Azizbek TOKHIROV

PALACKÝ UNIVERSITY OLOMOUC
UNIVERSITY OF CLERMONT AUVERGNE
UNIVERSITY OF PAVIA

MASTER THESIS

Olomouc 2019 Azizbek TOKHIROV

Effectiveness of migration and remittances in improving the well-being of migrant-sending households: evidence from Tajikistan

Supervisor: Jaromír HARMÁČEK

DECLARATION OF AUTHORSHIP

I hereby declare that I am the author of this thesis and that I have not used any sources other than those listed in the bibliography and identified as references.

Date 30.5.2019 Signature Akhir

UNIVERZITA PALACKÉHO V OLOMOUCI

Přírodovědecká fakulta

Akademický rok: 2018/2019

ZADÁNÍ DIPLOMOVÉ PRÁCE

(projektu, uměleckého díla, uměleckého výkonu)

Jméno a příjmení:	**Azizbek TOKHIROV**
Osobní číslo:	**R170194**
Studijní program:	**N1301 Geography**
Studijní obor:	**International Development Studies**
Téma práce:	**Effectiveness of migration and remittances in improving the well-being of migrant-sending households: evidence from Tajikistan**
Zadávající katedra:	**Katedra rozvojových a environmentálních studií**

Zásady pro vypracování

The purpose of the thesis is to investigate how private transfers from migrants are utilized by family members left behind using results of nationally-representative Tajikistan household surveys conducted in 2007, 2009 and 2011. Precisely, the research is aimed to answer the question of whether international remittances affect the subjective well-being of migrant-sending households? Given a thorough microeconomic data, the systematic comparison is possible by reference to the cases of satisfaction with current financial situation and with life as-a-whole. The efforts will be dedicated to the empirical establishment of a statistically significant difference with respect to the evolution of well-being patterns between remittance-receiving families and their counterparts without additional source of finance.

Rozsah pracovní zprávy:	**15000 slov**
Rozsah grafických prací:	**Podle potřeb zadání**
Forma zpracování diplomové práce:	**tištěná/elektronická**

Seznam doporučené literatury:

Adams Jr., R. H. 2011. Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review. Journal of Development Studies 47 (6), 809-828.

Clément, M. 2011. Remittances and household expenditure patterns in Tajikistan: A propensity score matching analysis. Asian Development Review 28 (2), 58-87.

De Haas, H. 2010. Migration and development: A theoretical perspective. International Migration Review 44 (1), 227-264.

Ivlevs, A., Nikolova, M., Graham, C. (2019). Emigration, remittances, and the subjective well-being of those staying behind. Journal of Population Economics 32 (1), 113-151.

Myrdal, G. 1957. Rich lands and poor: The road to prosperity. New York: Harper & Brothers.

Rosenbaum, R. P., Rubin, D. B. 1983. The central role of the propensity score in observational studies for causal effects. Biometrika 70 (1), 41-55.

Shefrin, H. M., Thaler, R. H. 1988. The behavioral life-cycle hypothesis. Economic Inquiry 26 (4), 609-643.

Stark, O., Bloom, D. E. 1985. The new economics of labor migration. American Economic Review 75 (2), 173-178.

Vedoucí diplomové práce:	**Ing. Mgr. Jaromír Harmáček, Ph.D.** Katedra rozvojových a environmentálních studií
Datum zadání diplomové práce:	**31. ledna 2019**
Termín odevzdání diplomové práce:	**31. května 2019**

V Olomouci dne 31. ledna 2019

L.S.

doc. RNDr. Martin Kubala, Ph.D.
děkan

doc. RNDr. Pavel Nováček, CSc.
vedoucí katedry

ABSTRACT

Given the considerable amount of private cross-border transfers, their potential role in improving the well-being of households is significant. Nevertheless, a conclusive answer on the contribution of remittances to development of migrant-sending communities cannot be derived from the literature. The variety of seemingly contradictory theoretical predictions suggests that a consensus is unlikely to be achieved in the foreseeable future. At the same time, only few empirical studies have investigated the impact of remittances on households in Central Asia, the region which lies on the cross-roads of active migratory movements. This study is aimed to determine the extent to which the receipt of international remittances influences household subjective well-being by applying the latest data from nationally-representative surveys conducted all over Tajikistan. After controlling for potential endogeneity in the treatment effects model based on the process of mental accounting, the findings countenance the notion that remittances can exert positive effects on the household well-being when measured by satisfaction with life as-a-whole. However, the impact of remittances is not unequivocally positive with respect to evaluative measures of financial welfare. The duality in the way remittances affect material and non-material well-being patterns is caused by the heterogeneity of treatment effects across different economic contexts.

Key words: consumption, investment, migration, remittances, subjective well-being

JEL classification codes: D12, F22, F24, I31

CONTENTS

1 INTRODUCTION

Internal market distortions all over the world force many individuals to migrate in search of better life conditions. The official statistics show that international migration stock of nearly 250 million people accounted for 3.4% of the world population in 2013 (World Bank, 2016). Due to constraints to move freely between countries in the form of strict immigration policies and transportation costs, international migrants in most of the cases not only leave their communities but also family members behind (Démurger and Wang, 2016). Migrant transfers of money and goods, commonly referred as remittances, therefore, have become one of the main sources of household income in increasing number of developing countries.

In many cases, remittances are not determined after the process of migration, but the prospect of remitting might significantly affect the decision to migrate at the first place. Hence, it is not surprising that the amount of inward remittances to developing countries has significantly increased over the last years: from USD 330.3 billion in 2006 to USD 592.9 billion in 2014 (World Bank, 2016). At the household level, the share of remittances might even reach 50% of the migrant-sending households' income (Duval and Wolff, 2010). There is an important question regarding the utilization of these cross-border financial flows: whether remittances can only improve the short-run household welfare by addressing immediate consumption needs or the additional income can also be channeled into long-term well-being improvements by accumulation of human and physical capital.

From the perspective of the generally accepted theoretical literature, intentions to migrate are indeed closely linked with subsequent remittances and these flows should not only weaken hard budget constraints, but also improve the overall household well-being of those who receive the transfers (Stark and Bloom, 1985). Nonetheless, it is difficult to find an unambiguous answer to the question on the well-being effects of remittances from the previous theoretical literature. Particularly because the alternative school of thought emphasizes that negative effects of migration would prevail over positive ones, and inevitably, remittance-receiving households should experience lower levels of well-being than their non-receiving counterparts (Bohra-Mishra, 2013).

Along with theoretical studies, there is a vast empirical research which is principally concentrated on how migration in general and migrants' remittances in particular affect the well-being of those who left behind. Though, these papers tend to explore changes in the

well-being of migrant-sending families indirectly based on socioeconomic indicators at the individual or household level. Among them, we can mention, for instance, consumption and investment (Adams and Cuecuecha, 2010), education (Gyimah-Brempong and Asiedu, 2015), health (Lu, 2013), income (De and Ratha, 2012), labor supply (Justino and Shemyakina, 2012) and poverty (Esquivel and Huerta-Pineda, 2007). Given the variety of applied well-being measures, the results of previous empirical studies cannot be generalized appropriately. Alternatively, the area of direct evaluation of well-being by migrant-sending households is relatively new and consequently, less investigated (Nguyen et al., 2007). In this field, many studies with varying degrees of success attempted to examine whether remittances through increased financial security can compensate emotional distress connected with the absence of household members (Ivlevs et al., 2019).

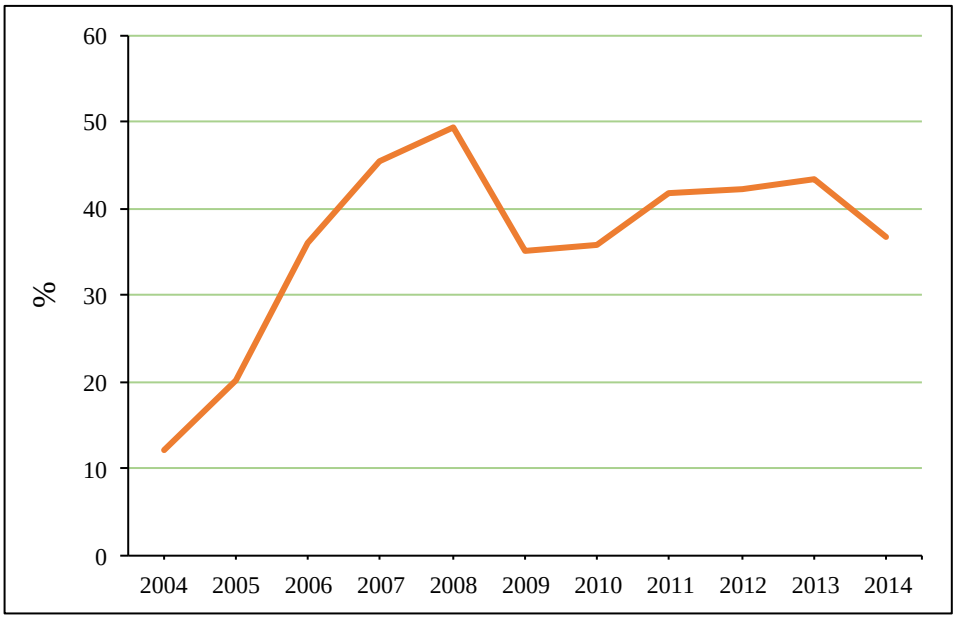
This dissertation is aimed to address the indeterminacy in the literature by studying the impact of migration on the left behinds in one of the under-researched regions. Specifically, the data for the analysis is retrieved from nationally representative household surveys conducted in 2007, 2009 and 2011 all over Tajikistan. Considering the advances in subjective well-being research (Di Tella and MacCulloch, 2008) and elaborating on the preliminary results of the author (Tokhirov, 2018), the study poses the following research question: to what extent does the receipt of international remittances foster the subjective well-being of remittance-receiving households?

To answer this question, the research sets several objectives:

- To review the existing migration literature and scrutinize the transmission channels through which remittances might affect household members left behind;
- To establish a theoretical link between the receipt of remittances and changes in the behavior of households;
- To evaluate empirically effects of the remittance receipt on the selected subjective indicators of household well-being;
- To investigate possible discrepancies in the impact of remittances;
- To summarize well-being implications of receiving remittances for migrant-sending households of Tajikistan.

The choice of the country is not arbitrary. Due to severe consequences of the Soviet Union collapse and prolonged transitory period, many Tajik households chose to migrate as a coping strategy. For many years in a row, Tajikistan is the world leader in terms of dependency on migrant transfers measured by a considerable margin of personal remittances in the country's national income (Danzer and Ivaschenko, 2010). As it can be seen from Figure 1, over the last years, the value of received personal remittances accounted for approximately 35% of Tajikistan's gross domestic product (GDP), with the lowest observed value being far higher than the unweighted global average value (World Bank, 2018). The issue of persistent labor emigration had also been acknowledged at the governmental level of Tajikistan by the establishment of the migration service agency (International Labour Organization, 2011).

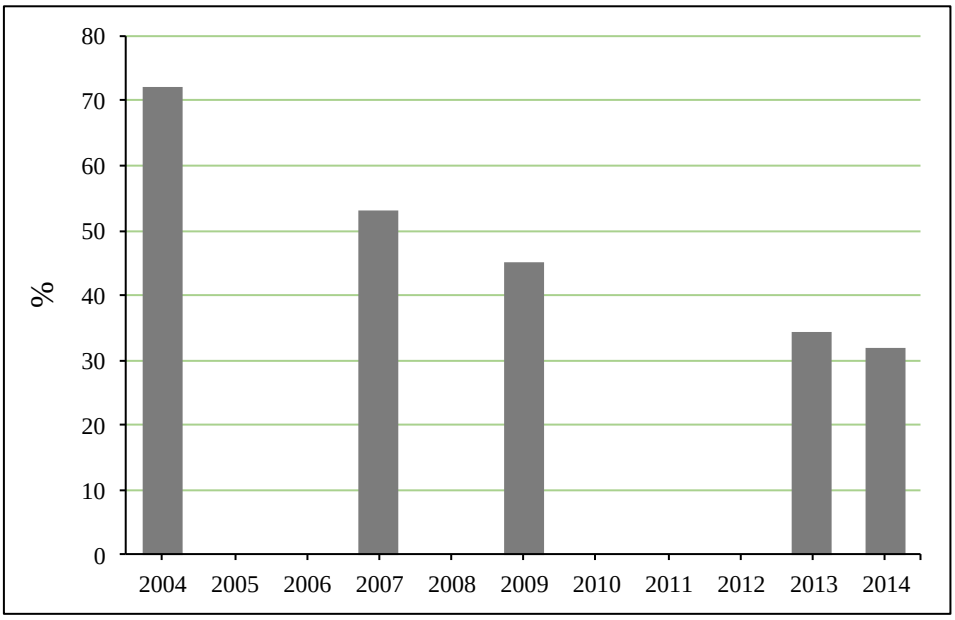
Figure 1. Personal remittances received (% of GDP)



Source: WDI (2017)

Despite high remittance inflows, the country is characterized by considerable number of households experiencing financial issues. Based on the last available estimations, more than 30% of the population was below the national poverty line (Figure 2). This economic situation is nothing new, Tajikistan was among the poorest states of the former Soviet Union (Clément, 2011).

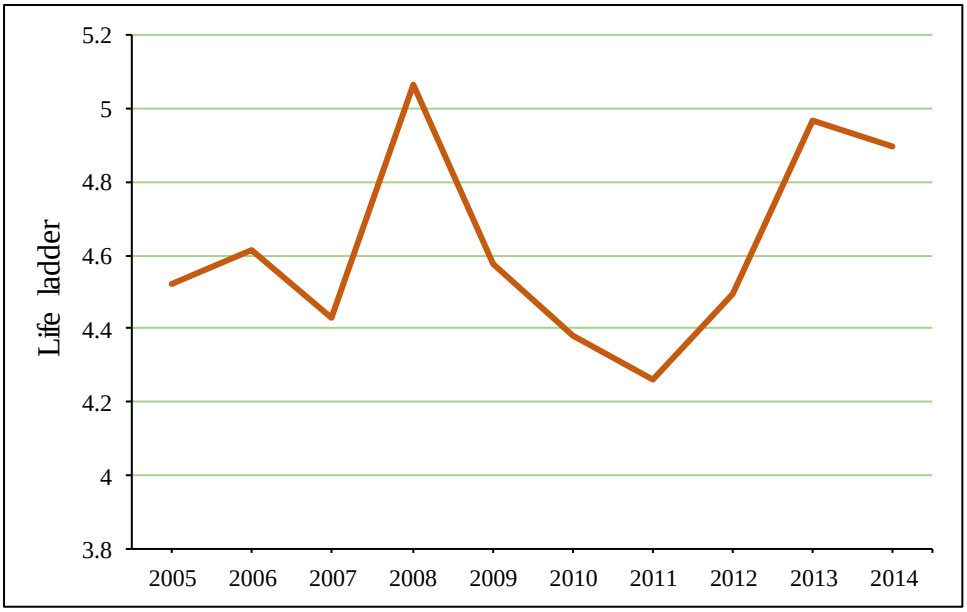
Figure 2. Poverty headcount ratio at national poverty lines (% of population)



Source: PHCR (2015)

With respect to subjective well-being measures, Tajikistan's country-average happiness score was ranked only 106th out of 158 countries in the World Happiness Report for the year 2014; however, when the relative increase in the index from 4.5 to 4.9 for the period between 2005 and 2014 is considered (Figure 3), the country was among the top 45 nations (Helliwell et al., 2015).

Figure 3. Happiness score of Tajikistan



Source: WHR (2015)

When the previous three indicators are viewed in dynamics, we can summarize that the percentage of Tajikistan's population living in poverty decreased by half from 2004 to 2014. During the same period of time, the country's dependency on remittances and happiness score increased. However, it should be noted that the positive changes in the poverty rates were steady, while the latter indicators fluctuated considerably.

Taking into consideration economic situation in Tajikistan, it is important to raise a question of whether remittances in addition to bringing new resources into the economy also contribute to the subjective well-being of migrant-sending households. It will help to obtain a more comprehensive measure of household migration experience. Despite the importance of remittances for the economy of Tajikistan, only few studies have attempted to investigate the relationship between remittances and the well-being of people living in this country (Clément, 2011; Kumo, 2012). Even the available microeconomic investigations do not address the issue properly since they tend to rely on cross-sectional data and their methods are limited to this type of data. Though, differences in well-being patterns can be studied more precisely with longitudinal data (Ivlevs et al., 2019). As for the multi-period studies, they are rare and in most of the cases, the applied samples are not representative in terms of geographic (Murakami et al. 2019) or chronological (Buckley and Hofmann, 2012) coverage. Accordingly, we revisit the topic and contribute to the literature by applying up-to-date country-representative data from previously less examined economy and appropriate techniques to achieve robust results. In this context, derived results would be layered upon the existing evidence from other regions.

Our main hypothesis is that the receipt of remittances modifies consumption-investment decisions of households due to internal cognitive constraining. Similar to the reasoning of Adams (2002) and Davies et al. (2009), we propose a mental accounting framework incorporated into the behavioral life-cycle hypothesis of Shefrin and Thaler (1988) as an alternative to liquidity constraints for the lower temptation to consume the remittance income. If households in the process of maximizing their utility start to receive remittances, they are expected to increase investments targeted to improve human capital at the expense of expenditures for consumer goods and services. The anticipation of the long-run welfare improvements then should cause positive changes in their overall subjective well-being. To test this hypothesis, we investigate empirically the impact of remittances on satisfaction with life as-a-whole.

