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Remittances, lagged dependent variables and migration stocks as determinants of migration from developing countries

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Remittances, lagged dependent variables and migration stocks as determinants of migration from developing countries

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Abstract. In regressions for net immigration flows of developing countries we show that (i) savings finance emigration and worker remittances serve to make staying rather than migrating possible until a certain value, beyond which the opposite holds; (ii) lagged dependent migration flows have a negative sign even in the presence of migration stock variables; (iii) migration stocks have S-shaped effects: at sufficiently low values higher migration stocks support emigration; beyond a threshold value they support net immigration before they possibly support emigration again after a second threshold value.
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Introduction

Clark et al. (2007) have pointed out that the literature on estimation of the determinants of migration is surprisingly short. We try to improve this literature in three ways. (i) Recent data on migration stocks in six OECD countries by country of origin make it possible to include stocks into migration regressions. This has not been done so far. It allows us to show that there are threshold values in the migration stock variable in regard to net immigration for developing countries. (ii) There are only a few papers (Mayda 2007, Naudé 2008, Ziesemer 2008a,b) dealing with developing countries that use lagged dependent variables and the adequate dynamic panel data method dealing with it. In Mayda's paper on bilateral data the only regressor that survives the introduction of the lagged dependent variable is the income difference between destination and origin countries. Naudé (2008) and Ziesemer (2008a, b) find significantly negative coefficients of lagged dependent variables without employing migration stock data. We employ lagged dependent flows, migration stocks and other variables and show that the sign of the lagged dependent variable remains negative. (iii) There are only two papers (Ziesemer 2008a, b) that use remittances as a regressor although '… direct returns to the nonmigrating family from the migration of a family member are his or her remittances.' (Stark and Bloom 1985). We show that remittances also play a significant role when the regressors mentioned before and savings are statistically significant.

Empirical and theoretical considerations regarding related literature

In this section we briefly motivate the regressors used when explaining net immigration of developing countries. The most frequently used variable in migration regressions is the income difference between areas of destination and origin since Todaro (1969). The problem of not knowing the country of destination is often circumvented by using the income of the USA or the OECD as a proxy.[1] Of course, many migrants go to other countries than those of the OECD, but OECD countries are the end of the chains of destination such as those from Pakistan to India to the USA, or from Latin American countries via Mexico to the USA, or from the former USSR to Poland and Hungary and from there to Western European countries (see Ratha and Shaw 2007).

[1] With the better availability of bilateral data this can be improved. But bilateral data are not available for example for remittances. They are currently constructions transforming balance of payments data of countries into bilateral information by use of models (see Ratha and Shaw 2007).

Lagged dependent flow variables in migration regressions have been used to proxy for the stock of migrants and the size of the network for which no data were available. They were considered to be a weak substitute for the availability of stock data. When stock variables were included the sign of the lagged dependent variable was positive (see Hatton 1995, for UK emigration data 1870-1913). In Naudé (2008) and Ziesemer (2008a, b) the sign of the lagged dependent migration flow variable of developing countries is negative, but they do not include stock variables. This raises the question whether or not it will remain negative when a stock variable is added to indicate the network effect and the lagged dependent variable may reflect the effect of behaviour after having helped a migrant earlier? After having helped migrants five years earlier, the network is larger if it did not shrink for other reasons (see Light et al. 1993) and therefore could help more people migrating, but financial means of those who did help may be more stressed and the necessity to migrate may also be negatively correlated with those five years earlier. Thus, the expected sign is a priori unclear.

The modern theory of migration has argued that one of the major motives for migration is the avoidance of capital market imperfections (Rapoport and Docquier 2006). One of the intentions of the family that sends a migrant is to use the remittances to finance investment and consumption expenditures at home, and remittances serve as source of foreign exchange (Massey 1988) and diversify against income risk Massey (1993). Therefore remittances should have the effect to allow family members either to stay at home and invest there or to finance other family members' migration using remittances besides savings from domestic income. If the first of these ideas dominates the expected sign is positive for the regression of net immigration of the country of origin on remittances and if the second one dominates we expect a negative impact of remittances on net immigration.

Migration generates costs paid from wages, income or savings. As we use income already in the difference with destination countries' income we add savings here.

