Who else migrates from Armenia?
Evidence from intentions

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September 21, 2013

Abstract

The paper analyzes recent migration wave in Armenia, using data on emigration intentions. The fact of remittances signals non-migrants about attractive life conditions in a host country and amplifies intentions to emigrate. Having a migrant member in household is another factor fortifying emigration intentions, with a strong potential of chain migration. Education measures have no significant role in shaping intentions, indicating low selectivity among non-migrants on educational grounds. Instead, respondents with work status express more willingness to emigrate. When turning to revealed actions in a macroeconomic level, we find that an inflow of remittances entails additional emigration, confirming that stated intentions to emigrate cannot be overlooked. Summarizing facts and findings, our analysis points out the existence of mass migration in Armenia.

Keywords: Migration, remittances, intentions, development, households.
JEL Classifications: F22, J11, O15

Introduction

Migration is an inextricable part of development with complex implications for migrant sending societies (Massey (1988), Martin and Taylor (1996)). In a decision making level, migration is a familial arrangement with underlying contractual relationship between migrants

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and their families (Stark and Bloom (1985)). In a macroeconomy, among other consequences, migration entails flows of remittances, which may benefit societies in transition by reducing poverty (Adams and Page (2003)) and may hurt by distorting growth (Chami et al. (2003)). Overall, migration is a consequence of certain socio-economic, demographic and political interactions, and it further reshapes these interactions as a self-enforcing dynamic process. It is inherent to most developing countries, heterogeneous in political regimes, ethno-cultural heritage, socio-economic conditions and future opportunities.

Post Soviet states, as a specific bloc of developing world, had faced huge migration flows already at the early stage of independence, along with broken traditional trade links, reciprocal territorial claims, civil wars and ethnic cleansing[1]. Armenia, among the most developed Soviet Republics during the Soviet era, had been given minimal opportunities to start building an independent, healthy-growing country with bright future. In 20 years of independence the country had been hit by numerous adverse shocks, while exhibiting low resilience and modest capability to absorb. In particular, Armenian policymakers are concerned with migration tendencies, inherited from the past and highly responsive to negative events. In this context, questions such as "What are the main factors influencing migration related decisions" and "How general is the tendency to emigrate?"[2] are of central interest. In the paper, we address these questions by exploring determinants of emigration intentions for individuals, using Armenian microeconomic data from 2011-2012.

We construct a three-stage model, where in the first stage migration related decision is estimated for a migrant member in the past; in the second stage, given the probability of currently having a migrant in household, determinants of remittances are identified; and in the third stage, emigration intentions are estimated, given migration and remittance related decisions and controlling for individual- and household specific characteristics. We estimate two versions of the model, linear and nonlinear (recursive multivariate), and the estimation

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[1]Migration flows between post Soviet countries had reached to about 2 million people in 1991 with a gradual decrease about 600,000 in 2002 (Tishkov et al. (2005)).

[2]The second question can be rephrased as"Do people heavily condition emigration choice on their skills, abilities and other individual characteristics or they follow to the mass?".

outcomes coincide in a qualitative sense.

The factor of remittances in our analysis is central. As the new economics of labor migration (NELM) literature points out (Lucas and Stark (1985), Stark and Bloom (1985)), once we realize that migration is a familial arrangement, remittances are commonly perceived as an instrument to establish and sustain contractual relationship between migrants and household members, aimed at maintaining the latter home. Our findings, nevertheless, foresee another role for remittances: it serves as a signal for non-migrants that there are certain opportunities to make money in a host country, strengthening their incentives to emigrate.

In this study, geography of households is essential for explaining remittances. Since the dataset is silent about migrants' characteristics, we search for instruments to explain remittances and they turn to be mostly of spatial nature, such as rural versus urban areas, distance from the capital etc.

Extended household networks abroad is another crucial factor shaping incentives for non-migrants to join household members and/or relatives abroad. Formation of *network migration* (Massey et al. (1993)) is time dependent, and observing concentration of Armenian emigrants in the last two decades, it becomes obvious that migration networks and systems are well established for the Armenian society. Our results suggest that once we control for the network, the role of a migrant member in household is deprived.

Special attention is paid to education. Our finding is that years of education and related factors have no impact on emigration intentions, leaving no room for migration selectivity on educational grounds. This evidence supports the hypothesis that society is closer to *mass migration*, when individual skill characteristics are not important and migration is perceived as massive phenomenon. Another evidence of mass migration is the irrelevance of household's location area, rural versus urban[3].

The next key finding is that the work status, *cetirus paribus*, amplifies willingness to

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[3]Households in rural areas are mainly involved in agriculture, distinguished by very low (relative) productivity (Begrakyan and Grigoryan (2012)). Insignificance of the rural dummy indicates the secondary role of productivity in shaping emigration intentions.

emigrate. We think that respondents with work status, more competitive in domestic labor market by selection, estimate their chances of success abroad better, translated into stronger willingness to emigrate. This result leaves no room for the neo-classical argument that the wage differential between home and host countries is central in migration decision (see Borjas (1987) and references therein).

Our microeconomic analysis uncovers important details on intentions, while the question "How effectively these intentions are translated into real actions?" remains open. In order to address this question, we construct a vector-autoregressive (VAR) macroeconomic model, remittances and migration flows added. We use Armenian quarterly data for the period 2000-2012 and draw impulse-response functions to assess the impact of remittances on migration. Our finding is that an unexpected increase in remittances generates excessive outflow of emigrants, supporting the argument that intentions are indeed credible signal for predicting the intensity of emigration in the near future. The pattern from the VAR model becomes more vivid, when shortening sample size towards more recent history[4].

Our paper contributes to the migration literature in certain aspects. In addition to Rozelle et al. (1999)'s approach, we construct an alternative nonlinear, recursive multivariate model, which accounts for the probabilistic nature of the underlying relationship. Unlike Van Dalen et al. (2005), we take observations into the model for *all* individuals, with and without (i) migrants and/or (ii) remittances received. Finally, to our knowledge, this is the first attempt to study emigration intentions in a post Soviet state formally, which may help better understand the complexity behind migration related decisions in a specific pool of developing countries.

The rest of the paper is organized as follows. The relevant literature is briefly surveyed in Section 1. Section 2 provides data description and related background information. Description of econometric models and estimation results are in Section 3 and 4, respectively. Section 5 covers macroeconomic analysis followed by concluding remarks. Most tables and

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[4]We run the model for the period 2004-2012 and the significance as well the magnitude of the impact increase.

graphs are displaced in Appendix.

1   Relevant literature

Recent advances in migration studies highlight the complexity of migration-development interactions in migrant sending societies. The theoretical perspective of the issue stresses the importance of viewing migration as a developmental phenomenon (Massey (1988)), for which application of distinct theories in isolation may fail to uncover the complexity (de Haas (2010)). For the post Soviet camp, many features of international migration can be understood and interpreted within existing migration-development theories with the caveat that these societies share unique heritage and followed transition path. Tishkov et al. (2005) provide background information on the emergence of migration patterns in the post Soviet area.

In neo-classical models (Todaro (1969), Harris and Todaro (1970)) migration is an individual decision based on wage differentials, in which no role is given to intrafamily relationship. In contrast, as a new strand of literature, NELM considers migration as a family involved decision, analyzed with remittances as a key consequence of migration ((Lucas and Stark (1985)), Stark (1995)). Taylor (1999) summarizes early literature on NELM from developmental viewpoint, concluding that remittances may contribute development process. Rapoport and Docquier (1998) reviews recent findings in NELM from micro- and macroeconomic perspectives.

There are two types of motives explaining the existence and nature of remittances: *altruism* (Lucas and Stark (1985), Stark and Lucas (1988), Van Dalen et al. (2005), among others), and *self-interest*. In the second category there are numerous motives assuming implicit contractual relationship: bequest (Hoddinott (1994), Bernheim et al. (1985)), accumulation of wealth (Dustmann and Kirchkamp (2001)), covering educational costs of household members (Lucas and Stark (1985)), allocating risks (Stark and Lucas (1988), Cox et al. (1998)), exchange of various types of services with remittances (Rapoport and Docquier (2005)). A

general theoretical model on interaction between the two parties under non-cooperative and cooperative scenarios is developed by Melkonyan and Grigorian (2011). As a distinct motive, remittances may encourage or discourage migration from a home country (e.g. Stark (1995), Van Dalen et al. (2005), Rapoport and Docquier (1998)). In the paper, we address the question in the context of the above literature, whenever applicable.

When turning to a migrant's relation to household, whose members receive remittances, the migrant can be a member of an *extended family* (Alesina and Giuliano (2010)). We test the importance of an extended family and it turns to be significant.

There are only few papers studying the pattern of migration and consequences in Armenia formally. The closest to our work is Grigorian and Melkonyan (2011), who use household data from 2004 and estimate the model for 4 distinct variables (hours worked, expenditures on education, savings and borrowings from banks). They conclude that in Armenia remittance-receivers (i) work less, (ii) spend less on education of their children, "...perhaps expecting to migrate themselves...", as the authors state, (iii) accumulate more savings and (iv) do not borrow more. As Grigorian and Melkonyan (2011), we also use a three-stage empirical model by Rozelle et al. (1999).

We may compare our results with those in Grigorian and Melkonyan (2011) from the first two stages of regressions, namely, migration and remittance equations. Still, these results are not perfectly comparable due to different objects in the two dataset: Grigorian and Melkonyan (2011) use household level dataset with average years of education, number of working hours, percentage of women etc, while we explore individual dataset, in which respondents answer questions on household's structure but with lesser extent. The most striking difference in terms of results is that in Grigorian and Melkonyan (2011) having a migrant in household increases the probability of receiving remittances for household, while we find an opposite result. We think the difference is due to the fact that Grigorian and Melkonyan (2011) control duration of being away for migrants, while we do not.

Dermendzhieva (2011) provides a cross-country empirical evidence on labor migration for the countries in South Caucasus. The author finds no evidence of mass emigration among

skilled workers. However, individuals with higher education are more likely to emigrate to high income OECD countries from the capital of Armenia. Despite the lack of clear evidence on brain drain, Dermendzhieva (2011) stresses that "... policy makers should be aware that the possibility of brain drain from the region towards high-income OECD destinations cannot be excluded".

Studies on emigration intentions are very few too. Early papers, such as Taylor (1999), discuss determinants of willingness to emigrate informally. Van Dalen et al. (2005) takes a step ahead by properly estimating the impact of remittances on emigration intentions for Egypt, Turkey, and Morocco. We share some of the findings with Van Dalen et al. (2005): being a mail or having job amplifies emigration intentions. We also share the main finding with Van Dalen et al. (2005), which is higher remittances have a positive effect on emigration intentions, which may further escalate migration, particularly in Morocco.