It is also true that certain households after receiving remittances might experience a short-run discomfort because of current consumption cuts. To test the secondary hypothesis, we examine the impact of remittances on satisfaction with current financial situation. When the structure of the relationship is considered, we anticipate finding a heterogeneity in the impact of remittances across different economic contexts. We expect that the association between the variables of interest would be considerably adjusted by the established settings where remittance-receiving households operate. There are certain difficulties to predict the possible direction of changes in the relationship due to insufficiency of existing empirical works for countries with similar characteristics as of Tajikistan.

Ideally, we need control and treatment groups with similar characteristics other than the remittance status to measure the well-being changes caused by the receipt of remittances. In this case, the way forward would be to rely on a randomized controlled trial. However, it is difficult to conduct a nationally representative experiment with the given financial and time constraints. There are also several ex-post methodological tools to provide robust evidences for the inference based on the non-experimental data. This study applies several treatment-effects models with selection bias adjustment to large-scale household surveys. With a scrupulous information provided in the datasets, it is possible to compare robustly remittance-receiving and non-remittance households in terms of several subjective well-being indicators. We create hypothetical values for well-being measures of remittance-receiving households as if they do not have additional source of income. If statistically significant differences between the actual and counterfactual well-being patterns are present, they are then attributed to the impact of remittances.

The establishment of the relationship is not an ultimate goal, but a foundation for economic implications that will follow. In the case if our results are discovered to be consistent and meaningful, one of the main recommendations would be to ensure that development interventions aimed to improve household well-being with the help of labor migration policies should explicitly consider the cognitive changes connected with the receipt of remittances. Since policymakers in majority of the situations are concerned with a tradeoff between a provision of social assistance to improve welfare of population and a balanced budget, the results of this research may help to evaluate the way households utilize remittances and whether these flows can be considered as beneficial for the communities of

Tajikistan. Consequently, conclusions of the study may have important implications and can be used in the design of various public and private development programs.

The rest of the dissertation is structured into the five further sections. The second part introduces the background of the study and discusses the major theories and empirical studies in the field of migrant remittances and the well-being of those who left behind. It is followed by the hypothesis development along with the description of methodology and data. In the fourth section, the results of baseline and complementary estimations can be found. The next chapter is dedicated to the discussion and explanation of the derived research outcomes. The summary of the analysis and implications of findings are presented at the end of the project.

2 LITERATURE REVIEW

There is no theoretical consensus on the development effects of internal or international migration on migrant-sending communities. Historically, classical and neoclassical migration paradigms mainly emphasized the positive impact of migration. One of the first attempts to explain the migration choice was undertaken by Ravenstein (1885). Several empirical generalizations regarded by the author as "laws of migration", mainly described migration as a geographic reallocation of labor force over short distances and caused by economic reasons. Differences between rural and urban regions in terms of industrialization and development of commerce were expected to induce people to move from the former to the latter area given the affordability of transportation costs. In a similar fashion, other early works related the tendency to migrate with established geographical disparities (Zipf, 1946). The pioneering studies also introduced intervening obstacles to migrate as one of the influencing factors of observed movements of people (Massey et al., 1993)

The more comprehensive explanation of consequences of the migration choice can be found in neoclassical macroeconomic theories (Ranis and Fei, 1961; Harris and Todaro, 1970). Even though, the role of economic differences between regions was still of vital importance, these paradigms attempted to explain the process of migration through the lens of ongoing economic development. Leaded by push factors in a region of origin of potential migrants and pull forces of available destinations for migration, now, migrants and the economic benefits from their activities were considered as a crucial element for prosperity of less developed states by capital reallocation and knowledge dissemination.

In addition to the macroeconomic schools of thought, neoclassical literature also provides a different angle to analyze migration (Sjaastad, 1962; Todaro, 1969). Microeconomic models of individual choice theorize migration as a rational decision made by individuals based on explicit cost-benefit analysis. In this case, migration should serve as one of the available options for agents to address their current economic struggles. When the macro- and microeconomic studies are considered jointly and more importantly, implicit assumptions (such as risk neutrality and symmetric information) of the models are met, it can be claimed that the neoclassical way of thinking is rather optimistic on the effects of migration on sending regions. Continuous movement of people meant to be one of the possible solutions to address unemployment and overpopulation at the aggregate level and

also improve wealth of individual economic agents (Wickramasinghe and Wimalaratana, 2016).

The migration literature is also characterized by a pessimistic view on the role of migration (Bohra-Mishra, 2013). According to the cumulative causation theory (Myrdal, 1957), migration exerts short-term positive effects by increasing financial inflows to migrant-sending regions and causes long-term damages to the economic productivity of these states. It was assumed that core countries drain human capital from the periphery and offer remittances instead. Nevertheless, remittance-receiving communities were not expected to use additional income appropriately because remittances were expected to cause Dutch disease effects and to bring inflationary pressure to regions with high migration outflows (Acosta et al., 2009). In this situation, with the passage of time, those who left behind could hardly feed themselves with remittances. Indeed, as summarized by Chami et al. (2005), there is a significant tendency by migrant-sending regions to use remittances only for consumption purposes. When the household level changes are considered, the theory predicts that remittance-receiving households eventually become passively reliant on remittances and might be trapped in the vicious cycle of poverty (Nzima et al., 2016). It was also previously demonstrated that the reliance on remittances can result in economic dependency even in the short-run perspective when additional inflows of resources hamper private and public development efforts (de Haas, 2010).

In fact, the early migration research was built on exogenous assumptions regarding the economic environment, where potential migrants could operate (Milanovic, 1987). The proposed specifications were embedded within multiple equilibria, allowing under certain preliminary circumstances for various social results. In this regard, several authors proposed a "new economics of migration" as a challenge to the main assumptions and conclusions of the neoclassical migration theories (Stark and Bloom, 1985). The initial propositions were re-introduced and elaborated more comprehensively by Lucas and Stark (1985), the study which has been referenced far more than any other remittance-related paper (Carling, 2008). From the perspective of this theory, intention to migrate is viewed as a joint decision between a potential migrant and other family members undertaken with the aim of diversifying risks perpetual to domestic environment, and that decisions to migrate and remit are closely connected (Lucas and Stark, 1985). Thus, remittances should serve as one of the main instruments by which migrant-sending households could achieve their joint

utility maximization point. However, whether this would subsequently lead to the improved well-being of individual household members is another question. The uncertainty arises because intention to remit might be enforced by self-interest or altruistic behavior of the migrant or contractual agreement between the migrant and other household members (Bouoiyour and Miftah, 2015). For example, in the case of self-interested migrants, mutually beneficial scenario for the migrant and household members left behind might be difficult to achieve, or informal contract may be in the form of consumption smoothing, which might hamper the current well-being of those who apply this strategy. The predictions are even less robust when we consider that the remittance motivations could coexist (Massey et al., 1993).

The variety of reasons to remit, or not to remit at the individual level does not provide the robust way to generalize the effect of remittances on the well-being of population of Tajikistan from the perspective of migration literature. Conversely, if remittances are present, they should affect the household consumption behavior via increased wealth, changes in which can be traced to well-being (Adams and Cuecuecha, 2010). The idea that a welfare can be interpreted as a function of consumption of goods and services is not new (Syrovátka, 2007). However, traditional consumption theories do not regard additional source of wealth in terms of remittances as a factor that might change consumption behavior (Tabuga, 2008). It is assumed that not the receipt of remittances, but rather increased income affects positively consumption. As in the case of Keynesian absolute income hypothesis, where the main determinant of consumption is a current disposable income, families with remittances should not have significantly different expenditure baskets than non-receiving families (Tapsin and Hepsag, 2014). The same reasoning is true for other notable classical approaches in this field (relative income hypothesis or life-cycle hypothesis) (Fasoranti, 2010).

To refine simplifying assumptions of the classical theories, new theoretical works attempted to incorporate behavioral economics notions to traditional consumption functions (D'Orlando and Sanfilippo, 2010). One of these concepts is mental accounting, which describes psychological operations generated by economic agents to evaluate and consolidate non-routine situations (Thaler, 1985). With respect to remittances, Shefrin and Thaler (1988) augmented the life-cycle hypothesis with mental accounting and proposed a behavioral life-cycle hypothesis. The theory assumes that households do not treat money in

cash or in other forms as a fungible asset, which leads to framing of their total wealth into mental accounts. The main implicit hypothesis of the theory emphasizes that temptation to consume out of different income sources is not the same. The liquidity of wealth is also incorporated into the mental accounting approach, meaning that even equally liquid income flows from different sources might not be aggregated into the same mental account. Overall, the theoretical model predicts that additional increments in the form of remittances would be treated differently (transforming into productive investments rather than conspicuous consumption) than permanent income even if the dividends are utterly expected (Shefrin and Thaler, 1988). The initial choice of the mental accounts was limited to current income, current and future assets, while Levin (1998) separated further assets by categories and Davies et al. (2009) disjointed sources of current income.

According to the available empirical literature, the behavior of remittance-receiving households might indeed be explained by the mental accounting paradigm. The study of Adams (2002) discovered differences in the saving and consumption patterns between families with different remittance status. The author concludes that households living in Pakistan, on average, tend to save more remittances than other sources of income. Davies et al. (2009) using cross-sectional data from Malawi extended the analysis of Adams (2002) to test higher number of mental accounting systems. The main result of the study is a confirmation of cognitive framing in the saving, investment and consumption decision making processes.

The empirical evidence on the direction of structural changes or in other words, allocation of additional resources is less clear. Several authors were able to find evidences for positive exploitation of remittances (Adams and Cuecuecha, 2010; Adams and Cuecuecha, 2013; Edwards and Ureta, 2003; Kifle, 2007; Meier, 2014; Osili, 2004), while others showed that remittances encourage non-productive spending behavior (Chami et al., 2005; Clément, 2011; de Brauw and Rozelle, 2008; Zhu et al., 2012). It is worth to mention that some papers failed to identify the effect of remittances and authors reported that households treat remittances as any other type of income (Ang et al., 2009; Cattaneo, 2012; Tabuga, 2008 Zhu et al., 2014). In most of abovementioned cases, the significant impact of remittances is discernible only when international money stems are considered, while the receipt of internal remittances are found not to affect households considerably.

The definition of the effective exploitation of resources is extensive and allows to consider many goods and services; however, as noted by Démurger and Wang (2015) household expenditure baskets with the highest long-term returns can be categorized into productive investments. It should be noted that there is no intrinsically wasteful expenditure products and each case should be analyzed in the context of overall macroeconomic situation. Even increased food expenditures, which is an example of pure consumption basket, through multiplier effects can induce positive impacts on the community where a particular household lives (Bohra-Mishra, 2013). Moreover, according to de Brauw and Rozelle (2008), despite the aspirations to invest or save, households maybe so poor that they have to use additional income for food to survive. Nevertheless, there is a certain consensus in the literature on the unambiguously positive role of human capital as an important factor in sustainable development since it improves performance capability of economic agents by making labour force more productive and skilful, and resulting in fresh knowledge and innovations (Odeleye, 2012).

The standard approach to infer welfare from observed behavior is not the sole empirical option. Another, less explored approach to well-being is based on personal judgments of economic agents (Syrovátka, 2007). Well-being indicators in this case are usually derived from answers of individuals to general and specific questions about their life satisfaction or happiness. Several attempts have been made to document the evaluative changes reported by household members left behind, be they children, seniors, or a spouse (Ivlevs et al., 2019). The available empirical evidence suggests that being a child of emigrant parents might affect negatively the child's emotional (Dreby, 2015; Wu et al., 2015) and psychological (Mazzucato et al., 2015) well-being or might not cause any changes in the evaluative well-being of the child (Vanore et al., 2015). By the same token, the subjective well-being of the elderly might be positively (Abas et al., 2009), negatively (Marchetti-Mercer, 2012) or not (Waidler et al., 2017) affected by the emigration of other family members. The situation is more transparent with respect to the stay-behind alone mothers, who is usually found to suffer from the deteriorated mental well-being after their spouses depart (Graham et al., 2015; Nobles et al., 2015).

More and more empirical studies have emerged with explicit consideration of the potential effects of remittances rather than of migration on subjective well-being. The results of cross-country studies based the Gallup World Poll data indicate that remittances might

improve the evaluative well-being mainly by addressing financial security of those who stay behind; unsurprisingly, the positive effects are particularly strong for poorer segments of the population (Cárdenas et al., 2009; Ivlevs et al., 2019). However, according to Ivlevs et al. (2019), remittances are not able to offset fully increased stress and depression associated with the absence of one or more household members. On the other hand, the analysis of the data from Ecuador by Borraz et al. (2010) indicates that remittances can actually outweigh negative emotions of separation and temporary loss of livelihoods among migrant-sending households. The empirical results of fully recompensating effects of remittances are supported by the internal migration data from Albania (Borici and Gavoci, 2015) and the rural to urban migration data from China (Akay et al., 2016). When objective and subjective measures are explicitly separated, the findings of Gartaula et al. (2012) suggest that the remittance receipt affects positively measures of objective well-being of Nepalese women, but these improvements are less notable when subjective well-being indicators are considered.

When we narrow our attention specifically to Tajikistan, irrefutably, the previous investigations tend to confirm that migration has been constantly amending socioeconomic conditions of this country (Zotova and Cohen, 2016). If the studies are reviewed in more detail, empirical findings from still scarce literature appear to be rather contradictory. Overall, migration experience is more likely to be evaluated positively at the household level (Catrinescu et al., 2011); but when the analysis of sub-indicators of happiness is considered, the impact of migration is statistically significant and positive for the quality of life assessment but not for emotional well-being (Hendriks et al., 2018). Though, even the reported positive effects of remittances may be subject to internal or external settings in which migrant-sending families live. For example, if the expected benefits of moving to another country are considerably larger than wages offered in the home country, family members of migrants have a higher probability to experience job dissatisfaction (Abdulloev, 2018). As for internal factors, there might be a reverse causation between remittances and positive subjective well-being because it was shown that people who feel more satisfied with their lives are more likely to choose the path of becoming migrants (Ivlevs, 2015).

As of the investigations concentrating on the objective well-being measures of those who stay behind, the results from Tajikistan are still not unambiguously positive. From the study of Gang et al. (2018), we can conclude that migrant-sending households are not less

vulnerable to poverty, but remittance-receiving households tend to have lower chances of being poor. This hypothesis is supported by the results of Betti and Lundgren (2012) but in contradiction with the findings of Buckley and Hofmann (2012) and Justino and Shemyakina (2012). In the case of Betti and Lundgren (2012), remittances are found to serve poverty alleviation through direct (improving the economic situation of those who receive remittances) and indirect (solving the problem of the unemployment burden) channels. Conversely, Buckley and Hofmann (2012) assert that differences between households with and without remittances in terms of economic stability, wealth and entrepreneurial activities are not statistically significant; and more importantly, according to Justino and Shemyakina (2012), remittances affect negatively the future prospects of receiving households by reducing their aspirations to participate in the labor market. Similar to subjective well-being, we still should not disregard reverse causation since there is an evidence that households in the top percentiles of wealth distribution have higher probability to supply international migrants (Kumo, 2012), which refutes "pro-poor" nature of Tajik migration.

Considering the importance of human capital formation, we can mention several studies linking migration with education and health in Tajikistan. The Engel curve specification estimated with several regression techniques (instrumental variables (IV), ordinary least squares (OLS), Tobit) in the case of Sultonov (2014) indicate that remittances might encourage to spend more on education and health, but the increase of education investments is not statistically significant for all estimations. Indeed, the analysis of coping strategies available for the population of Tajikistan also tends to confirm that remittances exert positive effects on health (Falkingham et al., 1997), which can be associated with enhanced nutritional intake (Azzarri and Zezza, 2011). In contrast, Clément (2011) suggests that Tajik households after receiving international remittances are expected to spend more on food and non-food consumption goods rather than on education and health. The studies with ex-post measures of human capital are more positive about the role of remittances: being a member of a migrant-sending household reduces the risk of educational lag (Cebotari, 2018) and increases the likelihood to attend school (Nakamuro, 2010).

Although the abovementioned studies are of considerable interest, and have important policy implications, they do not suggest a theoretical mechanism between remittances and the well-being of those who left behind. We address the gap in the literature and propose a cognitive framing due to the system of mental accounts as a reasonable

explanation for well-being changes introduced by the receipt of remittances at the household level. Moreover, we make one of the first attempts to link objective and subjective approaches to well-being by analyzing consumption behavior and evaluative well-being changes of households. We assume that the adopted approach would shed light on indeterminacy in well-being literature with respect to migrant remittances.

Before proceeding to the empirical analysis, we should also construct a model for remittances with explicit consideration of potential endogeneity. There are several sources of bias related to the "remittances" variable that may occur in empirical research; reverse causality, measurement error and self-selection being the most prevalent (Adams and Cuecuecha, 2010). McKenzie et al. (2006) tested the major methods to address endogeneity in migration studies by conducting a natural experiment in New Zealand. Based on their results, we can conclude that IV regressions with valid instruments provide the most accurate results, whereas estimations with poor instruments might generate extensive bias, larger than distortions inherent to the OLS calculations.

Treatment-effect models after bias adjustment such as differences-in-differences (DiD) and propensity score matching (PSM) can be ranked as the next best alternative (Angrist and Pischke, 2008). Indeed, in the literature we can find methodologies based on DiD (Blanchard and Katz, 1992; Card and Krueger, 1994) and PSM (Dehejia and Wahba, 1999; Smith, 1997) to solve the issue of endogeneity instead of searching for reliable instruments. Until recently, these methods had been mainly used separately (Angrist and Pischke, 2008). However, after Heckman et al. (1997) demonstrated that a DiD matching estimator can be constructed, several papers (Dimova and Wollf, 2015; Gebel and Voßemer, 2014; Gibson and McKenzie, 2014) attempted to apply the combined estimator to increase the efficiency of their estimations.