The central task of networks of migrants is to help migrants reducing the cost of their migration. To be successful in doing so it might be necessary for the network to have a certain size. For this size the stock of migrant is used as an indicator. However, this may also hold for return migration and the question then is which effect is stronger and for which we perhaps have a threshold. Again, the sign of the variable is a priori unclear. The regression equation we get from this line of thought is as follows:

$$nm/l = c_1 + c_2 nm(-5)/l(-5) + c_3(\log(oec)-\log(gdppc)) + c_4 wr/gdp + c_5 savgdp + c_6 migst/l + u$$

nm is net migration, *l* the labour force, *oec* the GDP per capita of the OECD countries, *gdppc* that of the country of origin, *savgdp* the percentage of gross savings as a share of GDP multiplied by hundred, *wr* worker remittances, *migst* the stock of migrants in the six OECD countries by country of origin, and *u* a residual. In order to correct for country size we express some of the variables as percentage of the GDP or of the labour force. More lags, logs and squares and other variants of specifications are indicated in Table1 containing the results.

Data and econometric method

We take most data from the World Development Indicators. The only exception are the Worldbank data on migrations stocks in six OECD countries (USA, Canada, Australia, UK, France and Germany) named Docquier (1975-2000)[2]. These stock data are only rough proxies for the migration stocks by country of origin because many other countries of destination host migrants as well. Net immigration flow data are estimated by the United Nations Population Division and are available for five year intervals. We express migrants as a share of the labour force, because more than 75% of those going to the USA are in the age group of 14-65 (Clark et al. 2004). Worker remittances received are from the IMF Balance of Payments Statistics Yearbook and contain payments to workers who are (intended to be) employed for more than one year. GDP per capita data in constant US dollars with the base year 2000 stem from the National Accounts. Gross savings are calculated as gross national income less total consumption, plus net transfers.

We estimate the migration regressions for three samples of countries (excluding OECD countries), those above $1200 and those below it, and a joint sample (see appendix for the names of the countries). These groups have performed quite differently in the past. The richer sample had growth rates of the GDP per capita above 2% and therefore higher ones than the OECD and the poorer sample had growth rates below 1% and was therefore diverging from the OECD.

[2] http://siteresources.worldbank.org/INTRES/Resources/469232-1107449512766/Docquier_1975-2000_data_Panel.xls.

Moreover, the poorer countries may have more emigration when getting richer, whereas the richer countries may be expected to have less (see Clark et al. 2007).

Because migration data are available only in five year intervals we will have a time dimension of only four or five periods. For dynamic panels with a relatively short time dimension the preferred method is the system GMM estimator, with or without the use of the orthogonal deviation method of Arellano-Bover (see Baltagi 2005, chap.8). The latter is similar to a systems GMM estimator, which uses one equation in levels and replaces the first difference equation of the systems GMM estimator by orthogonal deviations. The migration stock data are available for six five-year periods, from 1975 to 2000. As we will use five and ten years lags and the orthogonal deviation methods takes another five-year lag, the time dimension will ultimately be reduced to three periods. Because of missing data in the unbalanced panel the number of countries is fairly small. Therefore we also estimate the migration regression for the joint sample.

Results

We interpret the results in Table 1 as follows. The lagged dependent variable has a negative sign although we have included the migration stock variable. The income difference has a positive impact on migration (see Figure A1) until the income ratio of the OECD and the sample average is about 37 in the poor sample, 61 in the rich sample, and 103 in the joint sample. Here the incentive is likely to be large enough and additional increases do not make a difference. This point is reached earlier the poorer people are. Obviously there is some heterogeneity here among the country groups with non-linearities allowing the large sample to have values outside the range of those of the smaller samples. Worker remittances have a positive long term impact on net immigration until they reach a value of 6.1% for the poor sample and 7.4% for the rich sample and 10.3% for the total sample (see Figure A2). These values are below the panel average plus one standard deviation. Motives for staying at home and financing expenditures dominate until these values, but beyond these values remittances support emigration. Savings ratios have a positive impact on emigration, and more strongly so in poorer countries. In less poor countries this effect is relatively small though. Migration stocks have an S-shaped impact on net immigration (see Figure A3). They first support emigration to a decreasing extent. The minimum value occurs at 2% of the migrant stock as a share of the domestic labour force for the poor sample, at 7.1% for the rich sample and at 10.35% for the large sample.[3] As the panel average of the migration stock is 2% for the small and 8.7% for the richer sample, we can roughly say that in the neighborhood of the average sample value there is a turning point or threshold value for the migration stock to support net immigration, perhaps through return migration. The second turning point or maximum of the S-shaped curve is at a value of 5% for the poor countries where increases in migration stocks support emigration again (most of the data are below a value of 0.1; see last figure in the appendix). For the less poor sample and the total sample this is at 51% and 53% respectively, which is still within the sample and perhaps indicates that the cubic term is more than just a smoothing of the quadratic term. Qualitatively results are similar, but quantitatively they differ quite a bit between poor and less poor countries.