2 Data description

We use household level data collected by European Training Foundation (ETF), conducted in the period December 24, 2011 - January 30, 2012. Randomly selected individuals have been asked questions on 5 groups of distinct characteristics: (i) education, skills and socio-demographic, (ii) work, (iii) intentions, (iv) expectations and (v) economic and living conditions of household. The title of the survey, *Potential Migration Survey*, reflects its primary objective, which is to disclose individuals' intentions and expectations concerning emigration.

Number of respondents is 2630. After filtering variables due to the absence of answers for different reasons (refuse to answer, no answer, do not know and not applicable) we obtain around 2600 observations for most of the variables. Summary statistics of the main variables are reported in Table 1.

'Insert Table 1 here'

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Families with migrant member(s) are 12.7 percent in the sample. This number is potentially underreported, but the fact that an interviewer is asked to report whether a family has a migrant or not, it narrows the scope of migration, as migrated households are excluded from the sample. In Caucasus Barometer Project[5], interviewers are asked the question "Do you have a family member or close relative currently living abroad, outside the borders of country?", which involves migrated households too. For Armenia, positive answers in proportions for 2009, 2010 and 2011 are 0.59, 0.63 and 0.68, respectively, indicating growing emigration after the crisis.

33.93% of respondents answered "yes" to the question "Are you thinking seriously to move abroad to live and work at the moment?". Important for our analysis, the question aims to disclose intentions on *permanent emigration*. It is then interesting to identify the percentage of respondents with emigration intentions belonging to households with migrant members. Table 4 indicates that out of 334 respondents, whose family members are abroad, 147 (45.37%) intend to migrate, while only 32.46% of respondents with families without migrants expressed intention to migrate. Simple tabulation is by far insufficient to state any direct relationship between remittances and intentions to emigrate, as it may owe to household and migrant specific factors, driving both variables to the same direction. Van Dalen et al. (2005), for example, find that such means difference is significant for Turkey, but when controlling migrant specific factors, the impact of remittances on inentions to emigrate becomes insignificant.

Remittances are observed throughout the last year, while the presence of a migrant in a family is identified during the interview. Considering that interviews have been launched during the period of migrants' return, the mismatch between households with remittance receivers and non-migrants captures the seasonal pattern in migration. Table 5 indicates that the percentage of remittance receivers among non-migrant households are almost as many as households with migrants without remittances: out of 292 families, received remittances in the last year, 186 (63.7%) report that there is no migrant in a family. On the other side, 189

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[5]Dataset and related documentation can be found in http://www.crrccenters.org/caucasusbarometer/overview/.

(64.07%) from 295 respondents with a migrant household member report zero remittances received[6]. The issue of underreporting, studied by Shonkwiler et al. (2011) for Armenia, may explain a part of discrepancy, in addition to that there can be (i) migrants who are at their early stage of migration and earnings are not sufficient to send remittances and (ii) long term migrants, who stopped remitting to their household members at home. Grigorian and Melkonyan (2011) estimate that the probability to receive remittances increases in the first 3-5 years, from 53 to 58%, and then decays approximately by the same rate[7].

In Table 7 we tabulate the same variables, as in Table 6, but selecting households with migrant(s). We ask whether the two distributions of emigration intentions, one unconditional and the second conditional on current migrant(s), significantly differ from each other. We construct the distributions in columns, percentages in parentheses. The key observation is that once we control for families with migrant(s), intentions to migrate become stronger for families both with and without remittances. We observe this by comparing the second row of Table 7 with the corresponding row of Table 6.

There are some interesting observations, directly related to our study object. When considering emigration as an option, 25% of respondents (218 out of 872) are looking for support from relatives living abroad. 96.5% of responders, if migrating, will send money for first of all "living expenses of family and relatives", supporting the evidence that remittance-receivers are wealth constrained. Intention to move abroad is slightly lower among the respondents with dependent(s) over 65 years (29.44%), while respondents with child dependents express almost the same intention as the average respondent, 34.07%. Marital status and gender separately do not align intention either - percentages on intention to move remain close to 30%, little less than the average intention, 33.93%.

Next we ask whether there is much difference in intentions to emigrate among households in rural versus urban areas. We distinguish 3 types of residence: village, town and the capital. Mean tests in Table 8 indicate that intentions are almost the same among respondents living

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[6]The P-value of means difference test is 0.64.

[7]For discussion and references on remittances' decay over time, see de Haas (2007).

in the 3 areas. There is difference in intentions among the two pools of households, one living in villages and the second in towns, at the 10% significance level, with slightly higher inentions to emigrate in town areas. The last column in Table 8 provides total respondents in two corresponding residence types. *Overall, we do not see drastic differences in intentions in rural versus urban areas, signaling that migration is a countrywide phenomenon and cannot be merely explained by lower standard living in rural areas.*

We take a step further and check whether intentions to emigrate among house owners vary depending on these 3 types of residence. Table 9 reports that intentions are slightly different among residents in villages and in Yerevan. The last column in Table 9 indicates that respondents in villages are around 2.5 larger than those in towns or Yerevan, reflecting the fact that in rural areas houses are dominant. This, however, does not change the overall pattern that emigration intentions do not change much when moving from rural to urban areas. *Around one third of respondents express willingness to emigrate, no matter where they reside, in rural or urban areas and whether families own house or not.*

Considering specific geopolitical situation, Armenia has been experiencing since the collapse of the Soviet Union, we also inspect the variation of intentions to emigrate along the regions[8] bordered with Georgia and Azerbaijan. Respondents living in regions bordered with Azerbaijan express less intention to emigrate relative to the average (29.77 versus 33.93%). If we select rural areas, in addition to the border with Azerbaijan, then the number changes only slightly, 28.51%. Respondents in regions bordered with Georgia are more eager to migrate, 38.10 % and the number is little smaller in rural areas, 36.13%. Given the overall underdevelopment of infrastructures in remote areas, the ongoing military conflict with Azerbaijan potentially intensifies the willingness to migrate in the regions bordered with that country, but the argument is not supported by the data[9].

Few of facts about destination geography and current migration stocks are worth highlighting. Vast majority of respondents (61.43%) considers Russia as a host country. Compar-

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[8]An administrative region is called "Marz". Armenia has 10 Marzes and the Yerevan city.

[9]This can be explained by the common perception, subject to challenge, that migration process has been stabilized in poorer and remote areas where households have either thoroughly migrated or stayed at home.

ing this number with Russia's share of the Armenian diaspora, 39.22%, it is evident that the composition of diaspora is changing in favor of Russia. The next country with the highest destination rate is USA with 10.55% (the migration stock is 24.40%). France and Germany follow with 8.29% and 5.28%, respectivey. Geography of intentions differs from that of diaspora significantly. In particular, South America and Middle East are the regions with large diaspora formed in the past, while these regions are out of interest for current (potential) migrants. Instead, Europe is of more interest with its high standard linving conditions and relatively easy access[10].

3   Estimation

Our econometric model is aimed to capture determinants of migration intentions in a three-stage decision making framework. Households send migrants, who are expected to remit to their family members in the home country. In our case, if we observe a migrant in household, he is more likely to be permanent, since interviews had been launched during the winter holiday, when most of the seasonal migrants working in construction and services return home. Then, if observed migration is permanent, the following time structure can be placed[11]: (i) in the first stage household sends migrant(s), (ii) in the second stage a migrant makes decision concerning remittances and (iii) in the third stage an interviewed household member discloses her/his intentions to emigrate, given the migration status of household member(s) and their decisions to remit, among other (individual and household specific) factors. A three-stage framework in the migration literature had been used by Rozelle et al. (1999) and Grigorian and Melkonyan (2011), where the authors carry variables in the third stage different from migration intentions. As noted by these authors, there is interdependence between migration and remittances. Despite the time structure, many

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[10]Maps for migration stocks and destination are available upon request.

[11]The structure is somewhat conventional, as decisions concerning migration and remittances much depend on the same set of determinants, which makes these decisions simultaneous. We discuss this point below in detail. Then, our assumption on observing permanent, rather than temporary migration, is not binding, but simply helps to place a formal structure.

economic factors affect migration and remittances simultaneously, entering both regression equations. Then, unobserved factors create strong correlation between the two error terms.

As for robustness, aimed to check the impact directions of determinants in the linear model, we estimate recursive multivariate probit model, where migration, remittances and (migration) intentions affect recursively - migration has an impact on remittances, and they both shape intentions. This model is a trivariate version of recursive bivariate probit model, discussed in Greene (2008). In order to compare outcomes of the two models, we use the same specification. For the benchmark specification two models yield identical results.

3.1 Linear model

The linear model consists of three equations: migration, remittances and intentions. The migration equation has the following form:

$$M = \alpha_1 + \beta_1 \Omega + \gamma_1 Z_M + e_M, \tag{1}$$

where Ω is the vector of observed individual and household characteristics, entering as control variables in the model, Z_M is the vector of excluded instruments for M and e_M is the error term. As migrants' characteristics are not observable, we need to identify migration by relevant instruments. We select instruments from (i) a subset of household characteristics, and (ii) regional level data on socio-economic and spatial factors.

In the second stage, given the migration status, decision on remittances is disclosed. The remittance equation is

$$R = \alpha_2 + \beta_2 \Omega + \gamma_2 Z_R + \theta_2 \bar{M} + e_R, \tag{2}$$

where Z_R and $\bar{M}$ are the excluded instruments of remittances and the instrumented migration, estimated from (1). Again, we select instruments from individual/household characteristics and regional dataset.

In the last stage, an interviewed-household member discloses her/his willingness to emi-

grate, given the migrant status of some members in household and their decisions to remit. The equation takes the form of

$$I = \alpha_3 + \beta_3 \Omega + \gamma_3 \bar{R} + \theta_3 \bar{M} + e_I, \tag{3}$$

where $\bar{R}$ and $\bar{M}$ are the expected values of remittances and migration, estimated from (1) and (2).

As mentioned, decisions concerning migration and remittances can be driven by common unobservable factors. For this reason, we estimate the model by 3SLS, which takes into account correlation between e_M and e_R. We obtain iterated 3SLS estimates, which are efficient relative to two-stage estimates, as the former is obtained by maximum likelihood estimation method[12].

For the migration equation, we use the following push factors from ETF Potential Migration dataset: *household size*, *house type* (house or apartment) and *number of rooms*. Following to the migration literature (Amuedo-Dorantes and Pozo (2006), Grigorian and Melkonyan (2011)), we enrich the set of instruments with socio-economic and spatial factors in a regional level. In the migration equation we interact Gini index from 2009 with *household size*. The Gini index in 2009 captures the increased inequality in Armenia as a direct consequence of the world financial crisis, started in 2008[13]. Households with many dependents in more unequal regions are potentially more vulnerable and to send migrants is less affordable due to binding wealth constraints. A positive coefficient will imply that large size households in more unequal regions are willing to send migrants.

The next regional variable in the migration equation is the corruption index, calculated from *corruption perception index* (CPI) by Transparency International[14]. We develop a simple methodology to disaggregate CPI for regions (Marzes and capital Yerevan), using *dis-*

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[12]For comprehensive textbook discussion on 3SLS, see Greene (2008).