The state of progress in econometric modelling within a cross-sectional setting was also not static and various methods to evaluate interventions have been introduced for drawing robust inferences (Athey and Imbens, 2017). As an illustrative example, we can refer to the study of Cattaneo (2010), where it was shown how to derive an efficient estimator for multi-valued treatment effects under the ignorability assumption. There are also other empirical solutions (such as randomized experiments, "natural experiments" or sample selection procedures) rather than treatment-effect models, but they address the

methodological difficulties with varying degree of success and more importantly, require specific type of data (Adams, 2011).

Even though the IV estimator might potentially offer the most reliable results, this method is highly vulnerable to the choice of instruments. In this case, we opt for the second-best solution because it was previously asserted that stable instruments for the "remittances" variable cannot be generated from the available Tajikistan household surveys (Clément, 2011). After weighing the issues associated with different empirical methods against statistical authenticity they can bring to the estimation, we suppose that the most feasible approach is to apply the combination of DiD and PSM proposed by Nguyen (2012) as a baseline tool. Since this method requires longitudinal data, we also consider treatment-effects selection-bias model of Cattaneo (2010) based on cross-sectional data to analyze the interim effects of remittances.

3 DATA AND METHODOLOGY

3.1 Theoretical framework

From a theoretical perspective, the basis for the empirical identification is derived from the works of Thaler (1999) and Shefrin and Thaler (1988). The proposed theory assumes that a group of economic agents, representing a household unit (*i*), has two identities: a "planner" who behaves according to the neoclassical utility maximization function, and a "doer" who actually performs each decision and is short-sighted, which implies a preference for high current consumption. The "planner" restricts the "doer" and attempts to reduce consumption by exerting willpower to achieve the optimum level of consumption for the period *t*, compatible with improved utility levels (*U*):

$$U_i = f(Z_i - W_i); \quad Z = \int_0^{\infty} z(c)\, e^{-\rho t} dt, \tag{1}$$

where Z is unconstrained utility and W represent "willpower" costs associated with decreased consumption; c is consumption per agent and $\rho > 0$ is the constant rate of time preference.

To decrease the willpower costs at any period, the "planner" divides a household wealth into mental accounts based on temptation levels. Each mental account is designed to address short- and long-term household needs. Ideally, the system of mental accounts should decrease available opportunity sets for the "doer", preventing excessive current spending on certain undesired (from the point of view of the "planner") consumption baskets and inducing to spend more on investment goods and services. If we consider the framework of Davies et al. (2009), which assumes that households might create different mental accounts for current income (*Y*) from different sources and different categories of assets (*A*), we can include remittances (*R*) into the model. The categorization of the household wealth leads to the changes in the household budget constraint, out of which each household member (*t*) makes expenditure decisions (*C*):

$$C = \sum_{g=1}^{G} c_g \leq E_i \left[\sum_{k=1}^{K} \sum_{t=1}^{T} A_{kt} \right] + E_i \left[\sum_{j=1}^{J} \sum_{t=1}^{T} Y_{jt} \right] \tag{2}$$

Given that, the consumption or investment basket g can be expressed with respect to different types of income (including remittances) and assets:

$$c_g = c_g\left(Y_1, Y_2, R, \dots, Y_j;\ A_1, A_2, \dots, A_k\right) \tag{3}$$

Then, it is also true to assume that the temptation levels to spend on the certain goods and services, which can be obtained by partially differentiating (3) with wealth and expenditure values, differ across the categories of household wealth:

$$\frac{\partial c_g}{\partial Y_1} \neq \frac{\partial c_g}{\partial Y_1} \neq \frac{\partial c_g}{\partial Y_2} \neq \frac{\partial c_g}{\partial R} \neq \cdots \neq \frac{\partial c_g}{\partial A_k} \quad \textbf{(4)}$$

To sum up, the receipt of remittances is expected to change the behavior of households by modifying their consumption choices. It is not necessarily the case that the whole amount of remittances is allocated to one mental account. The theory rather predicts that at least a certain part of remittances is expected to create a new mental account for the purpose which maximize a long-term household well-being. As it appears, the theory assumes that households after receiving remittances end up with additional source of wealth which is later invested in productive areas through keeping (unconsciously or not) different financial accounts. However, there are situations when this assumption does not hold, for instance, in the case if specific conditional "mental tags" are assigned to remittances (Davies et al., 2009) or if households view additional financial increments as a transitory stream of income (Adams and Cuecuecha, 2010).

We can also state that households treating remittances differently and more importantly, using them efficiently are expected to experience subjective well-being changes since the cognitive operations at the first place are undertaken to improve their overall utility. However, an aggregated direction of the structural change is unclear because even if a household head as a "planner" applies a system of mental accounts, other household members who act as "doers" might still experience significant emotional losses because of current consumption sacrifices (Ivlevs et al., 2019). A question whether the anticipation of long-run improvements outweighs the short-run discomfort is a question that can be answered by empirical analysis.

3.2 Empirical specification

3.2.1 Matching using panel data without baseline data

Due to internal constraining caused by the system of mental accounts, the typical expenditure behavior and subsequently, the well-being of remittance-receiving households should differ from non-receiving cases. Yet, we cannot directly compare households

because the difference in characteristics of households with respect to their intention to migrate may itself be the reason for the divergence. In other words, we should to take the possibility of selection bias into account.

Though, the most proper way to abate the potential bias would be to apply IV methods, in practice it might be difficult to find instruments which will uncover exogenous variation in the variables associated with well-being of remittance-receiving households. In this case, according to the alternative strategy, a household remittance status can be viewed as a treatment variable. Then, the impact of remittances is determined with respect to a control group.

We start by distinguishing an outcome variable (Y) for a group of representative agents living together (i) with observed (β) and unobserved (u) characteristics based on the exposure to a treatment (δ):

$$\begin{Bmatrix} Y_{i0} = \beta_i + u_i \\ Y_{i1} = \beta_i + \delta_i + u_i \end{Bmatrix} \quad \textbf{(5)}$$

To analyze the impact of the treatment or, in other words, the receipt of remittances, we should measure the difference between the outcome variable (well-being indicator) for the same household with (i = 1) and without (i = 0) the treatment:

$$\Delta Y = \delta_i = Y_{i1} - Y_{i0} \quad \textbf{(6)}$$

As far as we are interested in the impact of the treatment on many households, we should consider average treatment effects and introduce a binary term to indicate the treatment status and define D_t = 1 as a treated unit in the period t. From the individaual case, we can derive average treatment effects on the treated (ATT) for the entire sample under consideration:

$$\overline{\Delta Y} = \bar{\delta} = E(Y_{i1}, D_{it} = 1) - E(Y_{i0}, D_{it} = 1) \quad \textbf{(7)}$$

It is not possible to estimate directly cross-sectional ATT from Equation (7) because we can observe households only in one state. If the sample is randomly selected, that is to say that the independence assumption is held, it would be possible to estimate ATT by comparing the average values of outcome variables of treated and untreated households:

$$\bar{\delta} = E(Y_{i1}, D_i = 1) - E(Y_{i0}, D_i = 0) \quad \textbf{(8)}$$

Since a decision to receive remittances is not random, we should derive a counterfactual state for treated households instead. One of the solutions is to impose the conditional mean assumption and create hypothetical outcome variables for the treated households as if the treatment is absent by matching observed outcome variables of treated and non-treated households (Rosenbaum and Rubin, 1983). In this case, we assume that realization of the outcome variable for untreated units is independent of the treatment state after conditioning on the basis of observable characteristics (*X*):

$$D_i \perp (Y_{i1}, Y_{i0}) \mid X_i \quad \textbf{(9)}$$

We can now replace the actual outcome variables of non-treated units by counterfactual outcome variables of the treated units in the absence of the treatment:

$$E(Y_{i0}|D_i = 0, X_i) = E(Y_{i0}|D_i = 1, X_i) \quad \textbf{(10)}$$

After the substituion, we can estimate Equation (7) and derive the respective ATT from observed data:

$$\bar{\delta} = E(Y_{i1}|X_i, D_i = 1) - E(Y_{i0}|X_i, D_i = 0) \quad \textbf{(11)}$$

Since the conventional matching strategies impose a strong assumption that all factors correlated with outcome and treatment variables can be observed, it is important to check whether this conditional mean assumption is actually held for the given data. One of the possible ways to test the sensitivity of the estimated results to a hidden bias is the Rosenbaum bounds method (Rosenbaum, 2002).

The procedure is performed in a following way. Firstly, we should express a treatment probability as a function of observed covariates (*X*) and unobserved component (*u*) at the household level:

$$P_i = F(\beta X_i + \gamma u_i) \quad \textbf{(12)}$$

In this case, we can now express the odds ratio of receiving the treatment in terms of observed and unobserved characteristics for the treated case *i* in relation to the control case *j*:

$$\frac{P_i/(1-P_i)}{P_j/(1-P_j)} = \frac{exp(\beta X_i + \gamma u_i)}{exp(\beta X_j + \gamma u_j)} \quad \textbf{(13)}$$

Since the treated and untreated units are matched with the same observed covariates, the odds ratio can be re-written in the reduced form:

$$\frac{P_i/(1-P_i)}{P_j/(1-P_j)} = exp[\gamma(u_i - u_j)] \quad \textbf{(14)}$$

The test is based on the observation that if the effect of the unobserved component is equal to 0 or if the unobserved component is not affected by the treatment status, the odds ratio should be equal to 1. Hence, the sensitivity analysis measures whether the treatment effects are altered for the different values of γ and $u_i - u_j$, within the following bounds:

$$\frac{1}{\Gamma} \leq \frac{P_i/(1-P_i)}{P_j/(1-P_j)} \leq \Gamma, \;\; \Gamma = exp(\gamma) \quad \textbf{(15)}$$

The previous application of PSM to the data from Tajikistan by Clément (2011) showed that treatment effects of remittances might actually be subject to the hidden heterogeneity. Since there is a possibility that unobserved factors also affect decisions of households in our sample, we should opt for "selection on unobservables" methods and add unobserved factors into the conditional mean assumption. One of the appropriate solutions is to combine DiD estimation with PSM. In this case, the joint estimator would minimize selection bias by eliminating time-invariant unobserved determinants of the treatment status. Principally, matched treated and control households would be differenced not only in the period *t* but also with respect to their values in the period *t-n*. To apply this estimator, a researcher needs baseline data with all observations being non-treated and follow-up data, in which some observations remain non-treated and others receive the treatment. In the absence of randomized experiments, it is usually impossible to obtain such data in the case of treatment in the form of migration.

However, as shown in Nguyen (2012) even with two-period longitudinal data after intervention (when both periods include treated and non-treated units), it is still possible to apply the combined estimator by imposing two additional conditions to the standard conditional mean assumption. The first one asserts that a difference of the conditional outcome in the no-intervention state between households who do not receive remittances and those who receive them only in the second period is constant. The second one asserts that a difference between the conditional outcome in the no-intervention state in the second

period and in the intervention state in the first period is identical for households who receive remittances in both periods and for those who receive them only in the first period.

To obtain the combined estimator of Nguyen (2012), we should start with a static-to-dynamic transformation of Equation (7):

$$\begin{aligned}\bar{\delta} = Pr(D_1 = 1|X, D_2 = 1)[E(Y_{1t2}|X, D_1 = 1, D_2 = 1)] - \\ - E(Y_{0t2}|X, D_1 = 1, D_2 = 1)] + \\ + Pr(D_1 = 0|X, D_2 = 1)[E(Y_{1t2}|X, D_1 = 0, D_2 = 1)] - \\ - E(Y_{0t2}|X, D_1 = 0, D_2 = 1)]\end{aligned} \quad \textbf{(16)}$$

Then, we should impose above-stated assumptions and rederive the longitudinal version of ATT for observable outcome variables as in Equation (11):

$$\begin{aligned}\bar{\delta} = Pr(D_1 = 1|X, D_2 = 1)\{[E(Y_{1t2}|X, D_1 = 1, D_2 = 1)] - E(Y_{0t2}|X, D_1 = 1, D_2 = 0)] - \\ - [E(Y_{1t1}|X, D_1 = 1, D_2 = 1)] - E(Y_{1t1}|X, D_1 = 1, D_2 = 0)]\} + \\ + Pr(D_1 = 0|X, D_2 = 1)\{[E(Y_{1t2}|X, D_1 = 0, D_2 = 1)] - E(Y_{0t2}|X, D_1 = 0, D_2 = 0)] - \\ - [E(Y_{0t1}|X, D_1 = 0, D_2 = 1)] - E(Y_{0t1}|X, D_1 = 0, D_2 = 0)]\}\end{aligned} \quad \textbf{(17)}$$

As it can be seen from Equation (17), to perform the comparison, we should match remittance-receiving households in both periods with households who receive them only in the first period [1]; and households receiving remittances only in the second period with households who do not receive remittances in any period [2].

To derive the counterfactual state for treated households, we impose the following common support assumptions:

$$\left.\begin{matrix}0 < P(D_2 = 1|X, D_1 = 1) < 1 \\ 0 < P(D_2 = 1|X, D_1 = 0) < 1\end{matrix}\right\} \quad \textbf{(18)}$$

This is to say that given the intervention status in the first period, there are non-treated households with similar characteristics to treated households in the second period. These observable and preferably pre-treatment characteristics of households are then recapitulated into the index function (propensity score), which can be approximated by the probability of being assigned into the intervention in the second period given *X* and D_1. The propensity scores can be calculated from binomial regressions in the sample with $D_1 = 0$ and $D_1 = 1$:

$$P(D) = F(H, C, R), \tag{19}$$

where *F*(.) can take form of logistic or normal distributions; while *H*, *C* and *R* represent set of covariates at household, community and regional levels.

Once propensity scores have been identified, each treated unit should be matched with its "nearest" untreated unit. Even though, there are many available matching algorithms (Caliendo and Kopeinig, 2008), Gaussian kernel matching might be considered as an optimal choice because of lower variability, reproduction of more precise estimates and exploitation of information from all units in the control group (Démurger and Wang, 2016). This type of matching also requires a fixed bandwidth parameter. The previous literature does not provide a formal procedure to determine the bandwidth value (Handa and Maluccio, 2016); the only solution is to assign weights ad hoc by applying several values and after that, to calculate individual weights based on the following formula:

$$W\ (i,j) = \frac{K\ \frac{P_i - P_j}{b}}{\sum_{j \in \{D=0\}} K\ \frac{P_i - P_j}{b}}, \tag{20}$$

where *K* is a Gaussian normal function, *b* is a bandwidth parameter, *Pi* and *Pj* are propensity scores of treated and comparison units derived from the Probability index function (19).

Then, we augment outcome variables with the derived weights from Equation (20) and difference the obtained values for the individual periods. At the final step, we aggregate the periodical differences and estimate the ATT for the whole time span.

3.2.2 Cross-sectional endogenous treatment-effects estimation

When we cannot rely on the longitudinal analysis, the standard PSM is not the only available option. There is another way to calculate the average treatment effects, which allows some degree of "selection on unobservables". This empirical model takes the endogenous treatment-effects form proposed by Cattaneo (2010). Firstly, we should split the sample to two subsamples: with and without the treatment (*j*). Equation (21) defines a potential binary or continuous outcome variable *y* for household *i* as a sum of its expected value conditional on a set of regressors and an unobserved component:

$$y_{ij} = E\left(y_{ij} \middle| x_i\right) + \epsilon_{ij}, \quad j \in \{0,1\} \tag{21}$$

In a similar way, the treatment variable is fit by a set of regressors z_i (such that $z_i = x_i$) and an unobserved random component (ϑ) through the Probit regression:

$$t_i = E(t_i|z_i) + \vartheta_i \quad \textbf{(22)}$$

Given the previous setup, the observed outcome can be expressed as follows:

$$y_i = t_i y_{i1} + (1 - t_i) y_{i0} \quad \textbf{(23)}$$

We cannot directly estimate Equation (23) due to endogenity which states that the unobservables in the outcome equations are correlated with the treatment status:

$$E(\epsilon_{ij}|t) \neq 0 \quad \textbf{(24)}$$

To obtain the consistent results, we redefine the outcome as a function of set of regressors (x) and the unobserved component from the treatment regression (ϑ). Then, we fit the outcome by the Linear regression if the variable is continuous or by the Probit estimator with the standard normal distribution (Φ) if the variable is binary:

$$\begin{Bmatrix} E(y_{ij}|x_i, \vartheta_i, t_i = j) = x_i'\beta_{1j} + \vartheta_i\beta_{2j} \\ E(y_{ij}|x_i, \vartheta_i, t_i = j) = \Phi(x_i'\beta_{1j} + \vartheta_i\beta_{2j}) \end{Bmatrix} \quad \textbf{(25)}$$

Based on the first- and second-stage regression results, we can compute the ATT and potential mean values for the outcome variable using the generalized method of moments with sample analogues of standard moment conditions.

3.2.3 Random-effects Probit and fixed-effects Logit models

Before calculating propensity scores, we are aimed to conduct a longitudinal binomial regression analysis to test whether initially selected household characteristics actually predict the household remittance status. Due to similarities of the research objectives, we follow Duval and Wolff (2010) and apply random-effects Probit and conditional fixed-effects Logit models. The reason to consider the panel data regressions is that we can address unobserved heterogeneity at the household level which will be eventually eliminated by the combined estimator of Nguyen (2012). The general form of the model can be expressed as:

$$R_{i,t} = \beta X_{i,t} + \delta_i + \varepsilon_{i,t}, \quad \textbf{(26)}$$

where R is a variable indicating whether a case i receives remittances or not in a year t, X is a vector of observed characteristics, δ are unobserved individual effects and ε – error term.

In the case if there is no correlation between the vector of household characteristics and unobserved household effects, the theoretical literature suggests that Model (26) is estimated more efficiently with the random effects Probit model using Gaussian quadrature techniques (Butler and Moffitt, 1982). The opposite scenario when the correlation is actually present and can be eliminated by differencing, the robust solution would be the fixed effects Logit model (Chamberlain, 1980).