Conclusion

We have presented three new empirical results summarized in the abstract. The negative sign of lagged net immigration inflows show that migration dynamics have strong self-stabilizing forces which work against income differences between rich and poor countries as a strong incentive for migration. The S-shaped impact of larger migration stocks on emigration shows that networks first support emigration and later slow it down and support return migration and support emigration again at high values, implying two thresholds. For policy conclusions the result in regard to remittances is important. If lower taxes and fees on remittances provide an incentive to enhance remittances they reduce emigration (and vice versa) for values of remittances as a share of GDP below the average plus one half standard deviation.

[3] The panel average of the migration stocks as a percentage of the labour force of the country of origin is 2% for the small and 8.7% for the richer and 5% for the large sample. The standard deviation is 7.65%, 14% and 11.8% respectively. The maximum values are 85%, 77% and 85% respectively.

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Table 1: Results for migration regressions

Dependent variable: Net immigration as percent of the labour force

Regressors \ sample	Poor	Less poor	Large
NM(-5)/L(-5)	-0.314	-0.341	-0.298
	0.020	0.000	0.022
LOG(OEC)-LOG(GDPPC)	-3.393	-0.314	-0.300
	0.003	0.009	0.023
$(LOG(OEC)-LOG(GDPPC))^2$	0.818	0.038	0.032
	0.009	0.042	0.032
$(LOG(OEC)-LOG(GDPPC))^3$	-0.064	-	-
	0.003	-	-
WR/GDP	2.077	-	-
	0.004	-	-
$(WR/GDP)^2$	-24.262	-	2.062
	0.016	-	0.183
WR(-5)/GDP(-5)	-	2.571	1.845
	-	0.000	0.000
$(WR(-5)/GDP(-5))^2$	22.007	-17.395	-13.903
	0.000	0.000	0.000
WR(-10)/GDP(-10)	3.171	-	-
	0.000	-	-
$(WR(-10)/GDP(-10))^2$	-40.594	-	2.875
	0.000	-	0.042
SAVGDP(-2)	-	0.0036	-
	-	0.0051	-
SAVGDP(-3)	-0.002	-0.0037	-0.001
	0.000	0.009	-1.872
MIGST/L	-	-2.690	-3.304
	-	0.000	0.000
MIGST(-5)/L(-5)	-10.661	2.396	2.839
	0.007	0.000	0.000
$(MIGST/L)^2$	153.694	4.730	5.323
	0.023	0.001	0.000
$(MIGST(-5)/L(-5))^2$	208.278	-2.380	-2.640
	0.010	0.000	0.000
$(MIGST/L)^3$	-3100.415	-2.691	-2.827
	0.062	0.010	0.002
Period	1990-2000	1990-2000	1990-2000
Countries	18	18	35
Observations	34	39	73
S.E. of regression	0.009	0.023	0.022
J-statistic	10.500	18.980	26.208
Instrument rank	26	29	29
Sargan-Hansen p-value	0.57	0.33	0.051

p-values below coefficients
Transformation: Orthogonal Deviations
2SLS instrument weighting matrix. Instruments: see appendix.
Cross-section weights (PCSE) standard errors & covariance (d.f. corrected)

Appendix: Countries in the sample

Countries with GDP per capita above $1200 (2000) for which we have observations in the regressions presented in Table 1 are:
Belize, Brazil, China, Colombia, Dominican Republic, Egypt, El Salvador, Jamaica, Jordan, Malta, Mexico, Morocco, Panama, Togo, Trinidad and Tobago, Tunisia, Turkey.

Countries with GDP per capita below $1200 (2000) for which we have observations in the regressions presented in Table 1 are:
Bangladesh, Benin, Bolivia, Cameroon, Ghana, India, Indonesia, Madagascar, Mali, Mauritania, Niger, Nigeria, Pakistan, Philippines, Senegal, Sri Lanka, Vanuatu.

The large sample consists of all countries listed in the two groups above.

Appendix: instruments

When two lags are mentioned, this indicates the first and the last lag used for dynamic instruments. One lag indicates just a traditional instrument.

Instrument list for the poor sample: NM(-10)/L(-10), NM(-15)/L(-15), ((LOG(OEC)-LOG(GDPPC)),-1,-1), $((LOG(OEC)-LOG(GDPPC))^2$,-1,-1), $((LOG(OEC)-LOG(GDPPC))^3$,-1,-1), (WR(-1)/GDP(-1)), $((WR/GDP)^2$,-1,-2), WR(-10)/GDP(-10), $(WR(-5)/GDP(-5))^2$, $(WR(-10)/GDP(-10))^2$, SAVGDP(-3), (MIGST(-5)/L(-5)), $(MIGST(-5)/L(-5))^2$, $(MIGST(-10)/L(-10))^2$, $(MIGST(-5)/L(-5))^3$.