[13]In 2009, the Gini index, averaged for 10 Marzes and capital, had increased from 32.30 to 33.59. The standard deviation of the index had also been expanded from 3.69 to 4.43, amplifying differences among regions. The Gini index and poverty rate series are constructed using *Household Survey Data* by National Statistical Service of the Republic of Armenia (NSSRA).

[14]In fact, the index is an inverse of perceived corruption - the higher the value, the better the situation.

tance from capital, *overall population* and *urban population* as shares (centered to 1) with the weights 0.3, 0.3 and 0.4, respectively. We interact CPI from 2010 with household's estimate of the neighborhood's wellbeing[15], which scales transparency index upward for communities with better financial situation. We construct a measure for neighborhood's wellbeing rather than households' itself, in order to control for endogeneity, as household's current financial situation depends much on migration in the past, while community's wellbeing is predetermined relative to single household's financial situation. The way the index is disaggregated, identifies urban areas with relatively high standard living. In particular, Yerevan takes a large value as a (i) center with (ii) high population density.

We also control for spatial differences - a dummy variable taking value one if a region is bordered with Azerbaijan and otherwise zero, is another (excluded) instrument. Overall, we have 7 instruments for migration[16].

We use regional data on poverty rate from 2010 as an instrument for remittances in (2). For the poverty line we use the threshold 2 dollars a day per household member[17]. Interactions of rural dummy with borderline (with Azerbaijan and Georgia) dummies provide two more instruments. Rural dummy itself is an instrument, as well as *distance* of the marz center from Yerevan. The last instrument is created by interacting *household size* with *distance*. Number of instruments in the remittance equation is six.

Our control variables in migration and remittances equations are *marital status*, *work status*, *age*, *home ownership*, *gender*, *old dependents* and *wellbeing of neighborhood*. All variables, apart from *marital status*, enter the intention equation (3).

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[15]We have household's rating on (i) its financial situation and (ii) its economic situation compared to other households in the neighborhood. Both variables have the same scale (from 0 to 4), which enables to construct another variable as a difference of the two, measuring financial/economic situation of the neighborhood.

[16]Somewhat surprisingly, *years of education* is significant only in the migration equation, thus serving as an excluded instrument for it.

[17]As for the Gini index, the source of data is *Household Survey Data* by NSSRA.

3.2 Recursive multivariate model

Complementary to the linear model, we construct a recursive multivariate model with identical stages. In the literature, recursive bivariate models have been formulated by Maddala and Lee (1976) and Heckman (1978). As we have 3 stages, our model takes the multivariate (trivariate) form, as an extension of the bivariate model, in which the nature and the properties of the model are preserved. The model involves 3 equations with endogenous binary variables. In our case, the model takes the following form:

$$M^* = \tilde{\alpha}_1 + \tilde{\beta}_1 \Omega + \tilde{\gamma}_1 Z_M + \epsilon_M, [M = 1, \text{ if } M^* > 0] \tag{4}$$

$$R^* = \tilde{\alpha}_2 + \tilde{\beta}_2 \Omega + \tilde{\gamma}_2 Z_R + \tilde{\theta}_2 M + \epsilon_R, [R = 1, \text{ if } R^* > 0] \tag{5}$$

$$I^* = \tilde{\alpha}_3 + \tilde{\beta}_3 \Omega + \tilde{\gamma}_3 R + \tilde{\theta}_3 M + \epsilon_I, [I = 1, \text{ if } I^* > \bar{I}^*]. \tag{6}$$

Variable names are the same as in the linear model. Latent variables are in asterisk and can be properly interpreted. If intentions to migrate in the past, given by $M^* \in [0,1]$ have been realized, we set $M = 1$, otherwise $M = 0$. Also, if a migrant has sent remittances with the amount R^*, then $R = 1$; otherwise $R = 0$. Respondents' intentions to emigrate may take any value in $[0,1]$ in terms of probability, while they should report single number. For individual j, there should be some $\bar{I}_j^* \in [0,1]$, such that if $I_j^* > \bar{I}_j^*$, the individual expresses intention to emigrate, $I = 1$. Otherwise, $I_j^* \leq \bar{I}_j^*$, no intention is stated and $I = 0$. It is important to note that families, having no migrant at the interview moment, may receive remittances, which makes the model different from nested models with underlying decision three.

The vector of errors, $(\epsilon_M, \epsilon_R, \epsilon_I)$, is independently and identically distributed as trivariate normal, with the covariance matrix, involving nonzero off-diagonal elements ρ_{MR}, ρ_{MI} and ρ_{RI}. Correlation in error terms indicates the presence of endogeneity. For example, if $Corr(\epsilon_M, \epsilon_R) \neq 0$, then using the observed status of migration in (5) will lead to a biased estimate for $\tilde{\theta}_2$. We estimate the model by using the same set of instruments as in the linear

model, by this effectively controlling for endogeneity.

Multivariate form of this class of models appears in the literature without recursive structure. Cappellari and Jenkins (2003) develop an alborithm for multivariate probit model with a structure similar to that of a seemingly unrelated regression. Nevertheless, from the descriptive part of the model it is straightforward to see, that the model can be extended to a recursive form[18].

In our model, there are 8 possible outcomes with corresponding joint probabilities. Cappellari and Jenkins (2003) write the particular probability for the trivariate case (page 280), and it is obvious from the formulation that nothing impedes to have a dummy endogenous variable in vectors X_2 and X_3, as long as the model is identified. We use the algorithm by Cappellari and Jenkins (2003) to estimate the model.

4   Estimation results

We have three narrative rich sets of estimates, which can be discussed within the framework of NELM and recently growing literature on migration and development. We analyze causal relationship based on the linear equation, but equivalently we would have identical argumentations based on the recursive multivariate model. In alternative specifications, next to the estimation results from the linear model, estimates from the recursive model will also be discussed, whenever applicable.

4.1   Migration equation

We start with the migration model, summarized in columns 2 and 3, Table 2. Households with many dependents are more likely to have migrant(s). On the other side, large size households in more unequal regions are less likely to have members abroad: in average, households' income per capita decreases in size due to number of dependents and in more

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[18]Discussion with Stephen P. Jenkins has confirmed the argument. In our model, we have fully recursive structure without simultaneous relationship between endogenous variables. This makes the model identified (see, e.g. Maddala and Lee (1976)).

unequal regions these households are even poorer, which, *cetirus paribus*, makes more difficult to send migrants.

The wellbeing of neighborhood interacted with the corruption index identifies households in socially developed urban areas, Yerevan and surrounded towns. Probability for these households to have migrants is in average higher. This result may well depend on the distribution (in urban versus rural areas) of entirely migrated households. It might be the case that family unification abroad is more prevalent in rural areas, led to the observation that the share of households with migrant members is relatively larger in Yerevan and its agglomeration, as relatively more families are still to be unified.

'Insert Table 2 here'

The signs of coefficients for *house type* and *number of rooms* differ, despite the fact that both variables seem to measure the accumulated wealth for households. The issue is that houses outside Yerevan and the surrounded area are not priced significantly different from apartments, located in towns. This makes the variable *house type* an improper measure for household's wealth. It rather distinguishes households with more dynastic values and strong social networks. This pattern is even significant in municipalities in Yerevan, where houses dominate. The positive coefficient suggests, that such a social capital facilitates to send household members abroad. Contrary to *house type*, the variable *number of rooms* better reflects the accumulated wealth of families - they involve both large houses and apartments, the latter being highly expensive in centers of most towns and the capital. *Families with bigger houses or apartments are less likely to have a migrant.*

Education of respondents appears only in the migration equation. We do not have an answer on to what extent respondents' education represents average education of household members. Potential explanation for the positive coefficient for years of education will be that families with educated member(s) are more able to diversify household earning capacities by (more often) holding migrant members. Such a statement is in line with the insurance

motive, more prevalent in rural areas (see, e.g. Rapoport and Docquier (2005))[19].

Four individual characteristics from the set of control variables, *married*, *work status*, *age* and *female*, enter the migration model with significance, the first two with a negative and the last two with a positive sign. Given that no information is available on the relationship between an interviewer and a migrant, channels to explain these causal impacts are potentially several and not worth hypothesizing.

From household characteristics among the controls the presence of dependent(s) over 65 has a significant impact - probability to have a migrant for households with old dependents is smaller. This can be explained by the willingness to stay closer to parents among households headed by middle-age offspring.

4.2   Remittances

Columns 4-5 in Table 2 summarize the remittance equation. One of the central results of the paper is that migration enters the remittance equation with a negative sign. In another study for Armenia, Grigorian and Melkonyan (2011) report a positive coefficient, indicating that probability to receive remittances is higher among households with migrant(s). How come that in our model we have a negative coefficient? There are at least two complementary factors explaining the phenomenon. As argued above, we are more likely to observe permanent migrants, rather temporary. That is, the model does not properly distinguish households as potential remittance-receivers. The second argument is that the stock of permanent migrants has been continuously increased since independence and it comes natural to expect that many permanent migrants experience number of years abroad. If altruistic motives are dominant in remittance related decisions, then probability of sending remittances may get very low for such migrants. *In fact, our information set identifies households with permanent migrants, for whom the presence of migrant member(s) may even decrease the*

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[19]Running the same model for only rural areas, education preserves the positive coefficient with a slight loss of significance (p-value = 0.136), after cleaning all irrelevant and non-significant variables.

probability of receiving remittances as it may hinder to have temporary migrants[20]*, while households with temporary migrants, though not identified in the data, are by far more likely to receive remittances.* This result is robust to many specifications, such as two-stage linear and bivariate probit specifications, in which intention equation is dismissed. Household specific instruments for migration play a crucial rule in determining such a (negative) causal impact.

Potentially, this result hinges on the fact that migrants' characteristics are missing in the dataset. In particular, earnings of a migrant and the strength of family ties between household/respondent and the migrant are important determinants to control for. In our analysis, we retrieve the exogenous part of migration intentions, which is barely explained by household (and individual) characteristics and regional variables. If, however, we expect that migrant's characteristics also affect directly on decision whether to remit or not, they should be in the set of covariates in the remittance equation. This is exactly the endogenoeity problem, controlled in the model. In what follows, the impact of migration on remittances may differ from our finding, if there are migrant's characteristics, which merely affect on the migration decision, taking a role of an additional instrument with an opposite impact.

We have 6 excluded instruments for the remittance equation. Households' distance from the capital decreases probability to receive remittances. Nevertheless, if these households are distinguished by a large size (interaction between *household size* and *distance*), the probability increases[21]. Poverty rate in 2010 played a positive role to explain increased remittances by the end of 2011. Correlation between *distance* and *poverty*$_{2010}$ is fairly high, 0.774, but still the pure impact of poverty rate is significant and positive. Households in rural areas are less likely to receive remittances. But if we identify households in Marzes bordered with Azerbaijan and Georgia, in average, they have more chances to receive remittances.