3.3 Data description

The study employs the data obtained from the Tajikistan Living Standards Survey (TLSS) conducted under auspices of the World Bank in 2007 and in 2009, and the Tajikistan Household Panel Survey (THPS) implemented by the Institute for East- and Southeast European Studies in 2011. The representative data was collected from urban and rural areas of the country's each administrative region. Initially, 4860 households were randomly selected to participate in the survey connected with measuring the quality of life in Tajikistan (Gang et al., 2018). After 2 years, the survey organizers motivated by the same purpose, re-interviewed a random subsample of 1503 households within the 2007 TLSS (Danzer and Ivaschenko, 2010). In 2011, another large-scale questionnaire was distributed to 1503 households, most of them being from the TLSS, to investigate the migration patterns in Tajikistan (Danzer et al., 2013). With the available three-wave panel study, the overall effects of remittances are explored based on the data from the 2007 TLSS and the 2011 THPS, while the data from the 2009 TLSS is used for the examination of periodical changes in the impact of remittances.

Ideally, the analysis should be based on the random sample of 1503 households. There are several practical problems that reduce the actual number of households. Firstly, the information about only 1458 households was updated in 2011. In addition to the panel attrition, there are missing values on the variables related to household characteristics across the surveys. As a result, the sample without missing values and tracked over each wave of the survey comprises 1271 households. The number of households is comparable to the recent research in the similar settings by Gang et al. (2018), where the analysis was based on the balanced panel of 1257 households.

The study mainly concentrates on a single regressor, which is a binary variable indicating a receipt of remittances at the household level. We do not assign monetary values to the dependent variable to eliminate possibility of measurement errors since households might be reluctant to provide the correct information if remittance flows are received through unofficial channels (Koechlin and Leon, 2007). As in Clément (2011), the study adopts a broad definition of a remittance-receiving household, which is whether a household received cash or in-kind transfers by the donor from abroad during the last 12 months prior to the respective survey. The presented values in Table 1 suggest that from the total number of observations, 627 of cases were identified as being a remittance-receiving household. It should be noted that the survey probability to receive remittances is much higher in 2011 than in the previous years, whereas the difference in the number of remittance-receiving households between the years 2007 and 2009 is less significant.

Table 1. Distribution of sampled individuals by remittance status

	HH without remittances in 2007	HH with remittances in 2007	Total
HH without remittances in 2009	990	133	1123
HH with remittances in 2009	103	45	148
HH without remittances in 2011	877	93	970
HH with remittances in 2011	216	85	301
Total	1093	178	1271

Source: TLSS (2007), TLSS (2009) and THPS (2011)

Before proceeding to the subjective well-being measures, it is important to test initially the existence of internal constraining by analysing changes in household expenditure patterns. The similar approach can be found in previous empirical studies (Adams and Cuecuecha, 2010; Clément, 2011; Démurger and Wang, 2016). Specifically, we start with a construction of monthly consumption aggregates for each household in the sample. To account for the regional and rural/urban differences, the nominal aggregates are then adjusted by the strata level regional price deflator and the normalized food price index. Only food prices are considered because the data points of non-food expenditures are not enough to obtain proper price indices. After that, the deflated total household expenditures

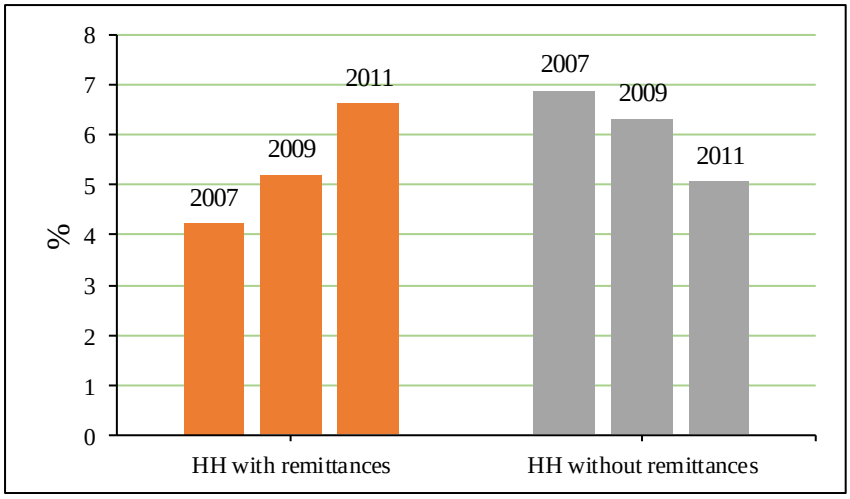
are disaggregated to several large expenditure baskets. From these expenditure categories, we select food and non-food consumer expenses to represent consumption basket and education – productive investment. As a last step, we create the ratio variable of education expenses as the percentage of two consumption baskets:

$$Relative\_investment = \frac{Education}{Food\ +\ Nonfood} \quad (27)$$

One of the reasons to consider aggregated baskets instead of individual expenditure items is to avoid possibility of estimation issues due to "zero consumption problem", when the values of expenditures are censored from below at or around 0 (McCracken and Brandt, 1987; Parpiev and Yusupov, 2011). The particular attention is drawn to education due to lower incidence of investment spending rather than purchase of consumption. Therefore, we consider all education related expenses from pre-school to higher education, as well as all expenses related to non-academic education activities.

Based on the values of the newly created variable, we can conclude that the average relative budget share for education increased slightly from 5.55% to 5.83% between 2007 and 2011. The conclusions are different when we consider households with and without remittances separately (Figure 4). The variable experienced a notable growth for households with a positive treatment status; whereas, the trend was negative for households without remittances. By 2009, the average relative budget shares had progressed in a similar way as from 2007 to 2011, with the aggregated value of the variable for the year being 5.75%.

Figure 4. Distribution of sampled individuals by relative education expenditures

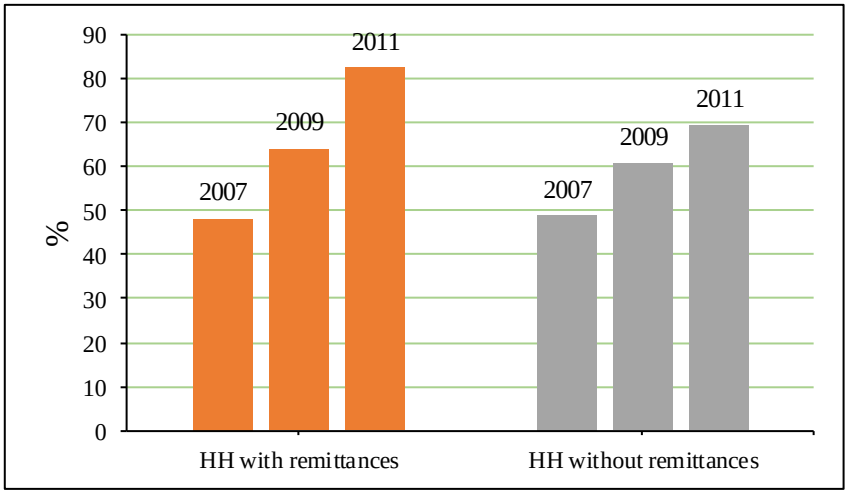


Source: TLSS (2007), TLSS (2009) and THPS (2011)

The observed budget shares in the range of 4-7 percentage points are comparable with the previous results from Ghana (Adams and Cuecuecha, 2010), Guatemala (Adams and Cuecuecha, 2013), and Tajikistan (Clément, 2011). Even though, the average budget shares are higher than 0, several households in the selected sample did not provide the data on education expenditures for the reporting period. Since it was shown that PSM techniques can be used to infer the correct distribution of consumption choices (Bardsley et al., 2017), reported 0 values should not distort the results as far as counterfactual states are appropriately created.

For the outcome variables, we consider the survey answers of the most informed household member on behalf of the whole household to the two following Likert scale questions: (1) Overall how satisfied are you with your life? and (2) How satisfied are you with your current financial situation? Although, the wording of questions remained the same across surveys, the division of answers into categories was changed between the waves of the survey. With the aim of enabling a comparison between periods, we therefore, constructed binary variables. The value of 1 is assigned for the cases when a household reports a certain level of positive satisfaction and the value of 0 is attributed for the cases in which a household explicitly expresses dissatisfaction. Figure 5 illustrates the changes in household satisfaction with overall life conditions over four years, while Figure 6 shows the evolution of household satisfaction with current financial situation.

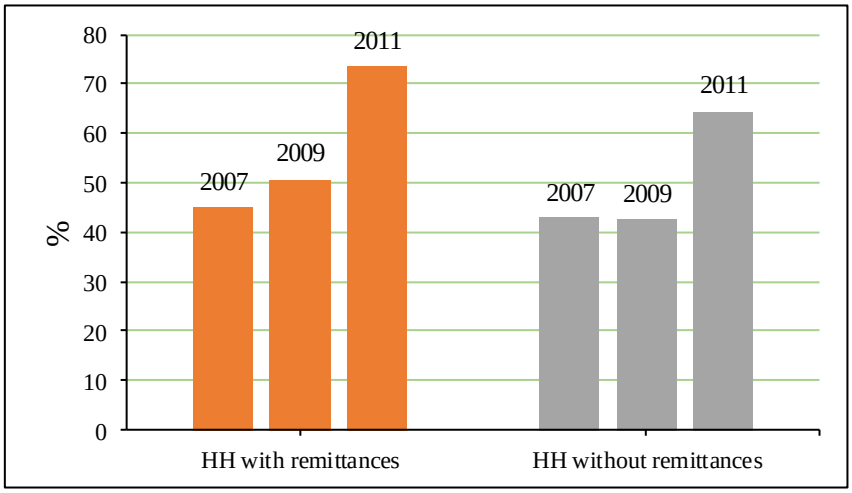
Figure 5. Distribution of sampled individuals by satisfaction with life as-a-whole



Source: TLSS (2007), TLSS (2009) and THPS (2011)

Based on the first graph, we can assume that subjective well-being measures had experienced a notable growth during the period under observation. The average share of households overall satisfied with their lives increased from 49% to 63% and then to 76%. The changes in the average share of households with current financial situation were less prominent, with 44%, 47% and 69% in 2007, 2009 and 2011 respectively. In addition to the changes induced by the time, the indicators also diverge with respect to the remittance status. When the subjective well-being measures are disaggregated, in all periods, the remittance-receiving households were more satisfied with life as-a-whole as well as with current financial situation than households who did not receive remittances.

Figure 6. Distribution of sampled individuals by satisfaction with current financial situation

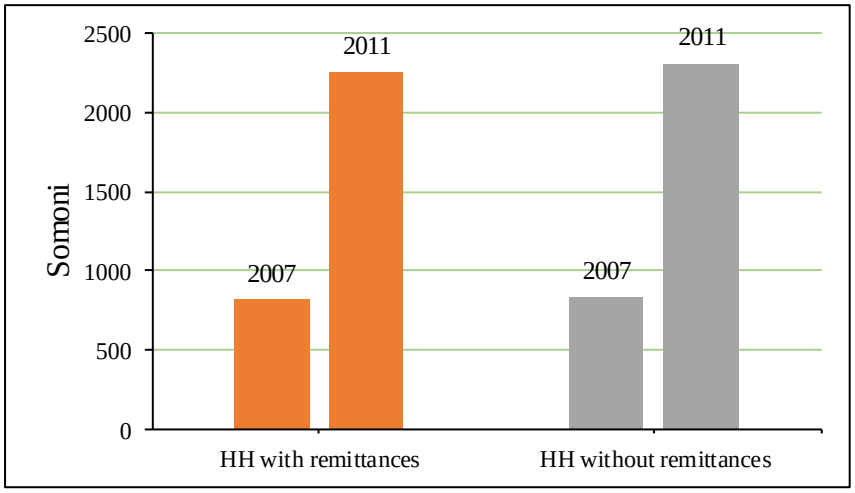


Source: TLSS (2007), TLSS (2009) and THPS (2011)

Since financial satisfaction might be different from financial deprivation, especially for poor households, we consider one more subjective well-being indicator as a complementary outcome variable. We create a quantitative, continuous variable based on the survey answers to the open-ended question about the minimum monthly income which is necessary for a particular household to sustain a livelihood. It is only possible to recreate the comparable variables for the 2007 TLSS and the 2011 THPS because in 2009 the question was restricted to the absolute minimum amount of funds. Figure 7 illustrates the average values of the minimum monthly income for two types of households. In both periods, households without remittances reported that they need relatively more funds in their current circumstances than households receiving remittances. Despite almost 3 times increase in the minimum level of monthly income to sustain the livelihood for the average Tajik household, it does not necessarily mean that the general living conditions also had

improved significantly over this time. The reason for this is that the country experienced relatively high inflation rates with per capita poverty line increasing from 139 Somoni in 2007 to 214 Somoni in 2011 (Gang et al., 2018).

Figure 7. Distribution of sampled individuals by minimum available household income



Source: TLSS (2007) and THPS (2011)

The aspect of the empirical specification related to matching requires selection of covariates. To avoid the possibility of endogeneity, these variables should simultaneously affect the treatment and outcome variables; and should not be systematically influenced by the treatment status (Démurger and Wang, 2016). Mostly, individual and regional household characteristics satisfy these requirements and are proposed by the literature on the typical behavior of migrants (Massey et al., 1993). Moreover, it is generally recommended to exclude the information about household head due to possibility of endogeneity, while the effect of migration network should be included since social ties tend to direct potential migrants providing them instructions on the ways of possible migration destinations (Démurger and Wang, 2016). This study considers a community level measure of migration network, which is a proportion of households with migrants within a primary sampling unit (Justino and Shemyakina, 2012).

Table A1, which can be found in Appendix, presents a summary of household data selected to be used for the calculation of propensity scores. Overall, characteristics of households are comparable across the surveys with expected time-induced changes. The average household size evolved from 6.46 to 6.41 people with a slight upsurge to 6.8 in 2009. As for the household composition, the share of children and the share of adults

increased, while the share of teenagers decreased and the share of elderly stayed almost at the same percentage. The household educational level experienced a growth based on the increase in average years of schooling and number of people with higher education. It is important to note that there was a notable increase in the relative size of the existing migration network in 2009, which can explain the previously mentioned increase in the number of remittance-receiving households in 2011. After the increase from 24% to 33%, the relative weight of households with migrants stabilized at 28% in 2011. In relation to the areal distribution, nearly twice as many households were residing in rural area than in urban agglomeration. There were no considerable changes with respect to the aggregate regional distribution of households, which might imply a temporary nature of labor emigration from Tajikistan with no changes in the permanent residence of main household units.

4 RESULTS

4.1 Examining the determinants of remittances

In the first stage of the analysis, we present the estimation of Longitudinal binary model (26). The analysis is based on two different approaches with the aim of improving the estimation efficiency. In the case of the random effects Probit model, the full sample is considered, which comprises 3813 observations. For the fixed effects Logit model, the sample is constrained to households who have positive treatment status for at least one wave of the survey but not over all periods under consideration. The fixed effects identification also requires to disregard time invariant household characteristics. The restricted version of the sample comprises 1302 observations. In addition to the data changes, a constant term also is not included to the fixed effects Logit model.

The summary of regressions is presented in Table A2. The log likelihoods of the estimations are relatively high for the respective degrees of freedom, indicating a strong explanatory power of the chosen covariates. The estimations can also be considered to be consistent since statistically significant covariates have comparable magnitudes and the direction of changes in the probability to receive remittances caused by regressors is the same across regressions.

When the individual results are considered, the probability of the remittance receipt is a decreasing function of number of persons living in the household, which may call into question altruistic motives of migrants. The probability to receive remittances with respect to the reference category of household composition is higher for households with the larger share of children under the age of 6 and lower for households with the larger share of adults and elderly. The choice of the reference cluster, which is the share of children between ages of 6 and 15, is purely arbitrary. Similarly, the administrative region of Khatlon is omitted from the analysis of regional differences. The difference between probabilities of the remittance receipt when compared to the reference region is positive and significant for DRS and GBAR, and not statistically significant for Dushanbe and Sughd. The regressions also indicate that international transfers are less likely to be received by households living in an urban area. This result might possibly imply a lack of opportunities in the rural locations of Tajikistan which forces more households to consider emigration.

Even though, the majority of Tajik migrants are males (Danzer et al., 2013), the probability of receiving remittances is increasing with the higher share of female adults. Another significant determinant of remittances is the household education level, which negatively affects remittance prospects. It is unclear whether more educated households are less likely to supply new migrants or the decision to remit is inversely correlated with education (casting additional doubts that remittances are received by less affluent households). Finally, the previously stated assumption that there is a direct and positive link between migration networks and subsequent receipt of remittances is supported by regressions. Households residing in the sampling units with high share of migrants are more likely to receive remittances.

4.2 Investigating the aggregate effects of remittances

For the baseline analysis, we aim to determine the overall impact of remittances. In this regard, we only consider the data retrieved from the first and third waves of the sample and compute the ATT for the well-being indicators which progress up to 2011.