Instrument list for the less poor sample: NM(-10)/L(-10), ((LOG(OEC)-LOG(GDPPC)),-1,-3), $((LOG(OEC)-LOG(GDPPC))^2$,-1,-3), WR(-5)/GDP(-5), $(WR(-5)/GDP(-5))^2$, $(WR(-10)/GDP(-10))^2$, SAVGDP(-2), SAVGDP(-3), MIGST(-5)/L(-5), MIGST(-10)/L(-10), $(MIGST(-5)/L(-5))^2$, $(MIGST(-10)/L(-10))^2$, $(MIGST(-5)/L(-5))^3$.

Instrument list for the large sample: NM(-10)/L(-10), NM(-15)/L(-15), ((LOG(OEC)-LOG(GDPPC)),-1,-2), $((LOG(OEC)-LOG(GDPPC))^2$,-1,-2), $((WR/GDP)^2$,-1,-2), (WR(-5)/GDP(-5)), $(WR(-5)/GDP(-5))^2$, $(WR(-10)/GDP(-10))^2$, SAVGDP(-3), MIGST(-5)/L(-5), MIGST(-10)/L(-10), $(MIGST(-5)/L(-5))^2$, $(MIGST(-10)/L(-10))^2$, $(MIGST(-5)/L(-5))^3$.

Appendix:
Figures of non-linear partial regression impacts within the data range

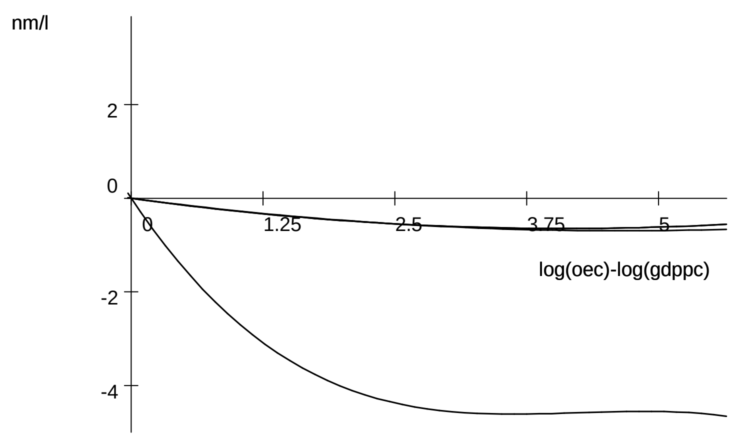


Figure A1: The impact of income differences on net immigration: The lowest curve is for the poor sample, the highest for the rich sample.

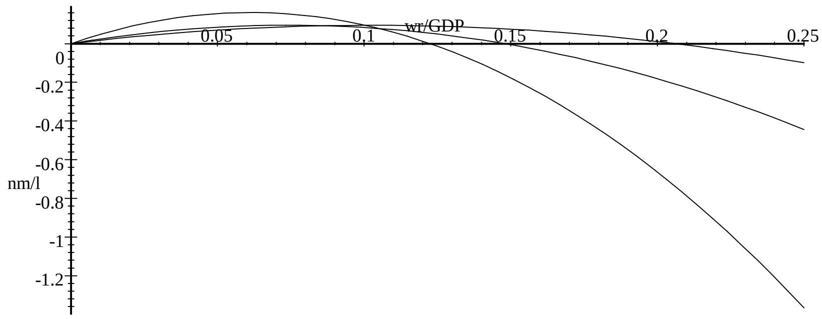


Figure A2: Impact of remittances on net immigration: The steepest curve is for the poor sample, the flattest for the large sample.

