No	No	No	No	Yes

Notes: Robust standard errors are reported between parentheses. The sample consists of all matched migrants and households. Each cell reports the result of a separate regression. The dependent variable is the standardized sum of all the discrepancies between m 's and h 's reports of the assets held by h , valued by the prices elicited from the households of origin. Valued discrepancies are expressed in FCFA 1,000 (€1 = FCFA 655.957). The explanatory variables are the standardized migration duration and the number of emigrants from m 's own household of origin. All regressions control for migration destination (1 for Mauritania and 0 otherwise). Columns 2–5 additionally control for m 's age and gender. Column 3 introduces m 's income (standardized). Column 4 controls for a binary indicator equal to 1 if m 's enumerator was Senegalese, and 0 otherwise. Finally, column 5 includes the interaction of the number of emigrants from h with a binary variable equal to 1 if m reports coordinating her remittances with other people remitting to h —see Section 2.2 for an explanation.

B Investment and information in Senegalese transnational households

The Senegalese diaspora offers a suitable setting to study information asymmetry and beliefs in the context of international migrants' remittances, for three reasons. First, Senegalese migrants are found in a variety of countries, from neighboring Mauritania to distant Europe. Second, their remittances constitute a major support of the Senegalese economy: 13.7% of its GDP was accounted for by international remittances in 2017 ([World Bank, 2019](#)).⁴⁵ Third, Senegalese emigration has a long history, so that we would expect Senegalese transnational households to have developed mechanisms to mitigate information asymmetry and manipulation. The socio-anthropological literature on the Senegalese diaspora however points to strategic behavior and conflicts over the use of remittances, which constrains migrants in their ability to invest.

In this Appendix, I summarize three aspects of the socio-anthropological literature on the Senegalese diaspora. (i) I discuss the importance for migrants of investing in their country of origin, and describe the investment process. (ii) I analyze, in the light of the literature and a qualitative survey I carried out in the north of Paris, the relationship between migrants and their investment intermediaries, with particular emphasis on preference differences. (iii) I focus on qualitative evidence of information manipulation by households of origin and discuss the issue of beliefs.

B.1 Investment process

Senegalese migrants' remittances consist of two parts: an irreducible, and usually flat, monthly remittance to support the "DQ," which stands for *dépense quotidienne* (daily expenditure, in French), and investment funds, the share of which increases as the families' needs are provided for and migrants have accumulated capital at destination. I focus here on investment remittances: what migrants use them for and how they reach the households.

Investments in the country of origin derive from a widespread desire among migrants to return after they have accumulated enough capital (or from the uncertainty surrounding their ability to stay and invest at destination). They aim at two different objectives: (i) providing their relatives with means of livelihood and thus reducing the remittance burden, and (ii) ensuring the migrant's own livelihood upon return. This double objective informs both productive investments and real estate

⁴⁵International remittances to Senegal mostly occur within transnational households: 76% of Senegalese households' transfer receipts indeed originate from family members ([De Vreyer et al., 2008](#)).

investments, except that the latter may also involve investment in social capital.⁴⁶ Productive investments are meant to provide returnees with a livelihood, but migrants may also offer their relatives a position in the business and ask them to run it until they return.

The investment process for Senegalese migrants is typically the following. First, money is sent back home. Migrants have several remittance channels available: international money transfer operators, the informal institution of *fax* (similar to *hawala*), whereby money is entrusted to a Senegalese shopkeeper at destination who instructs an associate to pay the final recipient, or through friends and relatives traveling back home. Migrants may also bring cash or goods with them on their trips to Senegal. Second, the migrant’s household is responsible for buying inputs into the business, including means of transportation such as a car or a motorcycle and productive assets such as a refrigerator and a freezer, or purchasing the materials needed for the construction of a new house (Dia, 2007). Household members are then expected to maintain the assets and run the business, in the case of productive investment. More generally, the qualitative survey I carried out for this study in Paris shows that a third of respondents earmark remittances for particular purchases, through in-kind transfers or verbal instructions.

Crucially, the remittances sent by migrants for investment are almost exclusively entrusted to their relatives. This is because close kin will be the ones enjoying the migrant’s investment in her absence and because migrants feel unable to find reliable intermediaries outside the family (Fall, 2003). Evidence of information asymmetry and manipulation by relatives should thus be seen as a lower bound on the difficulties migrants would face with non-relative intermediaries.