Contrary to the migration equation, where household characteristics and social factors

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[20]The fact of remittances is perceived as a signal for non-migrants what will be earnings abroad, if migrated. Adequately, if the migrant-member fails to send remittances, this creates disincentives for non-migrants to emigrate.

[21]Large size households in remote areas are expected to be more vulnerable with low long run income and they are likely to receive remittances based on altruistic motives. See, e.g., Rapoport and Docquier (2005).

served as instruments are prevalent, in the remittance equation the dominance accrues to spatial factors. There can be at least two reasons: (i) households are spatially clustered based on certain characteristics (wealth, business activity type, vulnerability towards external shocks etc), which drives corresponding, cluster-specific decisions concerning remittances and (ii) social norms, which are region specific and projected to migrants' uniform behavior, disciplined by households through social sanctions[22].

Among control variables, it is worth mentioning the negative sign for the variable *dependents (old)*. Perhaps the reason is that migrants do not invest in sharing inheritance, since the heir in household will bequeath the whole accumulated wealth in form of house/apartment and related economy.

'Insert Table 3 here'

4.3 Intentions

Estimation results for intentions equation are in columns 6 and 7, Table 2. The impacts of migration and remittances on intentions are of primary interest for this paper. Both affect remittances positively, signaling about the possibility of migration chain, which is *current migration begets migration in future.* Emigration intentions increase for respondents, whose households have a migrant member. Having a migrant member abroad, it facilitates emigration by pooling accommodation and job finding risks in a host country.

The fact of remittances fortifies incentives to emigrate, serving as a credible signal on better opportunities for work and earnings abroad. The NELM literature discusses the role of remittances in the light of contractual relationship between migrant and non-migrant members, stressing on an opposite causal relationship between remittances and emigration intentions. For example, Stark (1995) develops a game, in which strategic interaction between the parties takes place through remittances in order to maintain a non-migrant home[23]. In

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[22]A interesting discussion on the topic can be found in Rapoport and Docquier (2005).

[23]Such a relationship is sustainable if individual productivities of migrants are not perfectly observable in a host country.

our case, *the fact of* [24] remittances amplify incentives for a non-migrant to follow destiny of a migrant member.

Individual specific factors, such as skill or ability, determine the extent of migration (human factor) selectivity within the pool of potential migrants. In this aspect, we do not observe selectivity among respondents on educational grounds. Based on this result we put forward the hypothesis of *mass migration*, Armenia is currently experiencing, at least as far as it concerns education. Construction (21.26%), service (22.18%) and manufacturing (18.11%) are the main sectors respondents intend to work, and only 15.36% of them think that the work abroad will correspond their ednucational qualifications.

Work status for non-migrants is another factor to alter emigration intentions upward. From the first glance, this result is counterintuitive - those who hold vacancy with a permanent income are more expected to abstain from migrating which entails uncertainty in job finding, among other risks. This is what the neo-classical theory would predict, in which migration decision hinges on earning differentials (Sjaastad (1962), Borjas (1987)). In fact, it may well happen that individuals with work status are not saturated from employment conditions, while the indicator effectively selects respondents, competitive in labor market with potentially larger opportunities overseas. This may drive respondents with work status in home country to emigrate.

Better financial situation in the neighborhood drops emigration intentions, indicating the importance of externality for individuals, created by surrounding social environment. The rest of the controls (*age*, *home ownership*, *gender* and *dependent over 65*) enter the intentions equation with a negative sign, and they are self-explanatory. The set of potential controls is fairly large, while only few of them are significant, indicating overall low selectivity in individual and household characteristics in a migration related decision.

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[24]We use dummy variable for the series of remittances. There are at least two reason to convert the series with a continuous range into a dichotomous variable: (i) remittances are systematically underreported (see Shonkwiler et al. (2011)) and (ii) our model is probabilistic and remittances, as an endogenous continuous variable, would change that nature. Nevertheless, in Section 4.4 we estimate the model with volumes of remittances when checking sensitivity of the model.

4.4 Alternative measures

We provide some alternative measures for different variables to check the sensitivity of our results. For some of the specifications the recursive model is not applicable due to the continuous range of dependent variables. We first analyze the role of migration network using a different variable for remittances. Then we introduce numbers of migrant members in household and volumes of remittances instead of corresponding binary variables.

Migration network plays a certain role in explaining emigration tendencies in Armenia. Over the last 20 years, a new diaspora has been formed along the continual process of emigration. Geography of the young diaspora covers post Soviet countries (mostly Russia and Ukraine) USA and Europe (Germany, France)[25].

In order to assess the impact of migration network on emigration intentions, we use the flows of remittances received from *all* sources, outside the country. Remittances, sent by remote relatives and friends, signal about the strength of network, which cares about household and may facilitate emigration process for some of the non-migrants in household. Table 10 reports the estimates from the linear model with the new indicator of remittances (otherwise the same, as the one in Table 2). Once remittances from all sources are taken to the model, presence of a migrant member in household becomes insignificant in remittance and intention equations. If we agree that involving remittances from all sources is a proper measure for the strength of migration network, then the fact that it crowds out the factor of a migrant member in household indicates the key (and somewhat dominant) role of migration network. The presence of migrant members in households remains significant in the intentions equation for the recursive model, however, it fails to explain remittances (Table 11).

When using number of migrants in household as a measure for migration, estimation results do not change qualitatively - both significance and direction of impacts are preserved. The previous result can be reformulated: the more migrants in household, the lower the

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[25]IOM (2008) provides estimates of Armenian emigrants in top countries of destination for 2005. A different estimate is provided ILO (2009) for the period 2002-2007. More recent figures on emigration stock can be found in EUI (2013), in which USA leads the country list.

probability to be remitted in the second stage, and the higher the intentions to emigrate in the third stage. This argument suggests that family unification, if any, is more likely to take place in a host country, since along the increase in the migration stock, resources are redistributed in favor of migrant members, while intentions to emigrate and join the family increase. *The family unification process creates chain migration.*

Our model is robust to the use of actual volumes of remittances. The only minor difference is that the interaction variable for household size and Gini index (served as an instrument for migration) becomes insignificant. When using numbers of migrants with volumes of remittances, the previous outcome is preserved. We conclude that not only the fact of remittances is important for intentions, but also the volume providing more detailed information about migrants' wellbeing.

Using number of migrants and volumes of remittances instead of indicator functions create sample selection issues. The mass concentrated at zero for these variables introduces bias and destroys reported coefficients. Unfortunately, we cannot estimate the equations step-wise correcting the bias by Heckman-type procedure[26], as the relationship will be nonlinear and the expectation operator does not pass through[27]. Our recursive model accounts both for nonlinearity and sample selection, but it uses indicator functions.

We complete our microeconomic analysis and move to macroeconomics, aimed to uncover how effectively stated intentions can be translated to revealed actions.

5   Macroeconomic analysis

The early stage of emigration flaws in Armenia had started before the collapse of the Soviet Empire - after the Spitak earthquake in 1988, around 200,000 Armenians have left the country. Then, the territorial conflict over Nagorno-Karabakh, the active phase started in 1988-1989, had entailed two-direction migration flows: around 170,000 Azerbaijanis left Armenia and around 360,000 Armenians immigrated to the country from Azerbaijan (Yeghi-

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[26]See, e.g., Heckman (1976).
[27]For discussion on the topic, see e.g. Wooldridge (2010), Chapter 15.

azaryan et al. (2003)). The next wave of migration had started right after the independence in 1991, when economic conditions had continuously been deteriorated due to broken traditional trade links with the rest of the post Soviet camp and the military phase of Nagorno-Karabakh conflict, 1991-1994. According to different estimates, around 800,000 Armenians had left the country during the period 1991-2001. In the first decade of independence, two major outflows had been reported, 1991-95 and 1999-2001, the latter wave mostly conditioned by strong disappointment of the nation from government's inability on taking substantial steps towards sustainable development[28].

Taking a closer look at the country's recent history and current tendencies, it seems emigration incentives among distinct classes of population reflect general dissatisfaction from the country's course of development. A double-digit growth rate of GDP and significant improvement in poverty and inequality indexes in the period 2001-2008 have played little role in pooling down strong incentives to leave the home country and join the fast-growing Armenian young diaspora. As mentioned above, migration is perceived as a pattern intrinsic to development, but geopolitical environment specific to Armenia makes the issue sensitive to national security, since human capital in Armenia has been traditionally acknowledged as a leading factor for the long term development[29].

'Insert Figure 1 here'

Despite the huge outflow of population in the first decade, emigration has continued to be a major concern for policymakers in the new millennium. Figure 1 reflects this reality. In particular, we observe population inflow for the period 2004-2006, but then the pattern of emigration has been recovered, perpetuated by the world financial-economic crisis started in 2008.

In this section we ask how effectively stated preferences in terms of emigration intentions are transformed into revealed actions. In particular we ask, whether amplified intentions

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[28]Melkonyan and Grigorian (2011) discuss the early transition path from the migration viewpoint.

[29]An in-fact ongoing military conflict with Azerbaijan is another convincing argument that government needs to take substantial steps to reverse the current tendency in migration.

are projected to amplified emigration in response to remittances. In order to provide some evidence addressing to the question, we construct a recursive VAR model for the Armenian economy, for the period 2000-2012, using quarterly data. From the timing viewpoint, it seems logical to provide evidence from revealed actions covering the last decade or so, and then move to the microeconomic study, based on 2011-2012 data. We reverse the order, by this stressing the importance of microeconomic results, supported by macro evidence in the near past.

Our VAR has a recursive structure going back to Sims (1980). The classical literature distinguishes two classes of (policy oriented) VAR models, monetary (Sims (1980), Bernanke and Blinder (1992)) and fiscal (Blanchard and Perotti (2002) and Fats and Mihov (2001)). The latter class, nevertheless, involves a monetary policy component such as interest rate, making the model more general[30]. We model the economy as a mix of the two VAR-s, having tax collections as fiscal and exchange rate as monetary policy ingredients. Our list of variables, with a recursive order is as follows: (i) remittances, (ii) GDP, (iii) nominal exchange rate, (iv) taxes and (v) net migration (immigration minus emigration)[31]. The intuition behind is that first the economy is shocked by the flow of remittances, then the overall economic activity takes place, resulting in equilibrium exchange rate, after the amount of collected taxes is disclosed and in the final stage migration related decisions are made. The recursive structure ensures that the shock remittances affects all other variables in the current period, a shock on GDP affects all other variables in current period except remittances etc. We put remittances in the first order, as they are determined outside country (it is strongly correlated with Russia's GDP growth rate, IMF (2012), Figure 6) and directly condition the level of economic activity in the country. Migration, on the other side, is very endogenous to the ongoing macroeconomic processes and outcomes and hence we place it the last in the variables' order.

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[30]In fiscal VAR-s monetary indicators respond to the rest of the economy and embedded in the set of non-policy variables (Rebei (2004)).