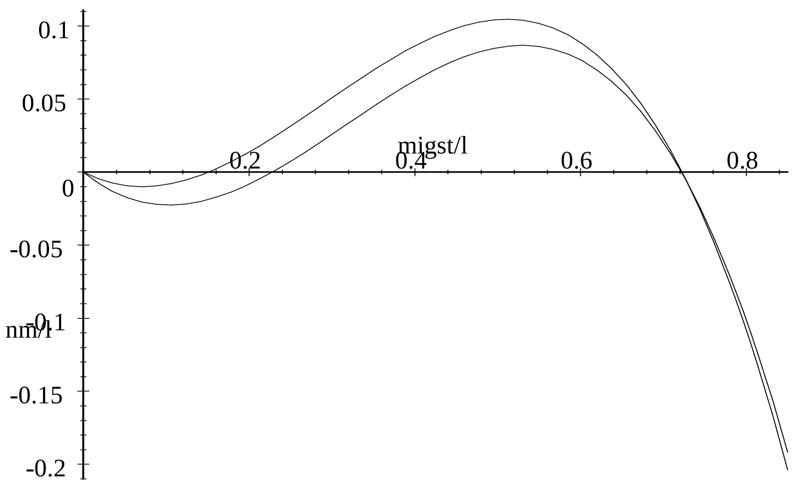


Figure A3a: The impact of the OECD-6 migration stock on net immigration: The higher curve (until 0.72) represents the less poor sample and the lower curve the large sample.

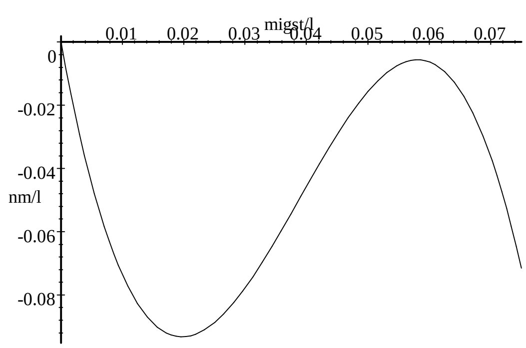
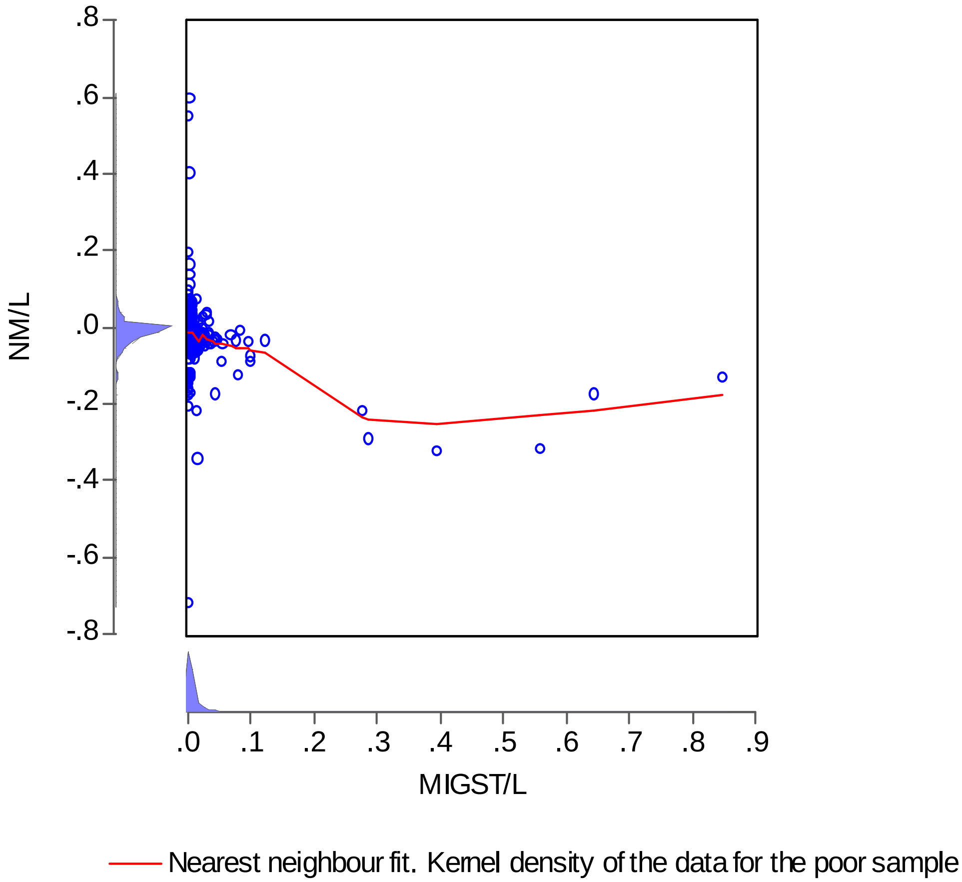


Figure A3b: The impact of the OECD-6 migration stock on net immigration in the poor sample.

Figure A4


.8
.6
.4
.2
.0
-.2
-.4
-.6
-.8
NM/L
.0
.1
.2
.3
.4
.5
.6
.7
.8
.9
MIGST/L
Nearest neighbour fit. Kernel density of the data for the poor sample

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