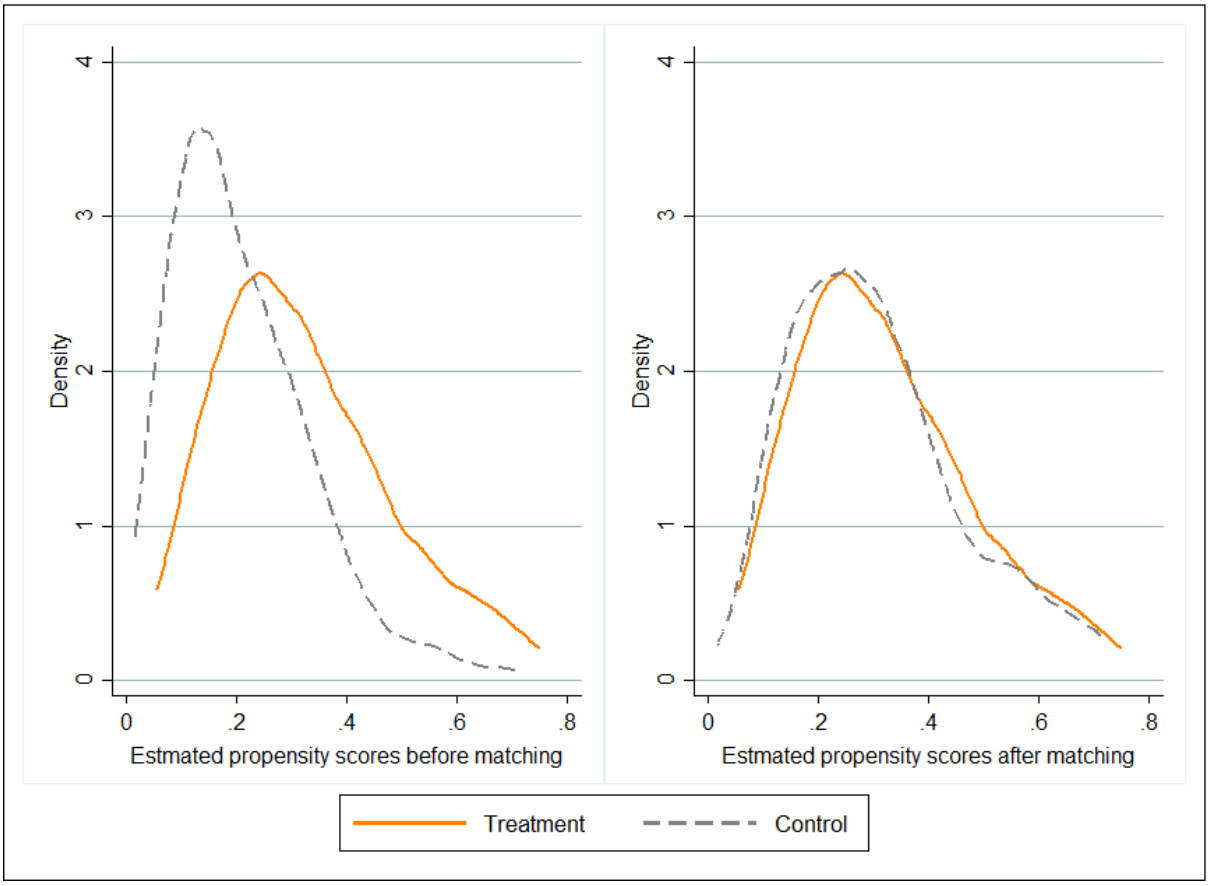
4.2.1 Propensity scores

Individual propensity scores required for the matching are estimated using results of two Logit regressions. The overall number of households is assigned to the first (178) and second (1093) matching group based on the remittance status in the first period. The results of the propensity score estimations are reported in Table A3. The values of pseudo R^2 are comparable with the previous literature (Bertoli and Marchetta, 2014; Démurger and Wang, 2016) and can signalize about proper explanatory power of the Logit regressions. More specifically, the percentage of well-predicted cases, the McFadden R^2s and the Nagelkerke pseudo R^2s are above the satisfactory level of 70%, 10% and 15% respectively (Clément, 2011). The overall effects of covariates are more significant for Regression [1] due to the restricted nature of the data used for this estimation.

Based on the graphical representation of selected covariates before and after matching (Figure 8), we can assume that derived weights from propensity scores are indeed appropriate and yield a large overlap in the distributions. The distribution of observable

household characteristics before matching is highly dispersed, but after assignment of the probabilities, covariates are rather homogeneous and follow a similar trajectory.

Figure 8. Distribution of propensity scores before and after matching



Source: Author's own calculations based on TLSS (2007) and THPS (2011)

Significant reduction of disparities between the mean and median of the treated and control groups (it is assumed that the remaining part of the standardized bias is eliminated by differencing) along with a decline in the explanatory power of the observed household characteristics to predict the remittance status after matching (Table 2) also authenticate that propensity scores are robust. Therefore, we can assume that consistent weights can be derived from the implemented Logit regressions.

Table 2. Summary of balancing checks

Samples	$p>Chi^2$	Mean bias	Median bias
Unmatched	0	21	16
Matched	0.995	3.5	3.2

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

Regarding the individual determinants of the probability to receive remittances for the selected observations, as expected from the longitudinal dynamics, an increase in the size of the migration network would affect positively the probability of the remittance receipt. The percentage of female adult household members can be referred as another significant positive determinant, while the number of household members with tertiary education is negatively associated with the probability of receiving remittances. The impact of household composition is negative with respect to the reference category (share of children under the age of 6) for statistically significant variables. In a similar fashion, the analysis of regional differences with respect to the prefecture of GBAR indicate that households from other regions are less likely to receive remittances. Several variables turned out to be insignificant or significant only in one of the regressions, which can be explained by the sampling variation. Overall, conclusions from propensity score estimations are similar to those from the panel analysis.

4.2.2 Mental accounting hypothesis

Table 3 shows the baseline estimations which test the changes in the consumption-investment behavior of remittance-receiving households for the whole period under consideration. The reported results are derived at the bandwidth parameter of 0.06, which can be considered as the default value for the matching (Handa and Maluccio, 2016). As a robustness check, we verified that the analogous conclusions were obtained from both smaller and larger bandwidth values. To enable the comparison, the same bandwidth parameter is considered for the subsequent cases when the combined estimator is applied.

As it can be seen, the difference between conditional average consumption choices for remittance-receiving households is statistically meaningful, which might suggest about the existence of a structural change created by the receipt of remittances (Table 3). As for direction of the relationship, the overall change in the share of expenditures for education purposes within aggregated consumer baskets, expressed by the combined estimator, constitutes roughly to 2.4% increase at the mean. It should be noted that the individual average values cannot be directly interpreted because they are scaled down to obtain the combined estimator. When the monthly expenditures are annualized, the percentage is more illustrious and can be approximated at 30% difference.

Table 3. Aggregate effects of remittances on relative education expenditures

Terms	Estimates
ATT_0	0.007 (0.74)
ATT_1	0.017 (2.57)**
Combined estimator	0.024 (2.15)**

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

4.2.3 Remittances and subjective well-being

Given the changes in consumption choices, we are now able to concentrate on subjective well-being measures. We are aiming to analyze whether remittance-receiving households are able to experience directly the implications of their remittance status and subsequent changes in consumption choices. The estimations for overall household life satisfaction (Table 4) are statistically significant at 99% of confidence level, highlighting a positive change in the average well-being of remittance-receiving households between the years 2007 and 2011. The impact of remittances is persistent and can be expressed by 12.2% difference between a representative remittance-receiving household over a non-receiving case.

The possibility of incorrect estimation of the ATT is at minimum because all procedures are based on appropriately matched and differenced data. Albeit, to verify the validity and consistency of the inference, we re-estimate the standard errors for the estimation procedures using bootstrapped technique with 500 replications. In this case, the confidence intervals are calculated by different random combinations of the estimates. Even though, the statistical significance of the estimator has decreased slightly, it is still sufficient to conclude that the effects of remittances are present. As an additional robustness check of autocorrelation and heteroscedasticity, we recalculate the estimates with robust standard errors. The inference based on the adjusted t-statistics is similar to the previous cases. After several estimations, we can assume that the impact of remittances on overall life satisfaction is positive and robust with respect to potential statistical issues.

Table 4. Aggregate effects of remittances on overall life satisfaction

Terms	Estimates	Estimates with bootstrapped standard errors	Estimates with robust standard errors
ATT_0	0.014 (0.48)		
ATT_1	0.108 (4.79)***		
Combined estimator	0.122 (3.3)***	0.122 (2.15)***	0.122 (2.32)**

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

The different scenario is observed for the second outcome variable (Table 5). In the absence of the additional source of wealth, remittance-receiving families, on average, have approximately 4% higher probability to be satisfied with current financial situation. The statistical significance of the difference between satisfaction with current financial situation of households receiving remittances when compared to the hypothetical state they would have without the receipt of remittances is less prominent; and therefore, the combined estimator is no more statistically significant. In a similar fashion to overall life satisfaction, in the second and third columns, we present t-statistics based on the bootstrapped and robust standard errors respectively. Despite the changes in the estimation method, the updated inference results imply the similar conclusions of the absence of statistically significant change induced by remittances on satisfaction with current financial situation.

Table 5. Aggregate effects of remittances on satisfaction with current financial situation

Terms	Estimates	Estimates with bootstrapped standard errors	Estimates with robust standard errors
ATT_0	-0.036 (1.18)		
ATT_1	0.08 (3.38)***		
Combined estimator	0.044 (1.12)	0.044 (0.77)	0.044 (0.81)

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

4.3 Testing the heterogeneous effects of remittances

In addition to remittances, several exogenous factors might affect well-being patterns of households. In the case of satisfaction with current financial situation, a household wealth might be an important factor (Démurger and Wang, 2016). Although, all external variables might be relevant for overall life satisfaction, socioeconomic opportunities available for households might not be the same in different parts of the country (Robinson and Guenther, 2007). For the sake of investigating the difference in the effect of remittances and testing the treatment effects heterogeneity, we should adjust the sample to different contexts. The sample is readjusted according to the position of a household in the overall consumption distribution of the first period (the initial distribution is considered to minimize the potential correlation between the changes in household characteristics and the receipt of remittances) and the regional distribution of a household unit in each period (updated household location is considered due to the absence of significant rural/urban household movements).

4.3.1 Regional decomposition

The effects of remittances are positive in both urban and rural settings in the case of overall household life satisfaction (Table 6), but the statistical significance of the combined estimators for the rural and urban areas is noticeably lower in comparison to the case when the whole sample is considered. The decrease of statistical significance can be explained by the decrease in the exogenous variation between variables caused by the sample splitting. Separate calculations also demonstrate that households receiving remittances in rural settings are likely to be more satisfied with life as-a-whole rather than urban households. Conversely, the impact of remittances on satisfaction with current financial satisfaction is still statistically insignificant for both urban and rural settings.

Table 6. Heterogeneous effects of remittances in terms of area of residence

Combined estimator by area	**Overall life satisfaction**	**Satisfaction with current financial situation**
Urban	0.118 (1.72)*	0.057 (0.8)
Rural	0.129 (2.92)***	0.044 (0.94)

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

4.3.2 Quantile estimation

Table 7 provides additional insights into the impact of remittances on subjective well-being measures across quintiles of initial household consumption. In the case of overall life satisfaction, the change caused by the receipt of remittances is positive for all quintiles; but the values of the combined estimator are significantly different from 0 only for the first and fourth quantiles.

In contrast, the impact of remittances is not unidirectional in terms of satisfaction with current financial situation. The results suggest that remittances tend to improve current financial satisfaction of households in the first quantile. At the same time, the effect of remittances is negative for the fourth quintile. Similarity in the statistical significance and magnitude of two estimators might explain the statistical insignificance of the baseline estimations. It might be the case that the two effects cancel each other when considered together.

Based on the quintile level changes in subjective well-being measures, we can hypothesize that the impact of remittances varies across quintiles of pre-transfer household income and most importantly, the positive change in overall life satisfaction does not necessarily reflect improved current financial satisfaction.

Table 7. Heterogeneous effects of remittances by consumption quintiles

Combined estimator by quintiles	**Overall life satisfaction**	**Satisfaction with current financial situation**
First	0.145 (1.68)*	0.211 (2.42)**
Second	0.138 (1.51)	0.037 (0.39)
Third	0.083 (0.92)	0.142 (1.58)
Fourth	0.145 (1.75)*	-0.199 (2.23)**
Fifth	0.107 (1.5)	0.056 (0.76)

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

4.4 Scrutinizing the impact of remittances on consumption poverty

Since the poorest remittance-receiving households were shown to be more satisfied with current financial situation compared to what they would actually experience without remittances, it is important to test whether remittances also increase the amount of expenditures these households can afford. As shown in the first column of Table 8, there is a statistically significant difference in the average value of minimum household income available for remittance-receiving and non-receiving households from the first quintile. The combined estimator here highlights the pro-poor effects of remittances. Once households are properly matched, the difference between the treated and control groups is approximately equal to twice of the per capita expenditure-based poverty level in 2011. For the illustrative purposes, the second column of Table 8 summarizes the results from DiD matching for all households. In this case, the positive impact of remittances narrows to 182 Somoni. This result also emphasizes the positive role of remittances in reducing poverty in Tajikistan since the necessity to increase the current level of spending is less vital when households from all quintiles are considered.

Table 8. Heterogeneous and aggregate effects of remittances on consumption poverty

Terms	Estimates for 1st quintile	Estimates for whole sample
ATT_0	279.552 (1.52)	5.297 (0.07)
ATT_1	182.462 (1.39)	176.956 (3.09)***
Combined estimator	462.014 (2.04)**	182.253 (1.94)*

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

4.5 Exploring the interim effects of remittances

Firstly, we change the baseline and follow-up data with the aim of analyzing whether the effect of remittances is subject to well-being fluctuations related to time and present only for the particular periods. More specifically, we add the information from the TLSS study conducted in 2009 and calculate the combined estimator for two-year data from 2007 to 2009 and from 2009 to 2011. Secondly, we restrict the period of analysis to one year and re-estimate the baseline regressions with the help of cross-sectional techniques.

4.5.1 Two-year data

As in the baseline estimations, we employ the combination of PSM and DiD for two-year estimations. Using the propensity scores from additional Logit regressions (Table A4), we obtain the interim probabilities of receiving remittances for generating weights with the help of Gaussian kernel matching. These weights are then reassigned to well-being measures and new combined estimators are finally calculated. Additional propensity scores are very similar to the baseline results in terms of validity and consistency with the McFadden's Pseudo R^2s being in the range between 10% and 18%. Moreover, the magnitudes and signs of covariates are comparable with the baseline estimations.

The two-year DiD matching estimation results are reported in Table 9. The statistical insignificance of the estimates in the first raw of the table indicates that the effects of remittances are not present for the period between 2007 and 2009. The ATT estimates in the second raw of the table tend to support the baseline results. Particularly, the combined estimator for the relative investment from 2009 to 2011 is very similar to the one which is derived for the period between 2007 and 2011 in terms of magnitude and statistical significance. This result suggests that if there is a change in the relative investment spending due to the receipt of remittances, it remains relatively constant over time. Even though, the impact of remittances on overall life satisfaction in the 2009-2011 period is also comparable with baseline results in terms of the direction of changes, the combined estimator of 7% is considerably lower than the ATT for the 2007-2011 period and only statistically significant within 90% confidence interval. The difference in the magnitudes signalizes that effects of remittances might depend positively on how long households are exposed to remittances. Lastly, the impact of remittances on satisfaction with current financial situation is not statistically significant for any two-year regressions.

Table 9. Two-year effects of remittances

Combined estimator by periods	**Relative investment**	**Overall life satisfaction**	**Satisfaction with current financial situation**
2007-2009	0.002 (0.26)	0.053 (1.34)	0.038 (0.95)
2009-2011	0.023 (2.3)**	0.069 (1.84)*	0.004 (0.1)

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

4.5.2 Cross-sectional perspective

For the one-period data, we initially estimate the cross-sectional ATT of remittances based on PSM. In this case, propensity scores for each wave of the survey are obtained with the help of three one-year Logit regressions (Table A5). Then, these propensity scores are transformed to adjustment weights through kernel density function with the bandwidth parameter of 0.06. The counterfactual state for the remittance-receiving households is assumed to be appropriately created if we consider the values of McFadden's Pseudo R^2, with the lowest one being higher than 10%. It is also important to mention that cross-sectional determinants of the remittance receipt do not contradict the previous regressions.

The ATT for relative investment share are reported in Table 10. The difference between the treated and control groups is statistically significant only for the 2011 THPS. Over this year, remittances tend to increase the share of the household budget devoted to investment compared to consumption expenses. The one-period difference of 1.7% is less distinguished (in terms of magnitude and statistical significance) than the difference based on the combined estimator from 2007-2011 and 2009-2011 periods. The separate results for the first and second waves of the survey indicate indeterminacy in the way households spend remittances due to statistical insignificance of the estimates.

Table 10. One-period effects of remittances on relative education expenditures

Terms	**Estimates for 2007**	**Estimates for 2009**	**Estimates for 2011**
Control-mean	0.048	0.056	0.049
Treated-mean	0.042	0.052	0.066
ATT	-0.006 (0.42)	-0.004 (0.48)	0.017 (1.85)*

Note: t-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

We apply the previously described sensitivity analysis to test the obtained estimates for the presence of hidden bias (Rosenbaum, 2002). The results of the analysis for statistically significant ATT based on the 2011 THPS are presented in Table 11. When Γ is equal to 1, the effect of unobserved component is negligible ($\gamma = 0$). And, if we select the higher values of Γ, we also increase the influence of unobserved characteristics. According to the rule of thumb proposed by Duvendack and Palmer-Jones (2012), there is a high

probability that unobserved heterogeneity is affecting the treatment selection if a confidence interval for the values of $\Gamma < 2$ includes 0. Since confidence intervals in our case include 0 starting from the value of $\Gamma = 1.3$, we reject the hypothesis of no hidden bias and conclude that the previously estimated ATT for household consumption choices also include the impact of unobserved household characteristics. Therefore, the application of the combined estimator of Nguyen (2012) for the baseline estimations was justified.