[31]Initially, we ran the model with inflation, but since it has no role in shaping outcomes, we excluded from the model.

GDP, exchange rate and tax collections are the gaps from their natural levels[32], remittances are in first difference and net migration is in gap[33], but taking the level for the latter leads to identical results[34]. All variables are seasonally adjusted. Time series of the variables are plotted in Figures 4-6.

'Insert Figure 2 here'

We restrict our attention to *structural* impulse-response functions, in particular, the impact of one-standard deviation shock on remittances to net migration. Impulse-responses for the full sample are drawn in Figure 8. We highlight the impulse-response of remittances on migration in Figure 2, indicating the significance of the impact for the current quarter. We find that remittances of 21.938 mln USD received leads to additional 1367 emigrants. Within the year, the cumulative stock of migration remains in favor of emigrants, 1281.

'Insert Figure 3 here'

When taking a short sample, 2004Q1 - 2012Q4, closer to recent tendencies in the economy, the pattern is even more intense: remittances amounted to 34 mln USD entails additional outflow of 3253 migrants. If compared to the full sample, then the same amount of remittances, (21.938 mln USD) generates 2100 emigrants, about 1.5 times more. This is an evidence that the adverse impact of remittances is even stronger, if moving closer to the recent tendencies in the economy. The sample size is too short for analyzing the post-crisis period (2008 onwards), but the structural relationship between remittances and net migration is expected to be preserved, given the consistent increase in remittances after the sadden drop in 2009 and growing emigration.

From the VAR-based evidence we stress high sensitivity of GDP growth from remittances. One can state *the nexus of remittances, growth and migration* - remittances generously

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[32]GDP and tax collection gaps are in percents, nominal exchange rate is in national currency (AMD) units.

[33]We take first difference for remittances as it patterns more variation and no-autocorrelation compared to the gap.

[34]In both cases the stability condition for VAR is met.

stimulate short-run economic growth, but it comes at the expense of excessive emigration. This, we believe, stands as a major challenge for Armenian governments: past, current and near future.

Concluding remarks

Post Soviet history distinguishes several waves of migration in Armenia, fairly diverse in terms of reasons and consequences. The recent migration wave, evolved along the world financial-economic crisis started in 2008, seems to be a serious challenge for policymakers from demographic and socio-economic perspectives. In this paper we take a step on this direction and study the determinants of migration using data on intentions.

We find that intentions are amplified if they receive remittances or if there is a migrant member in household. In some other societies these factors may create disincentives to emigrate, but not in Armenia. The next finding is that education seems to have no role in shaping intentions - respondents express willingness to migrate unconditional on the years and type of education. From this point of view, we deal with mass migration in Armenia.

Work status, nevertheless, matters and affects intentions positively. How to interpret this result? It can be that respondents with work status are selected based on skills and abilities and consider that migration will open more opportunities to further raise their life standard. But it may equally be that work status involves large diversity of skills and abilities and in average respondents with the status intend to emigrate in order to get better opportunities[35].

Macroeconomic analysis reveals certain relationship between migration and remittances. Our results from vector-autoregressive model confirm that additional remittances entail a new emigration flow (while stimulating short term growth), suggesting that observed intentions can be translated to real actions.

Given the above outcomes, how should the public policy, aimed at reducing (if not revert-

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[35]We developed several alternative models, in which *work status* is taken as an endogenous variable. Despite our efforts to find proper instruments for *work status*, no specification passed the endogeneity test, and consequently we treat the variable as exogenous.

ing) migration, be designed? The objective itself is subject to challenge from the viewpoint of migration-development literature, but the fact that huge outflows of migration since independence has adversely changed the demography of the country, justifies the above objective. For Armenia, central to the issue is the threat of chain migration, when migration becomes self-perpetuating by the help of strong migration networks (Massey (1988)). Descriptive statistics and regression outcomes support the existence of chain migration in modern Armenia, which, as the literature alerts (de Haas (2007)), may go on *ad-infinitum*.

Our findings suggest that public policies should be effectively addressed to the needs of households, which have already established connections abroad. Are these households more socially vulnerable relative to the rest of the society? According to respondents' perceptions about their households' financial situation (absolute and relative to the neighborhood), the only small positive difference is reported for households with remittances, compared to the average. It also turns out that unemployment rate for respondents, remitted and with intentions, is only slightly larger than the average rate (38.73% versus 35.92%), suggesting that the issue is beyond the work status. Then, if households with connections abroad are otherwise the same as the rest of the society, how should the economic policy discriminate the two classes?

Perceptions are central in a migration related decision. They absorb long term trends in a development course of a country and form incentives for migration. In our study, we do not observe perceptions, but the evidence on mass migration and rejection of a simple wage-differential argument infer that migration causes in Armenia are rather long lived and hence institutional, and short-term policy adjustments cannot address the issue. In these circumstances, large scale public policies are needed with new institutional arrangements, designed for the entire society. What should be these arrangements depends on expectations of society members, the latter hinging on incentives. The circle repeats back and the bottom line is that for policy analysis we need to observe perceptions, in order to answer the question "*Why* these people emigrate?".
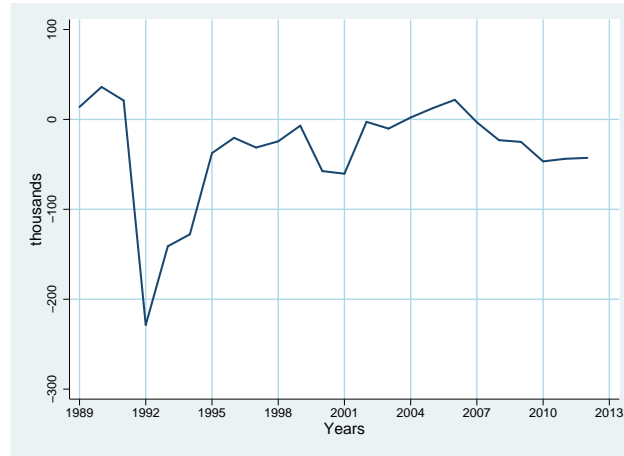
6 Appendix
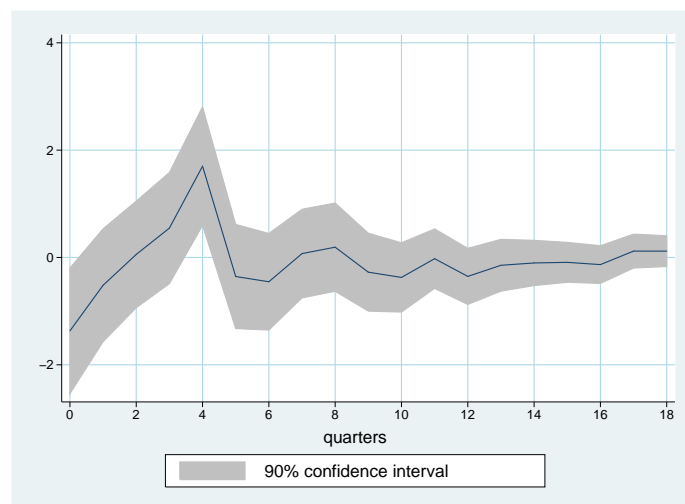

Figure 1: Net migration (individuals in thousands)

Figure 2: The response of net migration in thousands one-standard deviation shock to first-differenced remittances. Time span: 2000Q1 - 2012Q4.

Variable	Mean	Std. Dev.	Min.	Max.	N
Individual characteristics					
Age	35.128	9.254	19	52	2622
Gender (male=0, female=1)	0.645	0.479	0	1	2622
Marital status (single=0, married=1)	0.625	0.484	0	1	2622
Marital status among female	0.423	0.494	0	1	2622
Intention to move abroad (yes=1)	0.339	0.473	0	1	2621
Number of dependents over 65	0.43	0.662	0	4	2581
Number of dependents under 18	1.22	1.154	0	8	2593
Education					
Years of schooling	12.131	2.448	3	21	2621
Fit of education to work	2.319	1.038	0	3	1658
Education level	4.358	1.415	1	7	2621
Taking further education (yes=1)	0.194	0.396	0	1	2593
Work					
Skill fit to work	6.713	5.517	0	14	2622
Holding second job (yes=1)	0.062	0.242	0	1	1704
Work status (working=1)	0.328	0.47	0	1	2622
Hours worked	28.927	25.898	0	99	2503
Work income, 1000 AMD	97.675	1591.064	0	77808	2396
Career perspectives	1.896	0.675	1	3	1657
Looking for job	0.597	0.491	0	1	1602
Household characteristics					
Remitt-s from household members, 1000 AMD	30.254	327.495	0	11175	2488
Inter-household remittances, 1000 AMD	123.825	1130.345	0	37250	2341
Financial situation of household	1.496	0.982	0	4	2622
Households in rural areas	0.314	0.464	0	1	2622
House type (apartment=0, house=1)	0.543	0.531	0	2	2621
Home ownership (rented=0, own=1)	0.958	0.202	0	1	2615
Income from social transfers, 1000 AMD	18.289	33.372	0	700.	2542
Household size	4.742	1.86	1	13	2621
Migrant(s) in household (migrant=1)	0.127	0.333	0	1	2622
Number of migrants in household	0.291	0.855	0	5	2592
Number of migrants in Euro-Asian Neighbors	0.223	0.743	0	3	2600
Number of migrants in EU members	0.017	0.197	0	3	2592
Number of migrants in USA and Canada	0.006	0.107	0	3	2592
Distance from Yerevan	1.179	0.954	0	2.5	2622
Marz border with Azerbaijan	0.164	0.37	0	1	2622
Marz border with Georgia	0.22	0.415	0	1	2622
Rural and border with Azerbaijan	0.089	0.285	0	1	2622
Rural and border with Georgia	0.090	0.287	0	1	2622

Source: ETF Potential Migration Survey.