B.2 Preference differences

Migrants nevertheless “bemoan the lack of people worthy of trust among their kith and kin” (Fall, 2003).⁴⁷ The root causes of the diversion of investment funds by those in charge in Senegal are preference differences proper, self-control issues and redistributive pressure (kin tax).

⁴⁶Building a house back home is a major concern for Senegalese migrants (Fall, 2003; Dia, 2007). Expanding, refurbishing and equipping the family compound through remittances embodies migrants’ desire to return to their households of origin and offers a tangible signal of their efforts to maintain ties (Boltz-Laemmel and Villar, 2014). Another goal of real estate investments is to enhance the household’s prestige: “It is fashionable among migrants nowadays to have a house built in the village [although the existing house might be large enough]. [...]he house must be adorned with all the attributes of ‘modernity’: a TV set, a VCR, a telephone, and electrification thanks to solar panels” (Dia, 2007).

⁴⁷Quotes from Dia and Adamou (2003), Fall (2003) and Dia (2007) are translated by the author.

Migrants' preferences over the use of remittances need not be in line with their relatives' back home. Gaps between the migrants' and their households' preferences may originate from idiosyncratic differences. They may also be due to migrants' incentive to invest to reduce their remittance burden and facilitate their return, which leads them to favor productive assets more than their households. Finally, preference gaps may be due to jealousy of the migrant's success (Fall, 2003; Dia, 2007; Boltz-Laemmel and Villar, 2014), so that investments may systematically be resented by a fraction of the household. These differences lead to conflicts with relatives in Senegal over money, its use and the implementation of investment projects, creating a household economy characterized by "a struggle for controlling the resources from migration" (Dia and Adamou, 2003). Migrants report that they fear that members of the household of origin embezzle the money, do not purchase all that is necessary or fail to expend effort to maintain the assets purchased (Dia, 2007).

A second source of deviations from the migrant's investment instructions could be summarized as "self-control" issues. The migrant's intermediary may indeed agree with the migrant about the investment plan *ex ante* but fail to keep his promises. In economic parlance, the intermediary may be myopic. Respondents in my qualitative survey often mentioned fancy clothes and other private goods or participation in "baby naming ceremonies" (*ngénte* in Wolof), where social status is advertised, as the destination of the embezzled transfers. According to Marfaing (2003), the majority of migrants have experienced the failure of their business projects in Senegal as business funds are regularly swallowed up in the event of emergencies.⁴⁸

Different members of the transnational household are also subject to different pressures. Most of the time, migrants are not directly solicited for financial assistance; but their "left-behinds," first and foremost their spouses, are pressured to redistribute, as requests from closer relatives are more difficult to turn down (Dia, 2007; Boltz-Laemmel and Villar, 2014).

B.3 Information manipulation and beliefs

Preference differences can give rise to open conflict, but information manipulation is another powerful instrument that recipients can mobilize to impose their views. The distance between migrants and their households indeed implies imperfect observability of their actions to the other party. The key questions for this study are whether migrants are aware of information manipulation, what steps they take to prevent it if they are, and whether they can sustain biased beliefs.

In the qualitative survey I carried out in the north of Paris, I asked respondents

⁴⁸A similar conclusion is drawn by Boltz-Laemmel and Villar (2014).

to speculate on the stylized fact emerging from the matched data, i.e., that migrants systematically overestimate the number of assets held by their households of origin. Most maintained that the discrepancies observed are due to the household of origin lying to the migrant to extract more or secure remittances.⁴⁹ The most frequent story pertains to durable goods not being purchased, contrary to the migrant’s wishes, or sold if bought by the migrant directly. This suggests information asymmetry and manipulation, whereby relatives back home exploit private information about how remittances are spent to further their own interests. Half of the interviewees in the qualitative survey had doubts about the information received from their main transfer recipients and thought their earmarking was not followed or information was distorted to extract rents. As one of them put it: “We only know what they tell us.”

Qualitative evidence that migrants are aware of information asymmetry however suggests that they anticipate manipulation. Their beliefs about investment realization should thus be unbiased—if not in every instance, at least on average. Migrants indeed exert themselves to improve the information they receive. This may mean reducing the fungibility of transfers by sending them to shopkeepers so as to allocate them beforehand (Dia, 2007), remitting in kind,⁵⁰ monitoring transfer recipients through phone calls, and contacts with other migrants or neighbors from the same community. Migrants also make the most of their visits to Senegal to manage their projects (Fall, 2003; Dia, 2007). If information manipulation is detected, migrants can rely on two main channels to mete out sanctions: future investments and reputation. In the qualitative survey, respondents explained that they would heap opprobrium on (“bad-mouth”) their households of origin in their extended networks or put an end to investment remittances to punish them for deviating from their instructions.