Table 11. Rosenbaum bounds sensitivity analysis

Γ	**Hodges-Lehmann point estimates**		**95% confidence intervals**	
	Min	**Max**	**Min**	**Max**
1	-0.012	-0.012	-0.019	-0.006
1.1	-0.015	-0.01	-0.021	-0.004
1.2	-0.017	-0.008	-0.023	-0.002
1.3	-0.019	-0.006	-0.025	0.001
1.4	-0.021	-0.004	-0.026	0.003
1.5	-0.022	-0.003	-0.028	0.006

Source: Author's own calculations based on THPS (2011)

As we cannot rely on longitudinal data, we recalculate the average treatment effects with the alternative cross-sectional method of Cattaneo (2010). The final results of the calculations are presented in Table 12, while the interim calculations can be found in Appendices. When the unobservable heterogeneity is considered explicitly, the impact of remittances is no longer statistically significant in any disaggregated period. The difference in the relative investment budget share even becomes negative for the year 2011.

Table 12. Re-estimated one-period effects of remittances on relative education expenditures

Term	**Estimate for 2007**	**Estimate for 2009**	**Estimate for 2011**
ATT	0.285 (1.42)	0.173 (1.62)	-0.157 (1.58)

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Taking into consideration the hidden bias, we do not apply PSM for the main outcome variables and opt for the alternative method only. Similar to the education expenditures, the full regression procedures are reported in the Appendix section. The final results of the cross-sectional endogenous treatment-effects estimation for satisfaction with

life as-a-whole are presented in the first column of Table 13. As expected from the relatively insignificant changes in household expenditure patterns, the effects of remittances are not discernable with cross-sectional data. The potential-outcome mean (POM) values are only statistically significant for the year 2009. The value of 92.5% quantifies the average probability to be satisfied with life as-a-whole in the population of households who receive remittances if actually, none of them received remittances. The sign of the ATT for this year is negative; though, the estimate is not statistically significant.

Table 13. One-period effects of remittances on overall life satisfaction and satisfaction with current financial situation

Terms	**Estimates for overall life satisfaction**	**Estimates for satisfaction with current financial situation**
2007 POM	0.481 (1.13)	0.27 (0.79)
2007 ATT	0.001 (0.003)	0.18 (0.52)
2009 POM	0.925 (5.05)***	0.952 (7.02)***
2009 ATT	-0.281 (1.51)	-0.445 (3.13)***
2011 POM	0.441 (0.66)	0.95 (5.74)***
2011 ATT	0.382 (0.57)	-0.219 (1.3)

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Alternatively, the ATT based on the cross-sectional endogenous treatment-effects model of Cattaneo (2010) for household satisfaction with current financial situation (second column of Table 13) suggest a slightly different logic. The effects of remittances are still not present for the years 2007 and 2011. In the year 2009, however, the average probability to be satisfied with current financial situation for the households who receive remittances is less by 45% than in the situation if none of these households receive remittances. As for the POM, the values of which are statistically significant for the years 2009 and 2011, when there are no households receiving remittances, the average probability to be satisfied with current financial situation for these households would be 95%.

5 DISCUSSION OF FINDINGS

Our empirical findings suggest that international remittances might cause a structural change in the behavior of households and their expenditure choices might differ considerably when compared to the hypothetical scenario without remittances. Since we could observe the differences in the average conditional budget shares rather than actual amounts, it can be concluded that in the case of Tajikistan, households treat remittances in the different way in comparison to other sources of household wealth. The statistically significant change in expenditure patterns is due to the perception of remittances by household members left behind. In contrast to the studies of Adams and Cuecuecha (2010) and Adams and Cuecuecha (2013), our results do not confirm that households treat remittances responsibly only because they consider the funds to be provisional and indeterminate stream of wealth. This theoretical explanation is particularly in contradiction with our results which indicate that consumption-investment changes for remittance-receiving households might occur over relatively short as well as long periods. Alternatively, similar to Thaler (1999), we suggest that the behavioral changes are expression of either unconscious or conscious decision-making process undertaken to maximize overall household utility. However, we should be careful to interpret the results directly in terms of the behavioral life-cycle hypothesis as in Davies et al. (2009) because we did not compare marginal propensity to consume out of different income categories.

As for the utilization of migrant transfers, the findings imply their positive role in consumption poverty reduction and human capital formation. The former result is in line with the hypothesis that remittances can reduce poverty in Tajikistan (Betti and Lundgren, 2012; Gang et al., 2018). The latter result is in contradiction with the previous treatment-effects study based on the data from Tajikistan, where no statistically significant impact of remittances on education expenditures was reported by Clément (2011). The divergence can be explained by the choice of the matching estimator or time periods under consideration. Contrarywise, we can relate our results to the study of Meier (2014), where it was identified that Tajik households who receive remittances over time allocate higher budget shares to household investments at the expense of decreased consumption expenditures.

The average increase in the education expenditures is especially important from the standpoint of development. Generally, it is assumed that migration can cause the process of

brain drain when there is a noteworthy erosion of human resources in migrant-sending regions (Gyimah-Brempong and Asiedu, 2015). As far as remittances are motivating households left behind to increase investments in education, the migrant transfers may compensate to certain extent the country's losses related to one of the main factors of production. In addition to the effects of remittances, we should mention that the increase in the relative investment budget share may be partially due to policies implemented by the government of Tajikistan. Particularly, we are referring to the law introduced in 2008, which prohibits and monitors excessive wedding celebrations (Danzer et al., 2013). The regulation potentially decreased wedding-based migration and more importantly, eliminated one of the inefficient household non-food consumption categories. Nevertheless, it is important to note that the quantified impact of remittances was more pronounced than observed average changes in household expenditures induced by the endogenous and exogenous factors.

When the main research objectives are considered, we can trace the consumption changes to the improved overall life satisfaction. We were able to link household consumption and subjective well-being because sampled households experience positive shifts in the overall well-being only in the periods when the share of household investment expenditures relative to consumption goods increases. And unlike previous studies, the well-being changes are not only associated with the financial boost from remittances (Ivlevs et al., 2019). As it was shown, rich and poor households experience the very similar overall well-being improvements, indicating the importance of the attitude towards remittances and how the additional resources are utilized.

We can also explain the multidirectional effects (positive for poor households and negative for rich households) of remittances on satisfaction with current financial situation with the help of mental framing. Since poor households do not have too many consumption choices, anticipation of the improved household utility might not be affected considerably by distress from self-discipline and restraining. At the same time, the results demonstrate that remittances lift poor households out of consumption poverty. The absence of financial distress and positive poverty effects might explain that poor households after receiving remittances experience improved satisfaction with current financial situation. On the other hand, there is a noticeable sacrifice of the current consumption for rich remittance-receiving households. Moreover, as suggested by Di Tella and MacCulloch (2008), economic agents might be emotionally indifferent to further economic improvements after reaching a certain

income threshold. Hence, reduced current consumption could determine the observed financial dissatisfaction among remittance-receiving households from the top income quintiles.

The differences in the well-being patterns between rural and urban households do not also contradict the applied theoretical framework. It is well-documented that Tajik rural households encounter extra costs to receive international remittances due to limited access to transport infrastructures and financial intermediaries (Clément, 2011). At the same time, according to Robinson and Guenther (2007), households from rural areas of Tajikistan are more prone to natural hazards and engage in migration to diversify their current income. Given the constraints of living in rural areas, therefore, it is more likely that rural households treat remittances more responsibly. The proposition about attitude of rural households is supported by the results that their overall well-being after receiving remittances is notably higher than the overall well-being of households from urban areas.

Lastly, our findings provide an empirical support for the theoretical hypothesis that more than one year is required for the impact of international migration to transform from short-term consumption improvements to longer-term socioeconomic amendments (Lu, 2013). This is particularly true when there is an external crisis in the short run. To be more specific, the impact of remittances is not statistically significant for any cross-sectional regressions, except for the negative impact on current financial satisfaction in 2009, at the peak of the global financial crisis. This result highlights that migrant-sending households bear the burden of external economic shocks not only through decreasing income (Danzer and Ivaschenko, 2010) and increasing vulnerability to poverty (Gang et al., 2018) but also by suffering from subjective well-being losses.

We can relate the results of the current project not only to previous studies but also to potential further studies which may attempt to extend the scope of the examination or analyze the impact of remittances on a wider range of socioeconomic measures of well-being. Future studies can also consider other mechanisms by which labor migration might affect subjective well-being of household members left behind in addition to expenditure behavior changes. On the contrary, more sophisticated comparative examination can be executed by analyzing marginal spending patterns of households to account for a possible heterogeneity of the consumption choices. A research based on a larger number of

household transactions that possibly affect cognitive processes (for example, informal debts or savings) might also explain more accurately the changes in the household behavior after exposure to remittances.

New aspects of migration might also be possible to explore with improved data. In this study, the variable indicating a remittance status was based on the information about external transfers because the available surveys only register transfers received from donors who do not reside in Tajikistan. It can be suggested to account for the internal migration of Tajik households as well. In this case, the effects of internal and international migration can be compared. The proposition is nothing new, the internal migration data was collected for the 2003 TLSS (Clément, 2011) and it is highly welcome improvement to repeat the practice.

6 CONCLUDING REMARKS

Since the early 1990s, migrant transfers have made notable contributions to addressing financial vulnerability of households in transition economies. The question posed by this study was whether the access to remittances can also promote the well-being of those who left behind. Although rarely addressed, the research to date on the topic has produced mixed and highly debatable results. On this occasion, in an attempt to link well-being with remittances, we started with investigating the potential transmission mechanisms and developed an economic model of mental accounting for remittances based on the behavioral life cycle-hypothesis. Then, we formulated our main hypotheses and sought for empirical support. The quality and richness of the data provided by the TLSS and the THPS studies facilitated the analysis. Specifically, we used the surveys conducted in 2007, 2009, and 2011 and, employing the combination of PSM with DiD and cross-sectional endogenous treatment-effects methods, we tested the extent to which the receipt of remittances affects the chosen subjective well-being indicators.

After controlling for self-selection of migrant-sending households and potential endogeneity of the "remittances" variable, this research provides the certain evidence with respect to the positive effects of international migrant transfers on household members left behind. Empirical findings suggest that there is a positive relationship between overall subjective well-being and remittances. More specifically, the results demonstrate that the receipt of remittances, on average, is expected to increase the probability of being satisfied with life as-a-whole at the household level. The further analysis showed that specific characteristics of households may be a source of heterogeneity in the treatment effects of remittances. The impact is heterogeneous in terms of area of residence, implying that households residing in a rural setting benefit more from remittances in comparison to their counterparts in urban areas. As for the divergence in overall satisfaction levels between households from different consumption quintiles, the change introduced by remittances is less statistically significant and homogeneous.

Given the positive changes in the aggregated well-being patterns of remittance-receiving households, it is difficult nor relevant to determine definitely whether the cognitive framing and the system of mental accounts are real or unconscious. More importantly, the results support the conclusions of the behavioral life-cycle hypothesis that

households with similar characteristics except for the remittance status have different expenditure choices. The analysis of household expenditure decisions suggests that the share of investment-type goods relative to the categories of goods generally considered as consumption items is expected to increase after receiving remittances.

The receipt of remittances is not unambiguously positively related to subjective well-being, the effects of remittances on household satisfaction with current financial situation are not observed for the whole sample nor for regional subsamples. The statistically significant changes are only present when the average treatment effects are decomposed to test the sensitivity of the results to household consumption. Particularly, rich households after receiving remittances are expected to be less satisfied with their current financial situation than before the receipt. Conversely, it was shown that external migration through remittances can enable poor households to overcome financial struggles. Remittances tend to increase the minimum amount of expenditures poor households can afford and improve their satisfaction with current financial situation, implying that international migration from Tajikistan might be "pro-poor".

Despite the long-term, positive overall life satisfaction changes at the mean and improvements in material living conditions for poor households, the results indicate that remittance flows cannot be interpreted as a stable foundation for welfare in the short-term perspective. The reason for this is that the impact of international migration might be subject to transient economic shocks and more than one year might be required for remittances to materialize into improved subjective well-being.

The derived results are highly relevant for the socioeconomic setting of Tajikistan. Massive labor emigration as a consequence of poverty and lack of employment has become a routine occurrence for the people living in Tajikistan. Nevertheless, this household coping strategy appears to be barely addressed by the government of Tajikistan. The government's migration policy and the institutional agenda for applying the migration policy have been a complicated matter. It is illustrative that the official migration management institute was organized only in 2011. Taking into account the established situation, we can elaborate several suggestions based on the main research findings for the organizations operating in the field of or affected by migration and remittances.

Chiefly, a remittance status of households and possible mental accounts connected with the additional source of income should be considered explicitly in the process of policy formulation. For instance, monetary injections into the economy by municipal or non-governmental organizations can be directed more efficiently into sectors with high development impact if they do not distort household consumption choices. The private sector organizations can also adapt to the mental accounting agenda. It can be recommended for financial institutions to include behavioral household models into customer analysis processes to improve operational efficiencies. For example, the mental accounting framework can be applied to attract additional endowments from households, to assure that households use credits for targeted purposes or to choose the correct type of household assets for collateral purposes. Secondly, if remittances are encouraged under a certain policy, it should be noted that the impact of remittances is relatively susceptible to observed and unobserved household characteristics. In this regard, the more effective approach might be to concentrate on small-scale projects rather to introduce migration-related initiatives at the national level.

Thirdly, it can be hypothesized that migration might be construed not only in terms of wealth-expanding economic activity but also as an important factor contributing to the improvement of evaluative well-being among households receiving remittances. Thus, given the positive role of remittances, the authorities can encourage remittance inflows, especially for poor households. Exertions targeted to eliminate barriers to migrate and decrease costs of the remittance reception are possible steps in the respective direction. At the same time, the authorities should provide additional social assistance for remittance-receiving households in the periods of external crises to prevent well-being losses. The specific attention should be dedicated to economic monitoring of the regions with high number of households with migrants. Lastly, the policymakers also should not disregard improvements of current conditions for a steady investment atmosphere. The appropriate actions would not only motivate migrant-sending households to invest accumulated resources more but might also potentially address the issues of persistent emigration of the population.

In conclusion, the current empirical investigation was based on the recognized theoretical predictions and conducted with economic reasoning; while the possible limitations of the study are not critical and further corrections in most of the cases

complement the analysis rather than change considerably the derived conclusions. Fundamentally, the thesis was able to provide the robust answer for the initial research question with available statistical instruments.

7 LIST OF REFERENCES

[1] Abas, M. A., Punpuing, S., Jirapramukpitak, T., Guest, P., Tangchonlatip, K., Leese, M., Prince, M. 2009. Rural-urban migration and depression in ageing family members left behind. *British Journal of Psychiatry* 195 (1), 54–60.

[2] Abdulloev, I. 2018. Job dissatisfaction and migration: Evidence from Tajikistan. *IZA Journal of Development and Migration* 8 (21), 1–27.

[3] Acosta, P. A., Lartey, E. K. K., Mandelman, F. S. 2009. Remittances and the Dutch disease. *Journal of International Economics* 79 (1), 102–116.

[4] Adams Jr., R. H. 2002. Precautionary saving from different sources of income: Evidence from rural Pakistan. *Policy research working paper 2761*. Washington, DC: The World Bank.

[5] Adams Jr., R. H. 2011. Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review. *Journal of Development Studies* 47 (6), 809–828.

[6] Adams Jr., R. H., Cuecuecha, A. 2010. Remittances, household expenditure and investment in Guatemala. *World Development* 38 (11), 1626–1641.

[7] Adams Jr., R. H., Cuecuecha, A. 2013. The impact of remittances on investment and poverty in Ghana. *World Development* 50 (C), 24–40.

[8] Adams Jr, R. H., Page, J. 2005. Do international migration and remittances reduce poverty in developing countries? *World Development* 33 (10), 1645–1669.

[9] Akay, A., Bargain, O. B., Giulietti, C., Robalino, J. D., Zimmermann, K. F. 2016. Remittances and relative concerns in rural China. *China Economic Review* 37 (C), 191–207.

[10] Ang, P. A., Sugiyarto, G., Jha, S. 2009. Remittances and household behavior in the Philippines. *Economics working paper series 188*. Mandaluyong: Asian Development Bank.

[11] Angrist, J. D., Pischke, J. S. 2008. *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press.

[12] Athey, S., Imbens, G. W. 2017. The state of applied econometrics: Causality and policy evaluation. *Journal of Economic Perspectives* 31 (2), 3–32.

[13] Azzarri, C., Zezza, A. 2011. International migration and nutritional outcomes in Tajikistan. *Food Policy* 36 (1), 54–70.

[14] Bardsley, N., Büchs, M., Schnepf, S. V. 2017. Something from nothing: Estimating consumption rates using propensity scores, with application to emissions reduction policies. *PLoS ONE 12 (10)*. San Francisco, CA: Public Library of Science.

[15] Bertoli, S., Marchetta, F. 2014. Migration, remittances and poverty in Ecuador. *Journal of Development Issues* 50 (8), 1067–1089.

[16] Betti, G., Lundgren, L. 2012. The impact of remittances and equivalence scales on poverty in Tajikistan. *Central Asian Survey* 31 (4), 395–408.

[17] Blanchard, O., Katz, L. 1992. Regional evolutions. *Brookings Paperson Economic Activity* 23 (1), 1–76.

[18] Bohra-Mishra, P. 2013. Labor migration and investments by remaining households in rural Nepal. *Journal of Population Research* 30 (2), 171–192.

[19] Borici, A., Gavoci, M. 2015. The impact of remittances on households' well-being: Evidence from Albania. *International Journal of Economics, Commerce and Management* 3 (11), 80–103.

[20] Borraz, F., Pozo, S., Rossi, M. 2010. And what about the family back home? International migration and happiness in Cuenca, Ecuador. *Journal of Business Strategies* 27 (1), 7–27.