Table 2: Regression results from the linear model

	Migration		Remittances		Intentions	
	coefficient	t-value	coefficient	t-value	coefficient	t-value
Migration			-0.2747	[-1.941]*	0.3048	[2.159]**
Remittances					0.4614	[3.094]***
Instruments for migration						
Household size	0.0493	[3.957]***				
Household size $\times$Gini$_{2010}$	-0.0007	[-2.135]**				
Fin_sit$_{neighb}\times$ Corr$_{2010}$	0.0045	[3.892]***				
House type	0.0319	[2.330]**				
Border$_{AZE}$	-0.0763	[-4.155]***				
Rooms	-0.0312	[-6.022]***				
Years of schooling	0.0041	[1.655]*				
Instruments for remittances						
Household size $\times$ Distance			0.0113	[3.652]***		
Distance			-0.0933	[-4.791]***		
Poverty$_{2010}$			0.0091	[5.223]***		
Rural			-0.0903	[-4.280]***		
Rural $\times$ Border$_{AZE}$			0.1019	[3.345]***		
Rural $\times$ Border$_{GEO}$			0.1263	[4.680]***		
Control variables						
Married	-0.0962	[-6.433]***	-0.0490	[-2.307]**		
Work status	-0.0356	[-2.328]**	-0.0661	[-3.367]***	0.1051	[4.200]***
Age	0.0021	[2.541]**	0.0022	[2.175]**	-0.0052	[-4.443]***
Home ownership	0.0220	[0.690]	0.0377	[0.947]	-0.2058	[-4.149]***
Female	0.0395	[2.788]***	0.0414	[2.217]**	-0.1067	[-4.622]***
Dependent (old)	-0.0239	[-2.258]**	-0.0331	[-2.576]**	-0.0309	[-1.977]**
Fin_sit$_{neighb}$	-0.0165	[-1.543]	-0.0022	[-0.225]	-0.0440	[-3.785]***

t statistics in brackets

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Hansen statistic: 19.858 (p-value $= 0.705$)

Table 3:   Regression results from the recursive multivariate model

	Migration		Remittances		Intentions	
	coefficient	t-value	coefficient	t-value	coefficient	t-value
Migration			-0.4224	[-1.784]*	0.7760	[3.058]***
Remittances					0.5321	[2.035]**
Instruments for migration						
Household size	0.1989	[3.150]***				
Household size $\times$ Gini$_{2010}$	-0.0025	[-1.569]				
Fin_sit$_{neighb}\times$ Corr$_{2010}$	0.0224	[3.610]***				
House type	0.1506	[2.051]**				
Border$_{AZE}$	-0.4213	[-4.097]***				
Rooms	-0.1340	[-3.921]***				
Years of schooling	0.0192	[1.358]				
Instruments for remittances						
Household size $\times$ Distance			0.0333	[3.111]***		
Distance			-0.3281	[-4.347]***		
Poverty$_{2010}$			0.0348	[4.590]***		
Rural			-0.3724	[-3.905]***		
Rural $\times$ Border$_{AZE}$			0.4537	[3.269]***		
Rural $\times$ Border$_{GEO}$			0.4546	[4.279]***		
Control variables						
Married	-0.4529	[-6.017]***	-0.1520	[-2.043]**		
Work income	-0.1665	[-2.164]**	-0.2453	[-3.632]***	0.2444	[3.916]***
Age	0.0089	[2.159]**	0.0078	[2.120]**	-0.0135	[-4.356]***
Home ownership	0.1527	[0.792]	0.1790	[0.993]	-0.5050	[-3.989]***
Female	0.2198	[2.936]***	0.1462	[2.178]**	-0.2623	[-4.544]***
Dependent (old)	-0.1352	[-2.579]***	-0.1214	[-2.564]**	-0.1066	[-2.550]**
Fin_sit$_{neighb}$	-0.0807	[-1.394]	-0.0089	[-0.245]	-0.1301	[-4.275]***

t statistics in brackets

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. $\rho_{12} = 0.772$, $\rho_{13} = -0.332$, $\rho_{23} = -0.312$.

Table 4: Cross tabulation (variables in bold)

| Intention to move abroad | Migrant in family | | |
	No migrant in a family	Migrant in a family	Total
Stay at home	1,550	187	1,737
Intention to migrate	745	147	892
Total	2,295	334	2,629

Source: ETF Potential Migration Survey.

Table 5: Cross tabulation (variables in bold)

| Migrant in family | Sent remittances from family member | | |
	No remittances sent	Remittances sent	Total
No migrant in a family	2,015	186	2,201
Migrant in a family	189	106	295
Total	2,204	292	2,496

Source: ETF Potential Migration Survey.

Table 6: Cross tabulation (variables in bold)

| Intention to move abroad | Sent remittances from family member | | |
	No remittances sent	Remittances sent	Total
Stay at home	1,484 (67.36%)	163 (55.82%)	1,647
Intention to migrate	719 (32.64%)	129 (44.18%)	848
Total	2,203 (100%)	292 (100%)	2,495

Source: ETF Potential Migration Survey.

Table 7: Cross tabulation (variables in bold) for households with current migrant(s)

| Intention to move abroad | Sent remittances from family member | | |
	No remittances sent	Remittances sent	Total
Stay at home	116 (61.70%)	49 (46.22%)	165
Intention to migrate	72 (38.20%)	57 (53.78%)	129
Total	188 (100%)	106 (100%)	294

Source: ETF Potential Migration Survey.

Table 8: **Average intention to emigrate in villages, towns and capital.** Standard errors are in parentheses, * - significance at 10% level.

	Respondents in villages	Respondents in towns	Total in each category
Intention (yes=1, no=0)	0.316* (.016)	0.357* (.017)	823, 814
	in villages	in capital	
Intention	0.316 (016)	0.344 (.015)	823, 992
	in towns	in capital	
Intention	0.357 (.016)	0.344 (.015)	814, 992

Source: ETF Potential Migration Survey.

Table 9: **Average intention to emigrate among house owners in villages, towns and capital.** Standard errors are in parentheses, * - significance at 10% level.

	Respondents in villages	Respondents in towns	Total in each category
Intention (yes=1, no=0)	0.305 (.017)	0.349 (.028)	747, 292
	in villages	in capital	
Intention	0.305* (.017)	0.364* (.028)	747, 297
	in towns	in capital	
Intention	0.349 (.028)	0.364 (.028)	292, 297

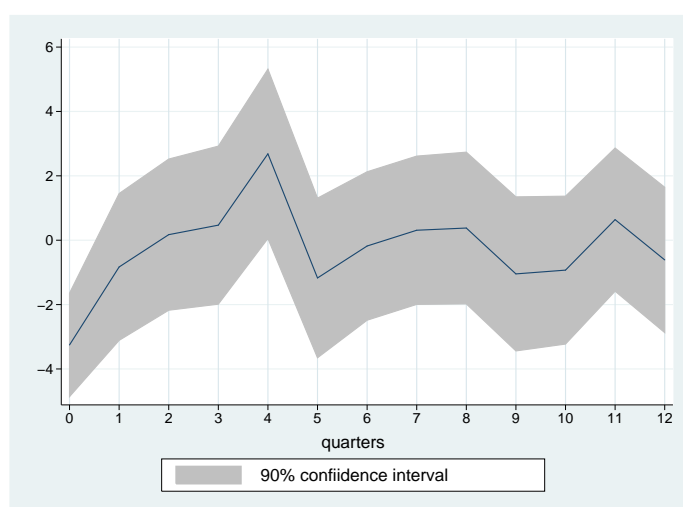*Source: ETF Potential Migration Survey.*

Figure 3: The response of net migration in thousands one-standard deviation shock to first-differenced remittances. Time span: 2004Q1 - 2012Q4. Source: National Statistical Service of Republic of Armenia, Central Bank of Armenia.

Table 10: Regression results from the linear model: remittances from *all* sources

	Migration		Remittances		Intentions	
	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value
Migration			-0.1024	[-0.676]	0.2122	[1.463]
Remittances					0.4420	[3.118]***
Instruments for migration						
Household size	0.0401	[3.096]***				
Household size $\times$Gini$_{2010}$	-0.0004	[-1.303]				
Fin_sit$_{neighb}\times$ Corr$_{2010}$	0.0047	[3.875]***				
House type	0.0359	[2.506]**				
Border$_{AZE}$	-0.0661	[-3.495]***				
Rooms	-0.0336	[-6.281]***				
Years of schooling	0.0045	[1.731]*				
Instruments for remittances						
Household size $\times$ Distance			0.0120	[3.500]***		
Distance			-0.0983	[-4.561]***		
Poverty$_{2010}$			0.0094	[4.893]***		
Rural			-0.0909	[-3.894]***		
Rural $\times$ Border$_{AZE}$			0.1031	[3.045]***		
Rural $\times$ Border$_{GEO}$			0.1272	[4.210]***		
Control variables						
Married	-0.0948	[-6.281]***	-0.0586	[-2.563]**		
Work income	-0.0359	[-2.341]**	-0.0853	[-4.107]***	0.1118	[4.359]***
Age	0.0020	[2.479]**	0.0024	[2.157]**	-0.0052	[-4.453]***
Home ownership	0.0227	[0.713]	-0.0314	[-0.745]	-0.1744	[-3.580]***
Female	0.0396	[2.798]***	0.0343	[1.734]*	-0.1020	[-4.514]***
Dependent(old)	-0.0232	[-2.185]**	-0.0298	[-2.185]**	-0.0332	[-2.163]**
Fin_sit$_{neighb}$	-0.0175	[-1.595]	-0.0036	[-0.357]	-0.0434	[-3.757]***

t statistics in brackets

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Hansen statistic: 23.705 (*p*-value = 0.477)

Table 11: Regression results from the recursive multivariate model: remittances from *all* sources

	Migration		Remittances		Intentions	
	coefficient	*t*-value	coefficient	*t*-value	coefficient	*t*-value
Migration			-0.2362	[-0.749]	0.6129	[2.556]**
Remittances					0.8119	[3.436]***
Instruments for migration						
Household size	0.1507	[2.125]**				
Household size $\times$Gini$_{2010}$	-0.0014	[-0.825]				
Fin_sit$_{neighb}\times$ Corr$_{2010}$	0.0242	[3.638]***				
House type	0.1576	[2.120]**				
Border$_{AZE}$	-0.3584	[-3.470]***				
Rooms	-0.1463	[-4.344]***				
Years of schooling	0.0205	[1.436]				
Instruments for remittances						
Household size $\times$ Distance			0.0342	[3.306]***		
Distance			-0.3107	[-4.366]***		
Poverty$_{2010}$			0.0314	[4.603]***		
Rural			-0.3249	[-3.858]***		
Rural $\times$ Border$_{AZE}$			0.3657	[2.819]***		
Rural $\times$ Border$_{GEO}$			0.4101	[4.096]***		
Control variables						
Married	-0.4287	[-5.594]***	-0.1876	[-2.618]***		
Work income	-0.1917	[-2.492]**	-0.2778	[-4.314]***	0.2737	[4.371]***
Age	0.0087	[2.080]**	0.0075	[2.152]**	-0.0136	[-4.417]***
Home ownership	0.1689	[0.885]	-0.0645	[-0.451]	-0.4512	[-3.490]***
Female	0.2286	[3.000]***	0.1207	[1.833]*	-0.2648	[-4.635]***
Dependent (old)	-0.1272	[-2.368]**	-0.0942	[-2.050]**	-0.1024	[-2.490]**
Fin_sit$_{neighb}$	-0.0895	[-1.494]	-0.0042	[-0.122]	-0.1226	[-4.055]***