Evidence from the literature and my qualitative survey suggests that migrants are aware of deviations from their instructions, but information manipulation may be imperfectly anticipated. This brings us to the issue of beliefs. Providing qualitative evidence of biased beliefs is challenging because, by definition, the respondents are not aware of their own bias and see others are delusional. The migrants interviewed

⁴⁹Out of 20 respondents, 15 indicted the household of origin for the observed discrepancies; 7 of those understood the stylized fact immediately and spontaneously answered without my listing of possible options; and 12 came up with an anecdote or an example to illustrate their answers.

⁵⁰Customers’ comments posted on the website of Niokobok, a firm specializing in in-kind transfers to Senegal, eloquently reflect the relationship between control issues and in-kind remittances: For instance, one customer explains that it allows her to “make sure the money is really used by the household,” as “you are always afraid that the money is not managed well when you are far away,” according to another—see <https://www.niokobok.com/reviews-7.html>.

in the qualitative survey did provide numerous anecdotes about investment remittances being embezzled by origin households. Interestingly though, they usually introduced anecdotes by this phrase: “It happened to a friend.” Such an introduction may reflect reticence. It is however also consistent with heterogeneous beliefs: The migrants who do send investment remittances tend to be optimistic about their own relatives’ trustworthiness, and thus do not realize that embezzlement may be happening. They see the distribution of beliefs, which they do observe, as reflecting how much *others* can be wrong.

C Measurement error

I model h 's and m 's survey answers as follows:

$$\widetilde{A}^h = A^h \tag{C1}$$

$$\widetilde{A}^m = (1 - c)(1 + \zeta + \delta_A + \delta_O)A^h + cr + \nu \tag{C2}$$

where \widetilde{A}^i denotes the (potentially error-ridden) report of the true information A^i held by $i = h, m$; $\zeta \in [-1, 0]$ captures a negative correlation between the report and the error-free variable, which [Bound and Krueger \(1991\)](#) call “mean-reverting measurement error” and is particularly likely for bounded variables such as A ; $\delta_A \geq 0$ corresponds to the inflation in h 's message to m possible under information asymmetry and observable in survey reports under differing priors *cum* selection (see Section 4.1); $\delta_O \geq 0$ stands for factors leading to a systematic inflation of the migrant's report; ν is such that $E[\nu] = 0$ and $E[A^h\nu] = 0$; and c is the migrant's propensity to provide a “clueless” random answer r . I shall deal with cluelessness first and then discuss the impact of the other sources of measurement error.

C.1 Classical measurement error and mean reversion

Equation C2 immediately tells us that Prediction 1 ($\Delta \geq 0$) can be tested with the error-ridden $\widetilde{\Delta} \equiv \widetilde{A}^m - \widetilde{A}^h$ as long as $\delta_O = 0$. Indeed, ζ being negative it can only bias the estimate of Δ downwards. Given our assumptions about ν , artificial support for Prediction 1 can only originate in the positive δ_O , studied in Section 2.2, or from cluelessness—see below.

C.2 Random response

Considering for simplicity that A^i is a binary variable, i.e., equal to 1 if h owns at least one unit of A according to i and 0 otherwise, an intuitive way of modeling clueless migrants' behavior is to assume that their answers follow a Bernoulli distribution of mean 0.5, responding 0 or 1 with equal probability. I assume that the probability c of answering randomly is the same for all respondents but may differ across assets.⁵¹

⁵¹Assuming the converse yields qualitatively similar results—available upon request.

Rewriting Equation C2 to focus on random responses, we have:

$$\widetilde{A}^m = (1 - c)A^h + cr \quad (\text{C3})$$

$$\therefore c = \frac{\widetilde{\Delta}}{r - A^h} \quad (\text{C4})$$

Since we assumed that $r = 0.5$, we can replace c by $\widetilde{\Delta}/(.5 - A^h)$. Averaging over all individuals in the sample yields the desired quantity c .

Estimates of c are displayed in Table A11.