[21] Bouoiyour, J., Miftah, A. 2015. Why do migrants remit? Testing hypotheses for the case of Morocco. *IZA Journal of Migration and Development* 4 (1), 1–20.

[22] Buckley, C., Hofmann, E. T. 2012. Are remittances an effective mechanism for development? Evidence from Tajikistan, 1999–2007. *Journal of Development Studies* 48 (8), 1121–1138.

[23] Butler, J. S., Moffitt, R. 1982. A computationally efficient quadrature procedure for the one factor multinomial Probit model. *Econometrica* 50 (3), 761–764.

[24] Caliendo, M., Kopeinig, S. 2008. Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys* 22 (1), 31–72.

[25] Card, D., Krueger, A. B. 1994. Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania. *American Economic Review* 84 (4), 772–793.

[26] Cárdenas, M., Di Maro, V., Sorkin, I. 2009. Migration and life satisfaction: Evidence from Latin America. *Journal of Business Strategies* 26 (1), 9–33.

[27] Carling, J. 2008. The determinants of migrant remittances. *Oxford Review of Economic Policy* 24 (3), 581 –598.

[28] Catrinescu, N., Willis, J., MacAuslan, I., Barca, V., Sandu, V., Rimmer, M. 2011. *Impact of labour migration on "children left behind" in Tajikistan*. Dushanbe: The United Nations Children's Fund.

[29] Cattaneo, C. 2012. Migrants' international transfers and educational expenditure: Empirical evidence from Albania. *Economics of Transition* 20 (1), 163–193.

[30] Cattaneo, M. D. 2010. Efficient semiparametric estimation of multi-valued treatment effects under ignorability. *Journal of Econometrics* 155 (2), 138–154.

[31] Cebotari, V. 2018. Transnational migration, gender and educational development of children in Tajikistan. *Global Networks* 18 (4), 564–588.

[32] Chamberlain, G. 1980. Analysis of covariance with qualitative data. *Review of Economic Studies* 47 (1), 225–238.

[33] Chami, R., Fullenkamp, C., Jahjah, S. 2005. Are immigrant remittance flows a source of capital for development? *Palgrave Macmillan Journals* 52 (1), 55–81.

[34] Clément, M. 2011. Remittances and expenditure patterns in Tajikistan: A propensity score
matching analysis. *Asian Development Review* 28 (2), 58–87.

[35] Danzer, A. M., Dietz, B., Gatskova, K. 2013. *Tajikistan household panel survey: Migration, remittances and the labor market survey report*. Regensburg: Institute for East- and Southeast European Studies.

[36] Danzer, A. M., Ivaschenko, O. 2010. Migration patterns in a remittances dependent economy: Evidence from Tajikistan during the global financial crisis. *Migration Letters* 7 (2), 190–202.

[37] Davies, S., Easaw, J., Ghoshray, A. 2009. Mental accounting and remittances: A study of rural Malawian households. *Journal of Economic Psychology* 30 (3), 321–334.

[38] De, P. K., Ratha, D. 2012. Impact of remittances on household income, asset and human capital: Evidence from Sri Lanka. *Migration and Development* 2 (2), 163–179.

[39] de Brauw, A., Rozelle, S. 2008. Migration and household investment in rural China. *China Economic Review* 19 (2), 320–335.

[40] de Haas, H. 2010. Migration and development: A theoretical perspective. *International Migration Review* 44 (1), 227–264.

[41] Dehejia, R. H., Wahba, S. 2012. Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs. *Journal of the American Statistical Association* 94 (448), 1053–1062.

[42] Démurger, S., Wang, X. 2016. Remittances and expenditure patterns of the left behinds in rural China. *China Economic Review* 37 (C), 177–190.

[43] Di Tella, R., MacCulloch, R. 2008. Happiness adaptation to income beyond "basic needs". *Working paper 14539*. Cambridge, MA: National Bureau of Economic Research.

[44] Dimova, R., Wolff, F-C. 2015. Remittances and chain migration: Longitudinal evidence from Bosnia and Herzegovina. *Journal of Development Studies* 51 (5), 554–568.

[45] D'Orlando, F., Sanfilippo, E. 2010. Behavioral foundations for the Keynesian consumption function. *Journal of Economic Psychology* 31 (1), 1035–1046.

[46] Dreby, J. 2015. U.S. immigration policy and family separation: The consequences for children's well-being. *Social Science & Medicine* 132, 245–251.

[47] Duval, L., Wolff, F-C. 2010. Remittances matter: Longitudinal evidence from Albania. *Post-Communist Economies* 22 (1), 73–97.

[48] Duvendack, M., Palmer-Jones, R. 2012. High noon for microfinance impact evaluations: Re-investigating the evidence from Bangladesh. *Journal of Development Studies* 48 (12), 1864– 1880.

[49] Edwards, A., Ureta, M. 2003. International migration, remittances and schooling: Evidence from El Salvador. *Journal of Development Economics* 72 (2), 429–461.

[50] Esquivel, G., Huerta-Pineda, A. 2007. Remittances and poverty in Mexico: A propensity score matching approach. *Integration & Trade Journal* 11 (27), 45–71.

[51] Falkingham, J., Klugman, J., Marnie, S., Micklewright, J. 1997. *Household welfare in Central Asia*. Basingstoke: Macmillan Press.

[52] Fasoranti, M. M. 2010. The determinants of consumption pattern among rural dwellers of Ondo State (Case study of Akoko North West local government). *European Scientific Journal* 8 (6), 72–79.

[53] Gang, I. N., Gatskova, K., Landon-Lane, J., Yun, M-S. 2017. Vulnerability to poverty: Tajikistan during and after the global financial crisis. *Social Indicators Research* 138 (4), 925–951.

[54] Gartaula, H. N., Visser, L., Niehof, A. 2012. Socio-cultural dispositions and wellbeing of the women left behind: A case of migrant households in Nepal. *Social Indicators Research* 108 (3), 401–420.

[55] Gebel, M., Voßemer, J. 2014. The impact of employment transitions on health in Germany. A difference-in-differences propensity score matching approach. *Social Science & Medicine* 108, 128–136.

[56] Gibson, J., McKenzie, D. 2014. The development impact of a best practice seasonal worker policy. *Review of Economics and Statistics* 96 (2), 229–243.

[57] Graham, E., Jordan, L. P., Yeoh, B. S. 2015. Parental migration and the mental health of those who stay behind to care for children in South-East Asia. *Social Science & Medicine* 132, 225–235.

[58] Gyimah-Brempong, K., Asiedu, E. 2015. Remittances and investment in education: Evidence from Ghana. *Journal of International Trade & Economic Development* 24 (2), 173–200.

[59] Handa, S., Malaccio, J. A. 2010. Matching the gold standard: Comparing experimental and nonexperimental evaluation techniques for a geographically targeted program. *Economic Development and Cultural Change* 58 (3), 415–447.

[60] Harris, J. R., Todaro, M. P. 1970. Migration, unemployment and development: A two-sector analysis. *American Economic Review* 60 (1), 126–142.

[61] Heckman, J. J., Ichimura, H., Todd, P. E. 1997. Matching as an econometric evaluation estimator: Evidence from evaluating a job training program. *Review of Economic Studies* 64 (4), 605–654.

[62] Helliwell, J. F., Huang, H., Wang, S. 2015. The geography of world happiness. In: Helliwell, J. F., Layard, R., Sachs, J. D. (ed.) *World happiness report 2018*. New York, NY: Sustainable Development Solutions Network.

[63] Hendriks, M., Burger, M. J., Ray, J., Esipova, N. 2018. Do international migrants increase their happiness and that of their families by migrating? In: Helliwell, J. F., Layard, R., Sachs, J. D. (ed.) *World happiness report 2015*. New York, NY: Sustainable Development Solutions Network.

[64] Institute for East- and Southeast European Studies. 2011. *Tajikistan household panel survey (THPS) 2011*.

[65] International Labour Organization. 2011. *Tajikistan sets up migration service*.

[66] Ivlevs, A. 2015. Happy moves? Assessing the link between life satisfaction and emigration intentions. *Kyklos* 68 (3), 335–356.

[67] Ivlevs, A., Nikolova, M., Graham, C. 2019. Emigration, remittances, and the subjective well-being of those staying behind. *Journal of Population Economics* 32 (1), 113–151.

[68] Justino, P., Shemyakina, O. N. 2012. Remittances and labor supply in post-conflict Tajikistan. *IZA Journal of Labor & Development* 1 (8), 1–28.

[69] Kifle, T. 2007. Do remittances encourage investment in education? Evidence from Eritrea. *GEFAME Journal of African Studies 4 (1)*. Ann Arbor, MI: Michigan Publishing.

[70] Koechlin, V., Leon, G. 2007. International remittances and income inequality: An empirical investigation. *Journal of Economic Policy Reform* 10 (2), 123–141.

[71] Kumo, K. 2012. Tajik labour migrants and their remittances: is Tajik migration pro-poor? *Post-Communist Economies* 24 (1), 87–109.

[72] Levin, L. 1998. Are assets fungible? Testing the behavioral theory of lifecycle savings. *Journal of Economic Behavior & Organization* 36 (1), 59–83.

[73] Lu, Y. 2012. Household migration, remittances and their impact on health in Indonesia. *International Migration* 51 (1), 202–215.

[74] Lucas, R. E. B., Stark, O. 1985. Motivations to remit: Evidence from Botswana. *Journal of Political Economy* 93 (5), 901–918.

[75] Marchetti-Mercer, M. C. 2012. Those easily forgotten: The impact of emigration on those left behind. *Family Process* 51 (3), 376–390.

[76] Massey, D. S., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A., Taylor, E. J. 1993. Theories of international migration: A review and appraisal. *Population and Development Review* 19 (3), 431–466.

[77] Mazzucato, V., Cebotari, V., Veale, A., White, A., Grassi, M., Vivet, J. 2015. International parental migration and the psychological well-being of children in Ghana, Nigeria, and Angola. *Social Science & Medicine* 132, 215–224.

[78] McCracken, V. A., Brandt, J. A. 1987. Household consumption of food-away-from home: Total expenditure and by type of food facility. *American Journal of Agricultural Economics* 69 (2), 274–284.

[79] McKenzie, D., Stillman, S., Gibson, J. 2006. How important is selection? Experimental vs. non-experimental measures of the income gains from migration. *Journal of the European Economic Association* 8 (4), 913–945.

[80] Meier, K. 2014. Low-skilled labor migration in Tajikistan: Determinants and effects on expenditure patterns. *Discussion paper 1433*. Berlin: German Institute for Economic Research.

[81] Milanovic, B. 1987. Remittances and income distribution. *Journal of Economic Studies* 14 (5), 24–37.

[82] Murakami, E., Yamada, E., Sioson, E. 2019. The impact of migration and remittances on labor supply in Tajikistan. *Working paper 181*. Tokyo: Japan International Cooperation Agency Research Institute.

[83] Myrdal, G. 1957. *Rich lands and poor: The road to prosperity*. New York, NY: Harper and Row.

[84] Nakamuro, M. 2010. School attendance and migrant remittances in transition economies: The case of Albania and Tajikistan. *International Development Planning Review* 32 (3), 333–361.

[85] Nguyen, L., Brenda, S. A., Toyota, M. 2007. Migration and the well-being of the 'left behind' in Asia. *Asian Population Studies* 2 (1), 37–44.

[86] Nguyen, V. C. 2012. Program impact evaluation using a matching method with panel data.
Statistics in Medicine 31 (6), 577–588.

[87] Nobles, J., Rubalcava, L., Teruel, G. 2015. After spouses depart: Emotional wellbeing among nonmigrant Mexican mothers. *Social Science & Medicine* 132, 236–244.

[88] Nzima, D., Duma, V., Moyo, P. 2016. Theorizing migration-development interactions: Towards an integrated approach. *Migration and Development* 6 (2), 305–318.

[89] Odeleye, A. T. 2012. Education and economic growth in Nigeria: A comparative analytical approach. *European Journal of Globalization and Development Research* 6 (1), 330–342.

[90] Osili, U. 2004. Migrants and housing investments: Theory and evidence from Nigeria. *Economic Development and Cultural Change* 52 (4), 821–849.

[91] Parpiev, Z., Yusupov, K. 2011. Testing household economies of scale in Uzbekistan. *Eurasian Journal of Business and Economics* 4 (7), 25–51.

[92] Ranis, G., Fei, J. C. H. 1961. A theory of economic development. *American Economic Review* 51 (4), 533–565.

[93] Ravenstein, E. G. 1885. The laws of migration. *Journal of the Statistical Society* 48 (2), 167–227.

[94] Robinson, S., Guenther. T. 2007. Rural livelihoods in three mountainous regions of Tajikistan. *Post-Communist Economies* 19 (3), 359–378.

[95] Rosenbaum, P. R. 2002. *Observational studies*. New York, NY: Springer Publishing.

[96] Rosenbaum, P. R., Rubin, D. B. 1983. The central role of the propensity score in observational studies for causal effects. *Biometrika* 70 (1), 41–55.

[97] Shefrin, H. M., Thaler, R. H. 1988. The behavioral life-cycle hypothesis. *Economic Inquiry* 26 (4), 606–643.

[98] Sjaastad, L. A. 1962. The costs and returns of human migration. *Journal of Political Economy* 70 (5), 80–93.

[99] Smith, H. L. 1997. Matching with multiple controls to estimate treatment effects in observational studies. *Sociological Methodology* 27 (1), 325–353.

[100] Stark, O., Bloom, D. E. 1985. The new economics of labor migration. *American Economic Review* 75 (2), 173–178.

[101] Sultonov, M. 2014. Remittances and household expenditures on health and education in Tajikistan. *International Journal Economic Policy Studies* 9 (4), 61–75.

[102] Syrovátka, M. 2007. Aggregate measures of welfare based on personal consumption. In: Šauer, P. (ed.) *Environmental economics, policy and international relations*. Conference proceedings. Prague: Litomysl Seminar Publishing.

[103] Tabuga, A. 2008. International remittances and family expenditure patterns: The Philippines' case. *Philippine Journal of Development* 35 (2), 103–123.

[104] Tapsin, G., Hepsag, A. 2014. An analysis of household consumption expenditures in EA-18. *European Scientific Journal* 10 (16), 1–12.

[105] Thaler, R. H. 1999. Mental accounting matters. *Journal of Behavioral Decision Making* 12 (3), 183–206.

[106] Todaro, M. P. 1969. A model of labor migration and urban unemployment in less-developed countries. *American Economic Review* 59 (1), 138–148.

[107] Tokhirov, A. 2018. Remittances and subjective well-being of the left behinds in Tajikistan. *Economics Bulletin* 38 (4), 1735–1747.

[108] Trading Economics. 2015. *Poverty headcount ratio (PHCR)*.

[109] United Nations. 2015. *World happiness report (WHR) 2015*.

[110] Vanore, M., Mazzucato, V., Siegel, M. 2015. 'Left behind' but not left alone: Parental migration and the psychosocial health of children in Moldova. *Social Science & Medicine* 132, 252–260.

[111] Waidler, J., Vanore, M., Gassmann, F., Siegel, M. 2016. Does it matter where the children are? The wellbeing of elderly people 'left behind' by migrant children in Moldova. *Ageing and Society* 37 (3), 607–632.

[112] Wickramasinghe, A. A. I. N., Wimalaratana, W. 2016. International migration and migration theories. *Social Affairs* 1 (5), 13–32.

[113] World Bank. 2011a. *Tajikistan - Living standards survey (TLSS) 2007*.

[114] World Bank. 2011b. *Tajikistan - Living standards survey (TLSS) 2009*.

[115] World Bank. 2016. *Migration and remittances factbook 2016*. 3rd ed. Washington, DC: The World Bank.

[116] World Bank. 2017. *World development indicators (WDI)*.

[117] World Bank. 2018. *Personal remittances, received (% of GDP)*.

[118] Wu, Q., Lu, D., Kang, M. 2015. Social capital and the mental health of children in rural China with different experiences of parental migration. *Social Science & Medicine* 132, 270–277.

[119] Zhu, Y., Wu, Z., Peng, L., Sheng, L. 2014. Where did all the remittances go? Understanding the impact of remittances on consumption patterns in rural China. *Applied Economics* 46 (12), 1312–1322.

[120] Zhu, Y., Wu, Z., Wang, M., Du, Y., Cai, F. 2012. Do migrants really save more? Understanding the impact of remittances on savings in rural China. *Journal of Development Studies* 48 (5), 654–672.

[121] Zipf, G. 1946. The P_1P_2/D hypothesis: On the intercity movement of persons. *American Sociological Review* 11 (6), 677–686.

[122] Zotova, N., Cohen, J. H. 2016. Remittances and their social meaning in Tajikistan. *Remittances Review* 1 (1), 5–6.