t statistics in brackets

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. $\rho_{12} = 0.700$, $\rho_{13} = -0.328$, $\rho_{23} = -0.412$.
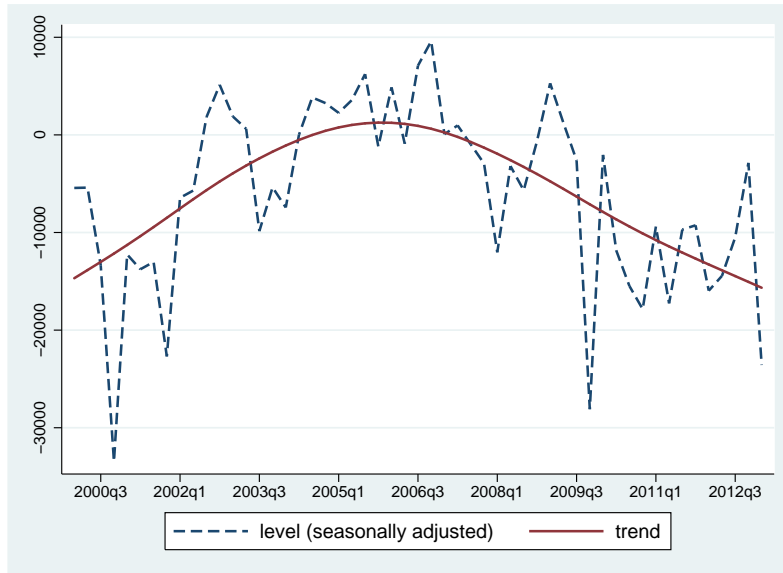
Figure 4: Net migration (number of individuals). Source: State Migration Service of Armenia
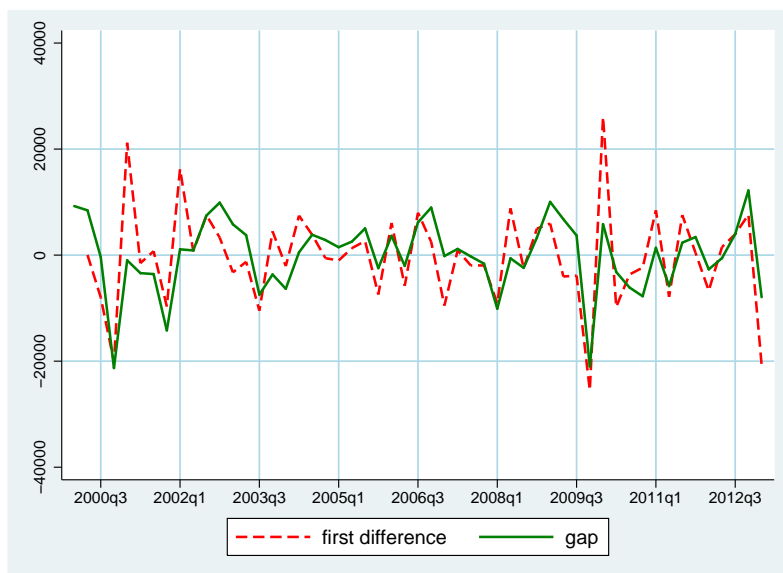

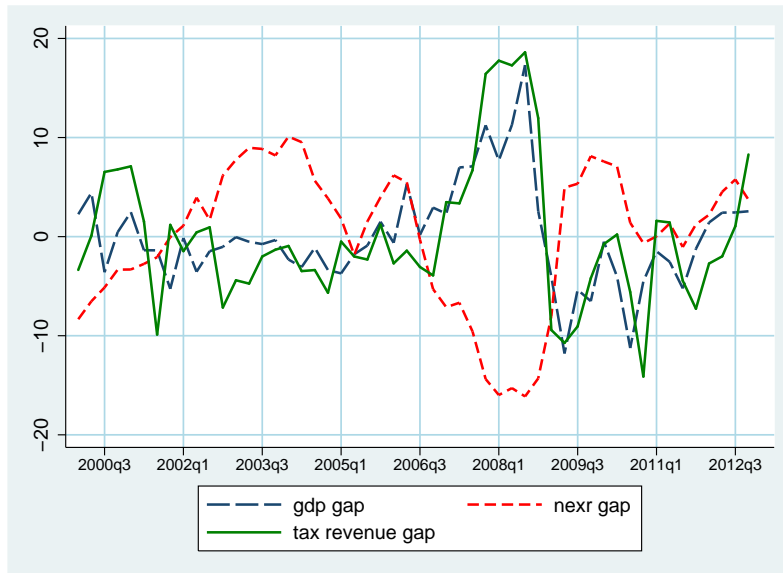Figure 5: Net migration (number of individuals). Source: State Migration Service of Armenia

Figure 6: GDP gap, nominal exchange rate gap and tax revenue gap. Source: National Statistical Service of Republic of Armenia, Central Bank of Armenia.
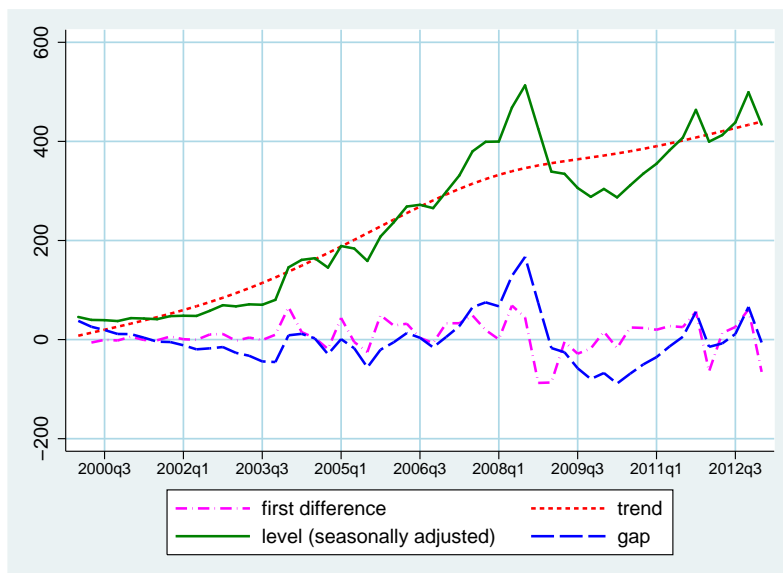

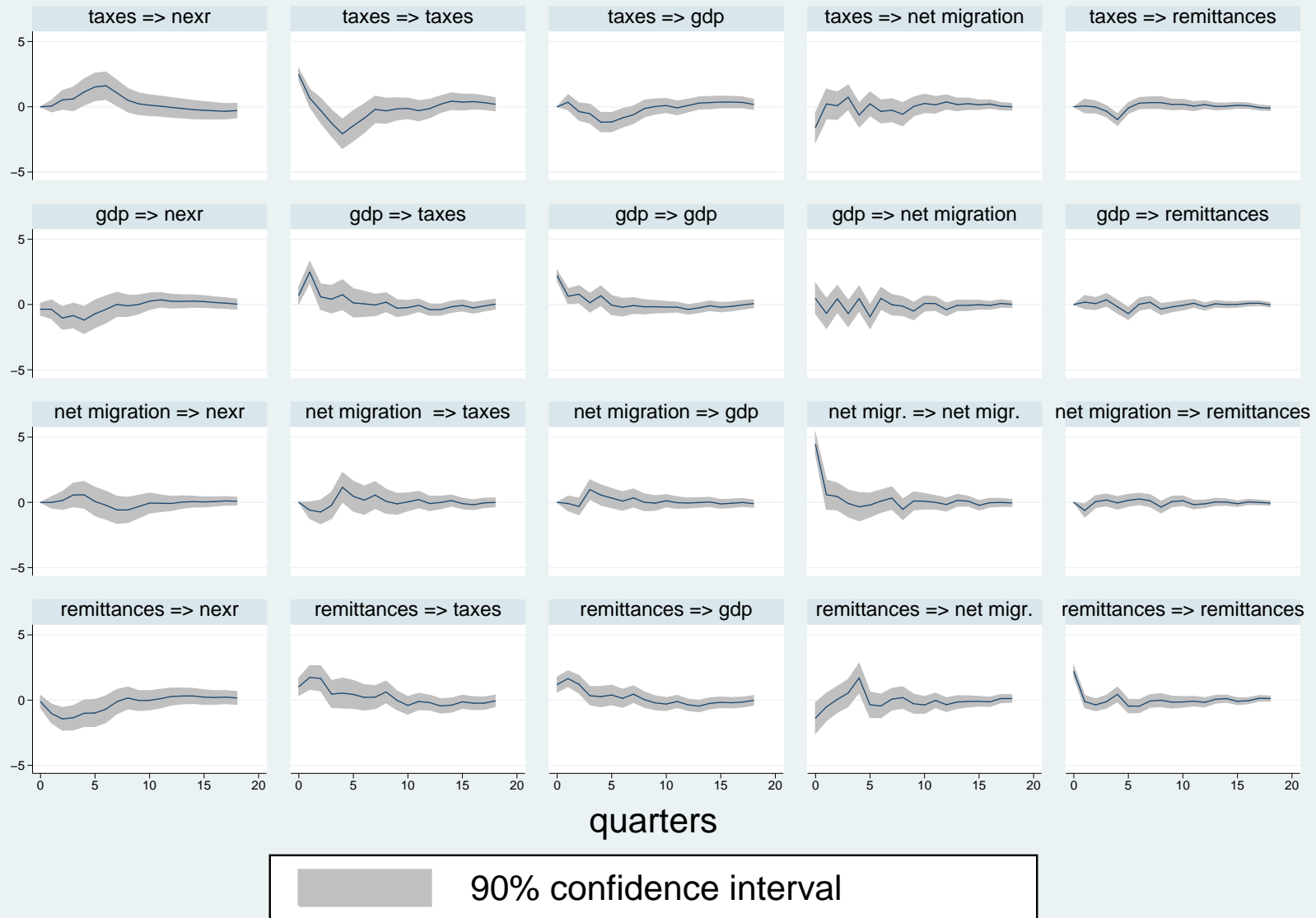Figure 7: Remittances in current USD mln. Source: National Statistical Service of Republic of Armenia