8 APPENDICES

Table A1. Descriptive statistics

Terms	Mean	St dev	Mean	St dev	Mean	St dev
	2007		2009		2011	
Household size	6.46	2.83	6.76	2.99	6.41	3.14
Household composition:						
Share of children under age of 6	0.103	0.13	0.107	0.13	0.11	0.14
Share of children between ages of 6 and 15	0.234	0.19	0.21	0.19	0.195	0.19
Share of adults between ages of 16 and 65	0.607	0.23	0.631	0.23	0.636	0.23
Share of elderly above the age of 65	0.056	0.15	0.052	0.15	0.059	0.16
Share of female adults between ages of 16 and 65	0.33	0.17	0.334	0.17	0.346	0.18
Household education level:						
Average education of household members	2.54	0.9	2.62	0.9	2.68	0.95
Number of household members with tertiary education	0.38	0.76	0.43	0.8	0.45	0.84
Household location:						
Districts of Republican Subordination-Rural	0.172	0.38	0.172	0.38	0.178	0.38
Districts of Republican Subordination-Urban	0.031	0.18	0.032	0.17	0.026	0.16
Dushanbe	0.161	0.37	0.161	0.37	0.161	0.37
Gorno-Badakhshan Autonomous Region-Rural	0.091	0.29	0.091	0.29	0.091	0.29
Gorno-Badakhshan Autonomous Region-Urban	0.013	0.11	0.013	0.11	0.013	0.11
Khatlon-Rural	0.224	0.42	0.223	0.42	0.229	0.42
Khatlon-Urban	0.041	0.2	0.041	0.2	0.035	0.18
Sughd-Rural	0.178	0.38	0.178	0.38	0.178	0.38
Sughd-Urban	0.089	0.29	0.089	0.29	0.089	0.29
Migration network:						
Proportion of households with migrants in primary sampling unit	0.24	0.16	0.33	0.21	0.28	0.24

Source: TLSS (2007), TLSS (2009) and THPS (2011)

Table A2. Longitudinal regression analysis of the determinants of remittances

Terms	2007 – 2009 – 2011	
	Random-effects Probit	**Fixed-effects Logit**
	Estimates	**Estimates**
HH size	-0.059 (4.05)***	-0.337 (6.86)***
Share of children (<6)	0.704 (2.19)**	2.135 (2.2)**
Share of adults	-1.268 (4.37)***	-5.33 (6.47)***
Share of elderly	-0.918 (2.69)***	-2.737 (2.49)***
Share of female adults	2.507 (8.64)***	6.758 (8.06)***
Average education of HH members	0.007 (0.12)	-0.33 (2.27)**
# of HH members with tertiary education	-0.135 (2.11)**	
Proportion of HH with migrants in PSU	1.181 (7.8)***	1.131 (3.31)***
DRS	0.215 (2.02)**	
Dushanbe	-0.004 (0.03)	
GBAR	0.637 (4.97)***	
Sughd	0.078 (0.74)	
Urban	-0.365 (3.35)***	
Intercept	-1.324 (6.6)***	
Number of households Number of observations Log likelihood	1271 3813 -1506.53	426 1278 -365.48

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Table A3. Logit regressions for propensity scores – Aggregated data

Terms	2007 – 2011	
	[1]	[2]
	Estimates	Estimates
HH size	-0.066 (1.08)	-0.122 (3.2)***
Share of children (6-15)	1.31 (0.69)	0.307 (0.39)
Share of adults	-3.43 (2.18)**	-2.668 (3.58)***
Share of elderly	-6.669 (2.97)***	-2.3 (2.49)***
Share of female adults	4.72 (2.94)***	3.059 (4.85)***
Average education of HH members	0.397 (1.09)	0.069 (0.43)
# of HH members with tertiary education	-0.503 (1.22)	-0.275 (1.66)*
Proportion of HH with migrants in PSU	3.519 (2.93)***	2.644 (4.8)***
DRS	-1.259 (1.95)*	-0.43 (1.48)
Dushanbe	-0.503 (0.51)	-1.093 (2.73)***
Khatlon	-1.114 (1.81)*	-0.825 (2.88)***
Sughd	-1.844 (3.11)***	-0.842 (2.94)***
Urban	-0.183 (0.26)	-0.234 (0.98)
Intercept	-0.113 (0.06)	0.032 (0.03)
Number of households	178	1093
Pseudo R^2 (McFadden)	0.17	0.11
Pseudo R^2 (Nagelkerke)	0.28	0.17
Correctly classified cases	0.71	0.81
LR test (prob.)	41.61 (0.000)***	119.94 (0.000)***

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007) and THPS (2011)

Table A4. Logit regressions for propensity scores – Two-year data

Terms	2007 – 2009		2009 – 2011	
	[1]	[2]	[1]	[2]
	Estimates	Estimates	Estimates	Estimates
HH size	0.004 (0.05)	0.168 (3.78)***	-0.135 (1.58)	-0.106 (3.03)***
Share of children (6-15)	0.055 (0.03)	2.454 (1.87)*	-1.306 (0.53)	0.191 (0.25)
Share of adults	3.762 (2.05)**	4.051 (3.28)***	-5.641 (2.79)***	-3.147 (4.35)***
Share of elderly	2.714 (1.1)	-0.233 (0.12)	-10.13 (3.22)***	-2.29 (2.61)***
Share of female adults	-1.229 (0.81)	0.517 (0.64)	2.27 (1.57)	3.817 (5.97)***
Average education of HH members	0.388 (0.95)	0.415 (1.95)*	0.082 (0.19)	0.014 (0.09)
# of HH members with tertiary education	-1.494 (2.49)**	-0.239 (1.28)	-0.16 (0.44)	-0.314 (1.83)*
Proportion of HH with migrants in PSU	1.491 (1.17)	1.575 (2.16)**	0.278 (0.33)	1.047 (3.14)***
DRS	-0.496 (0.81)	-0.875 (2.45)**	-0.944 (1.65)*	-0.338 (1.13)
Dushanbe	-1.585 (1.49)	-1.638 (3.26)***	-0.864 (0.94)	-0.807 (1.96)**
Khatlon	-1.063 (1.65)*	-1.419 (3.9)***	-2.289 (3.33)***	-0.448 (1.53)
Sughd	-1.076 (1.8)*	-1.423 (4.02)***	-2.124 (3.27)***	-0.422 (1.43)
Urban	0.656 (0.88)	0.087 (0.29)	-0.829 (1.33)	-0.518 (2.18)**
Intercept	-3.851 (1.65)*	-7.056 (4.758)***	5.761 (2.06)**	0.312 (0.35)
Number of households	178	1093	148	1123
Pseudo R^2 (McFadden)	0.18	0.11	0.18	0.1
Pseudo R^2 (Nagelkerke)	0.27	0.14	0.29	0.16
Correctly classified cases	0.77	0.90	0.66	0.8
LR test (prob.)	36.321 (0.001)***	75.46 (0.000)***	36.61 (0.000)***	118.05 (0.000)***

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Table A5. Logit regressions for propensity scores – Cross-sectional data

Terms	2007	2009	2011
	Estimates	**Estimates**	**Estimates**
HH size	-0.018 (0.5)	0.036 (0.94)	-0.092 (3.01)***
Share of children (6-15)	-1.845 (2.31)**	0.161 (0.15)	-0.115 (0.17)
Share of adults	-3.161 (3.85)***	0.989 (1.02)	-3.019 (4.79)***
Share of elderly	-2.482 (2.37)**	-0.445 (0.33)	-2.825 (3.47)***
Share of female adults	3.882 (5.33)***	1.466 (2.13)**	3.372 (6.07)***
Average education of HH members	0.397 (1.09)	0.272 (1.5)	0.132 (0.93)
# of HH members with tertiary education	-0.07 (0.44)	-0.275 (1.65)*	-0.377 (2.56)**
Proportion of HH with migrants in PSU	4.847 (8.32)***	3.284 (6.66)***	0.853 (2.85)**
DRS	-0.807 (2.59)***	-0.665 (2.27)**	-0.605 (2.44)**
Dushanbe	-0.048 (0.11)	-0.891 (1.99)**	-1.18 (3.32)***
Khatlon	-0.733 (2.46)**	-1.252 (4.21)***	-0.96 (3.87)***
Sughd	-0.486 (1.71)*	-1.026 (3.49)***	-0.956 (3.86)***
Urban	-0.601 (1.95)*	-0.028 (0.11)	-0.527 (2.45)**
Intercept	-1.106 (1.21)	-4.564 (3.81)***	0.75 (0.94)
Number of households	1271	1271	1271
Pseudo R^2 (McFadden)	0.16	0.14	0.1
Pseudo R^2 (Nagelkerke)	0.22	0.18	0.16
Correctly classified cases	0.87	0.89	0.77
LR test (prob.)	162.89 (0.000)***	124.43 (0.000)***	142.66 (0.000)***

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Table A6. Cross-sectional endogenous treatment-effects – I stage (Probit treatment model)

Terms	2007	2009	2011
	Estimates	**Estimates**	**Estimates**
HH size	-0.01 (0.53)	0.018 (0.9)	-0.054 (3.1)***
Share of children (6-15)	-1.004 (2.33)**	0.176 (0.36)	-0.077 (0.19)
Share of adults	-1.681 (3.61)***	0.56 (1.21)	-1.718 (4.7)***
Share of elderly	-1.303 (2.23)**	-0.181 (0.31)	-1.56 (3.43)***
Share of female adults	2.145 (5.35)***	0.828 (2.38)**	1.958 (5.85)***
Average education of HH members	-0.039 (0.46)	0.142 (1.61)	0.073 (0.9)
# of HH members with tertiary education	-0.075 (0.89)	-1.123 (1.27)	-0.218 (2.83)***
Proportion of HH with migrants in PSU	2.751 (9.09)***	1.821 (7.5)***	0.499 (2.8)**
DRS	-0.44 (2.54)**	-0.38 (2.37)**	-0.358 (2.35)**
Dushanbe	-0.052 (0.22)	-0.467 (2.01)**	-0.687 (3.36)***
Khatlon	-0.395 (2.41)**	-0.651 (4.12)***	-0.584 (3.95)***
Sughd	-0.28 (1.79)*	-0.545 (3.39)***	-0.576 (3.84)***
Urban	-0.301 (1.94)*	-0.011 (0.07)	-0.311 (2.56)**
Intercept	-0.726 (1.49)	-2.595 (4.71)***	0.422 (0.92)
Number of households	1271	1271	1271
Pseudo R^2 (McFadden)	0.16	0.14	0.1

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Table A7. Cross-sectional endogenous treatment-effects: II stage (Linear outcome model) – Relative education expenditures

Terms	Control [2007] Treated		Control [2009] Treated		Control [2011] Treated	
	Estimates		Estimates		Estimates	
HH size	0.004	0.004	0.001	-0.003	-0.002	0.02
	(2.17)**	(1.58)	(0.53)	(0.91)	(1.1)	(1.62)
Share of children (6-15)	0.294	0.142	0.187	0.293	0.191	0.157
	(3.14)***	(1.41)	(7.56)**	(2.91)***	(5.32)***	(1.43)
Share of adults	0.274	0.021	0.102	0.059	0.016	0.52
	(2.76)***	(0.19)	(3.31)***	(0.64)	(0.35)	(1.51)
Share of elderly	0.164	0.032	0.034	0.102	-0.024	0.376
	(2.03)**	(0.27)	(1.36)	(0.63)	(0.63)	(1.26)
Share of female adults	-0.146	0.014	-0.059	-2.06	0.089	-0.491
	(1.21)	(0.11)	(2)**	(2.15)**	(1.5)	(1.27)
Average education of HH members	0.0003	0.017	0.002	0.012	0.007	-0.027
	(0.04)	(1.19)	(0.26)	(0.71)	(1.16)	(1.12)
# of HH members with tertiary education	0.034	0.003	0.02	-0.006	-0.004	0.052
	(1.92)*	(0.19)	(2.79)***	(0.44)	(0.53)	(1.1)
Proportion of HH with migrants in PSU	-0.325	-0.016	-0.078	-0.234	0.015	-0.11
	(1.98)**	(0.1)	(2.23)**	(1.58)	(0.68)	(0.99)
DRS	0.09	-0.005	0.008	0.069	-0.015	0.062
	(2.25)**	(0.12)	(0.61)	(1.65)*	(0.89)	(0.73)
Dushanbe	0.006	-0.051	0.033	0.033	-0.032	0.088
	(0.21)	(0.77)	(1.81)*	(0.181)*	(1.32)	(0.59)
Khatlon	0.027	0.04	0.046	0.046	-0.027	0.118
	(1.22)	(0.1)	(2.58)***	(2.58)**	(1.33)	(0.95)
Sughd	0.066	0.021	0.018	0.018	-0.037	0.143
	(2.09)**	(0.57)	(1.18)	(1.18)	(1.68)*	(1.14)
Urban	0.026	0.081	0.012	-0.006	-0.005	0.094
	(1.04)	(1.46)	(1.22)	(0.28)	(0.34)	(1.57)
Intercept	-0.188	-0.053	-0.062	0.422	0.034	0.203
	(2.76)***	(0.38)	(2.31)**	(1.3)	(0.56)	(0.9)

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Table A8. Cross-sectional endogenous treatment-effects: II stage (Probit outcome model) – Overall life satisfaction

Terms	Control [2007] Treated		Control [2009] Treated		Control [2011] Treated	
	Estimates		Estimates		Estimates	
HH size	0.015 (0.87)	-0.017 (0.4)	-0.018 (1.08)	0.08 (1.45)	-0.019 (0.61)	-0.029 (0.29)
Share of children (6-15)	0.803 (1.86)*	0.4 (0.3)	-0.526 (1.4)	-0.113 (0.07)	0.851 (1.9)*	0.946 (0.97)
Share of adults	0.294 (0.61)	0.407 (0.22)	0.034 (0.09)	0.682 (0.44)	0.581 (0.64)	1.219 (0.45)
Share of elderly	-0.06 (0.13)	0.831 (0.5)	-1.036 (2.56)**	1.479 (0.7)	-0.323 (0.41)	0.819 (0.32)
Share of female adults	-0.617 (1.18)	-1.127 (0.5)	-0.974 (2.41)**	-1.267 (0.99)	-0.627 (0.61)	-1.739 (0.56)
Average education of HH members	0.254 (3.57)***	0.178 (0.87)	0.001 (0.01)	-0.065 (0.21)	0.191 (2.19)**	0.38 (1.4)
# of HH members with tertiary education	-0.025 (0.35)	0.371 (1.42)	0.142 (1.83)*	-0.077 (0.34)	0.105 (0.91)	-0.143 (0.37)
Proportion of HH with migrants in PSU	0.438 (0.62)	-1.099 (0.38)	0.6 (1.21)	0.003 (0.001)	-0.17 (0.52)	0.071 (0.08)
DRS	0.025 (0.13)	0.283 (0.49)	-0.549 (2.55)**	-0.903 (1.36)	-0.713 (2.18)**	-0.943 (1.36)
Dushanbe	0.112 (0.6)	-0.58 (0.98)	-0.317 (1.26)	-0.321 (0.4)	-0.675 (1.46)	-0.747 (0.66)
Khatlon	-0.136 (0.76)	0.181 (0.33)	-0.822 (3.21)***	-0.74 (0.91)	-0.422 (1)	-0.505 (0.5)
Sughd	0.21 (1.25)	0.308 (0.66)	-0.591 (2.58)***	0.071 (0.09)	-0.592 (1.41)	-0.638 (0.67)
Urban	-0.248 (2.06)**	-0.004 (0.01)	-0.068 (0.6)	0.585 (1.75)*	-0.067 (0.37)	-0.19 (0.32)
Intercept	-0.989 (1.97)**	-1.015 (0.37)	1.318 (2.91)***	2.588 (0.5)	0.236 (0.2)	1.939 (0.86)

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)

Table A9. Cross-sectional endogenous treatment-effects: II stage (Probit outcome model) – Satisfaction with current financial situation

Terms	Control [2007] Treated		Control [2009] Treated		Control [2011] Treated	
	Estimates		Estimates		Estimates	
HH size	0.041 (2.34)**	-0.08 (1.9)*	-0.001 (0.58)	0.063 (1.21)	-0.041 (1.35)	-0.045 (0.49)
Share of children (6-15)	1.036 (2.35)**	-0.918 (0.71)	-0.352 (0.9)	-0.71 (0.43)	0.572 (1.25)	0.67 (0.77)
Share of adults	0.738 (1.54)	-0.736 (0.39)	0.119 (0.3)	-0.317 (0.22)	-0.497 (0.58)	1.56 (0.6)
Share of elderly	0.49 (1.04)	1.251 (0.69)	-0.811 (1.92)*	1.717 (0.85)	-1.101 (1.41)	1.233 (0.49)
Share of female adults	-0.786 (1.55)	-0.656 (0.28)	-0.532 (1.3)	1.465 (1.15)	0.506 (0.54)	-2.037 (0.69)
Average education of HH members	0.215 (2.98)***	0.201 (0.97)	0.133 (1.63)	0.305 (0.95)	0.181 (2.2)**	0.145 (0.64)
# of HH members with tertiary education	0.091 (1.21)	-0.092 (0.36)	0.169 (2.23)**	0.24 (0.96)	0.05 (0.47)	0.056 (0.16)
Proportion of HH with migrants in PSU	0.369 (0.53)	1.346 (0.45)	1.352 (2.58)***	1.659 (0.85)	-0.226 (0.73)	-0.166 (0.21)
DRS	0.032 (0.17)	-0.094 (0.16)	-0.385 (1.82)*	-0.294 (0.5)	-0.972 (3.04)***	-1.257 (1.84)*
Dushanbe	0.351 (1.88)*	-0.401 (0.7)	-0.103 (0.41)	-1.227 (1.62)	-1.045 (2.43)**	-1.208 (1.07)
Khatlon	0.119 (0.68)	-0.361 (0.67)	-0.396 (1.52)	-0.855 (1.09)	-0.567 (1.4)	-0.327 (0.33)
Sughd	0.157 (0.94)	-0.122 (0.29)	0.039 (0.17)	-0.095 (0.13)	-0.703 (1.76)*	-0.526 (0.55)
Urban	0.014 (0.12)	-0.156 (0.35)	0.039 (0.33)	0.369 (1.15)	-0.297 (1.6)	0.104 (0.19)
Intercept	-1.782 (3.5)***	0.139 (0.05)	-0.378 (0.82)	-3.49 (0.69)	1.435 (1.22)	2.404 (1.24)

Note: z-statistics in parentheses; * p<0.1, ** p<0.05, *** p<0.01

Source: Author's own calculations based on TLSS (2007), TLSS (2009) and THPS (2011)