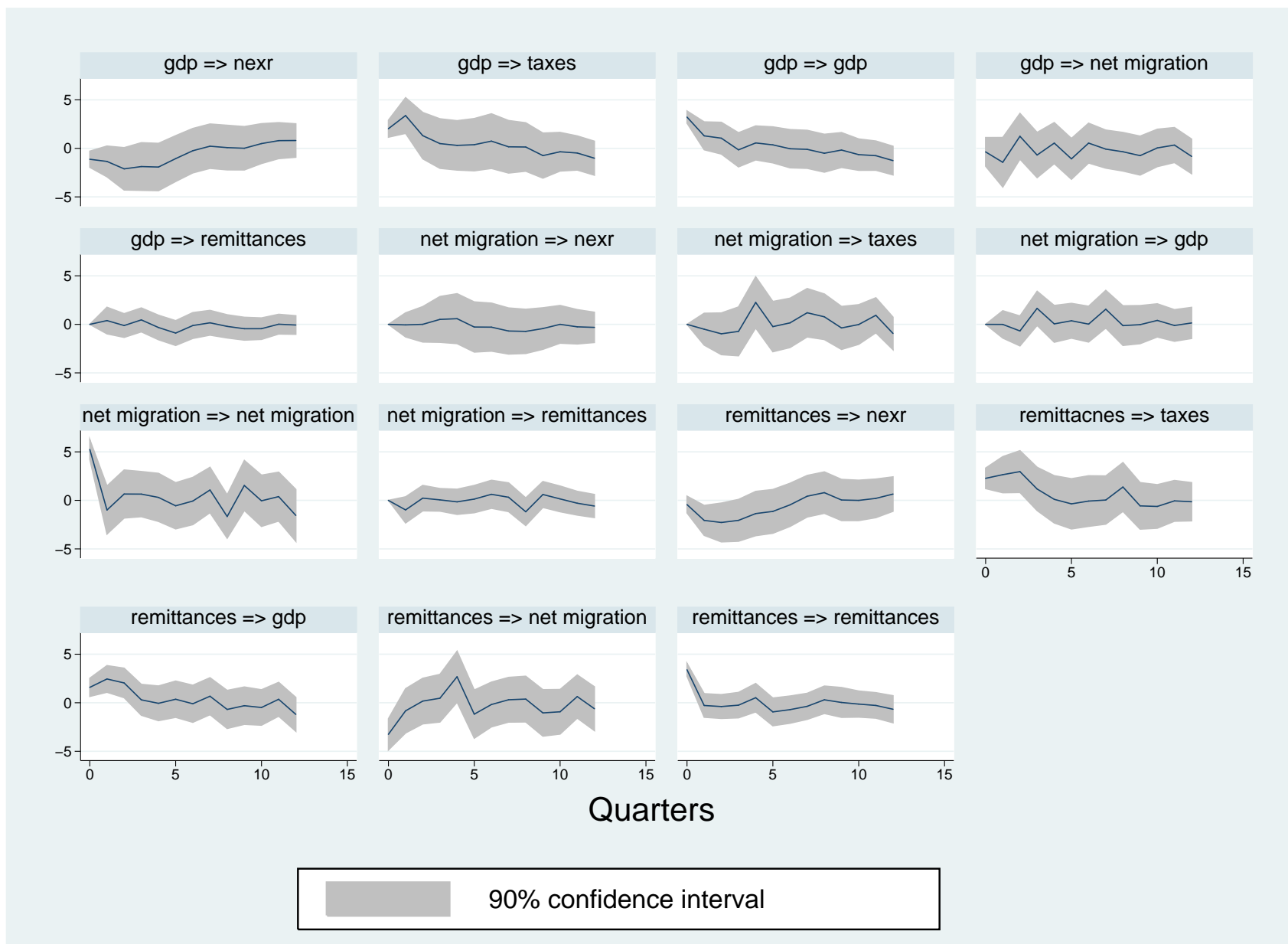Figure 8: Structural impulse responses for 2000Q1 - 2012Q4.

Figure 9: Structural impulse responses for the model without inflation (CPI gap). Standard errors and degrees of freedom are small-sample adjusted. Time span: 2004Q1 - 2012Q4.

References

Richard H. Adams and John Jr. Page. International migration, remittances, and poverty in developing countries. Policy Research Working Paper Series 3179, The World Bank, December 2003.

Alberto Alesina and Paola Giuliano. The power of the family. *Journal of Economic Growth*, 15(2):93–125, June 2010.

Catalina Amuedo-Dorantes and Susan Pozo. Migration, remittances, and male and female employment patterns. *American Economic Review*, 96(2):222–226, May 2006.

Edgar Begrakyan and Aleksandr Grigoryan. Inequality, growth and industry structure: Evidence from armenia. Technical report, AUA, CBA, December 2012.

Ben S Bernanke and Alan S Blinder. The federal funds rate and the channels of monetary transmission. *American Economic Review*, 82(4):901–21, September 1992.

B Douglas Bernheim, Andrei Shleifer, and Lawrence H Summers. The strategic bequest motive. *Journal of Political Economy*, 93(6):1045–76, December 1985.

Olivier Blanchard and Roberto Perotti. An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *The Quarterly Journal of Economics*, 117(4):pp. 1329–1368, 2002.

George J. Borjas. Self-selection and the earnings of immigrants. *The American Economic Review*, 77(4):pp. 531–553, 1987.

Lorenzo Cappellari and Stephen P. Jenkins. Multivariate probit regression using simulated maximum likelihood. *Stata Journal*, 3(3):278–294, September 2003.

Ralph Chami, Samir Jahjah, and Connel Fullenkamp. Are immigrant remittance flows a source of capital for development. IMF Working Papers 03/189, International Monetary Fund, September 2003.

Donald Cox, Zekeriya Eser, and Emmanuel Jimenez. Motives for private transfers over the life cycle: An analytical framework and evidence for peru. *Journal of Development Economics*, 55:57–80, January 1998.

H. de Haas. *Remittances, Migration and Social Development: A Conceptual Review of the Literature*. Social policy and development programme paper. United Nations Research Institute for Social Development, 2007.

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

Zvezda Dermendzhieva. Emigration from the south caucasus: who goes abroad and what are the economic implications? *Post-Communist Economies*, 23(3), 2011.

Christian Dustmann and Oliver Kirchkamp. The optimal migration duration and activity choice after re-migration. IZA Discussion Papers 266, Institute for the Study of Labor (IZA), February 2001.

EUI. Migration facts in armenia. Technical report, European University Institute, 2013. URL `www.migrationpolicycentre.eu/docs/fact.../Factsheet%20Armenia.pdf`.

Antonio Fats and Ilian Mihov. The effects of fiscal policy on consumption and employment: Theory and evidence. CEPR Discussion Papers 2760, C.E.P.R. Discussion Papers, April 2001.

W. H. Greene. *Econometric Analysis*. Upper Saddle River, NJ: PrenticeHall, 6 edition, 2008.

David A. Grigorian and Tigran A. Melkonyan. Destined to receive: The impact of remittances on household decisions in armenia. *Review of Development Economics*, 15(1): 139–153, 2011. ISSN 1467-9361.

John R Harris and Michael P Todaro. Migration, unemployment & development: A two-sector analysis. *American Economic Review*, 60(1):126–42, March 1970.

James J. Heckman. The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. In *Annals of Economic and Social Measurement, Volume 5, number 4*, NBER Chapters, pages 475–492. National Bureau of Economic Research, Inc, 1976.

James J. Heckman. Dummy endogenous variables in a simultaneous equation system. *Econometrica*, 46(4):pp. 931–959, 1978.

John Hoddinott. A model of migration and remittances applied to western kenya. *Oxford Economic Papers*, 46(3):pp. 459–476, 1994.

ILO. Migration and development: Armenia country study. Technical report, International Labour Organization, 2009. URL `www.ilo.org/public/english/region/eurpro/.../migr_dev_study_en.pdf`.

IMF. Remittances in armenia: dynamic patterns and drivers. Technical report, International Monetary Fund, 2012. URL `http://www.imf.org/external/country/arm/rr/2012/062012.pdf`.

IOM. Migration in armenia: A country profile 2008. Technical report, International Onrganization for Migration, 2008. URL `http://publications.iom.int/bookstore/index.php?main_page=product_info&products_id=501`.

Robert E B Lucas and Oded Stark. Motivations to remit: Evidence from botswana. *Journal of Political Economy*, 93(5):901–18, October 1985.

G. S. Maddala and Lung-Fei Lee. Recursive models with qualitative endogenous variables. In *Annals of Economic and Social Measurement, Volume 5, number 4*, NBER Chapters, pages 525–545. National Bureau of Economic Research, Inc, November 1976. URL `http://ideas.repec.org/h/nbr/nberch/10494.html`.

Philip L. Martin and Edward J. Taylor. The anatomy of a migration hump. *Development strategy, employment, and migration: Insights from models*, 19(3):pp. 43–62, 1996.

Douglas S Massey. Economic development and international migration in comparative perspective. *Population and Development Review*, 14(3):pp. 383–413, 1988.

Douglas S. Massey, Joaquin Arango, Graeme Hugo, Ali Kouaouci, Adela Pellegrino, and J. Edward Taylor. Theories of international migration: A review and appraisal. *Population and Development Review*, 19(3):pp. 431–466, 1993.

Tigran A. Melkonyan and David A. Grigorian. Microeconomic implications of remittances in an overlapping generations model with altruism and a motive to receive inheritance. *The Journal of Development Studies*, 48(8):1026–1044, March 2011.

Hillel Rapoport and Frdric Docquier. The economics of migrants remittances. IZA Discussion Papers 1531, Institute for the Study of Labor (IZA), March 2005.

Hillel Rapoport and Frederic Docquier. Are migrant minorities strategically self-selected? *Journal of Population Economics*, 11(4):579–588, 1998.

Nooman Rebei. Characterization of the dynamic effects of fiscal shocks in a small open economy. Working paper 2004-41, Bank of Canada, 2004.

Scott Rozelle, J. Edward Taylor, and Alan deBrauw. Migration, remittances, and agricultural productivity in china. *The American Economic Review*, 89(2):pp. 287–291, 1999.

J. Scott Shonkwiler, David Grigorian, and Tigran Melkonyan. Controlling for the underreporting of remittances. *Applied Economics*, 43(30):4817–4826, 2011.

Christopher A Sims. Macroeconomics and reality. *Econometrica*, 48(1):1–48, January 1980.

Larry A. Sjaastad. The costs and returns of human migration. *Journal of Political Economy*, 70(5):pp. 80–93, 1962.

Oded Stark. *Altruism and Beyond*. Cambridge Books. Cambridge University Press, 1995.

Oded Stark and David E Bloom. The new economics of labor migration. *American Economic Review*, 75(2):173–78, May 1985.

Oded Stark and Robert E B Lucas. Migration, remittances, and the family. *Economic Development and Cultural Change*, 36(3):465–81, April 1988.

J. Edward Taylor. The new economics of labour migration and the role of remittances in the migration process. *International Migration*, 37:63–88, 1999.

Valery Tishkov, Zhanna Zayinchkovskaya, and Galina Vitkovskaya. Migration in the countries of the former soviet union. Technical report, Global Commision of Internatonal Migration, September 2005.

Michael P. Todaro. A model for labor migration and urban unemployment in less developed countries. *American Economic Review*, 59(1):138–48, March 1969.

H.P. Van Dalen, G. Groenewold, and T. Fokkema. The effect of remittances on emigration intentions in egypt, morocco, and turkey. *Population Studies*, 59(3):375–392, November 2005.

Jeffrey M Wooldridge. *Econometric Analysis of Cross Section and Panel Data*, volume 1 of *MIT Press Books*. The MIT Press, September 2010.

Armen Yeghiazaryan, Vahram Avanesian, and Nelson Shahnazaryan. How to reverse emigration? Technical report, jointly with "Ameria" CJSC, 2003. URL `http://www.amerialegal.am/pdf/d5c0447534321fa8e3db55f97def1070.pdf`.