Remittances, Savings, Investment and School Enrollment

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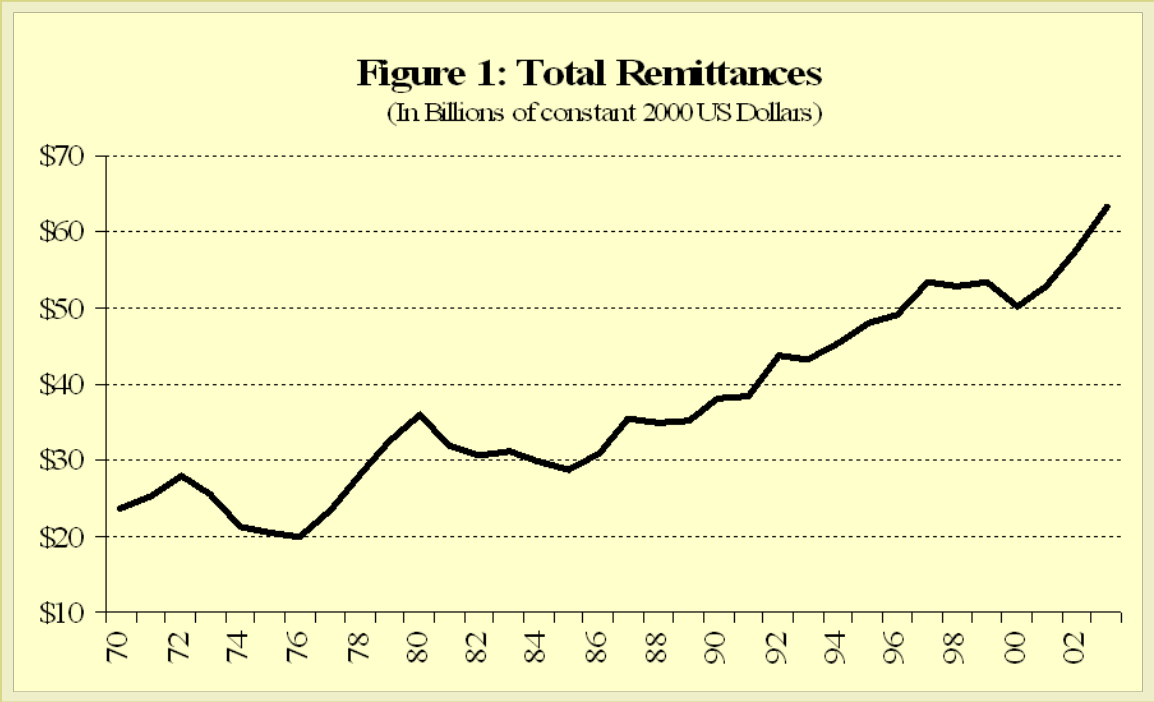
The Importance of Remittances

- In 1970, an index composed of countries with the longest remittances data available put the level of remittances for those countries at 23.6 billion US Dollars. This amount had almost tripled to 63.7 billion in 2003. And for the entire world, the amount was almost 80 billion.

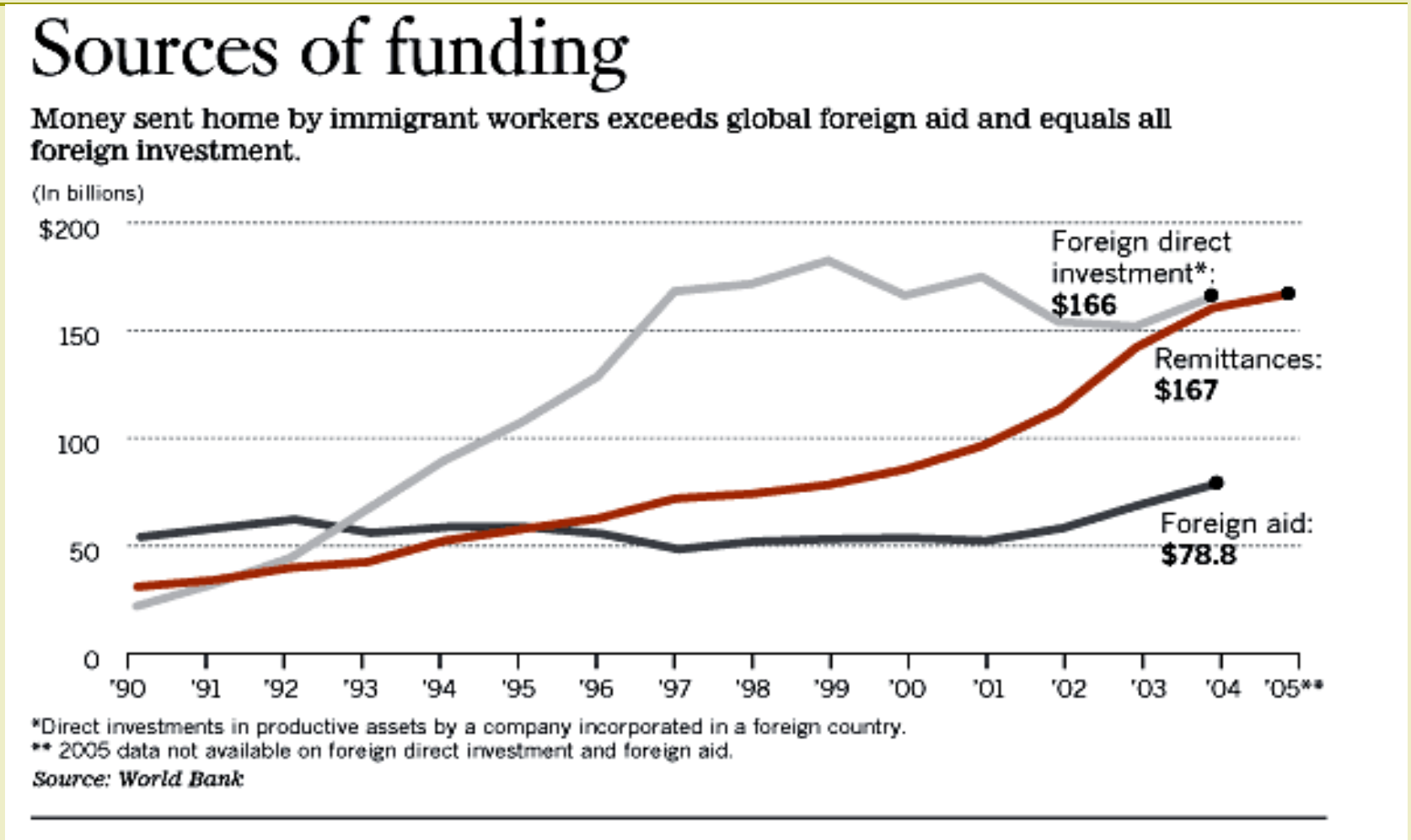


Remittances are a. . .

"giant transfer of wealth crisscrosses the Earth in millions of trickles, a few hundred dollars at a time, sent by workers who have assumed much of the burden of 3rd World development. *Their remittances — private aid from the poor to the poorer — offer a rare chance to accumulate savings; invest in schooling, housing or a small business; and rise into the middle class.*

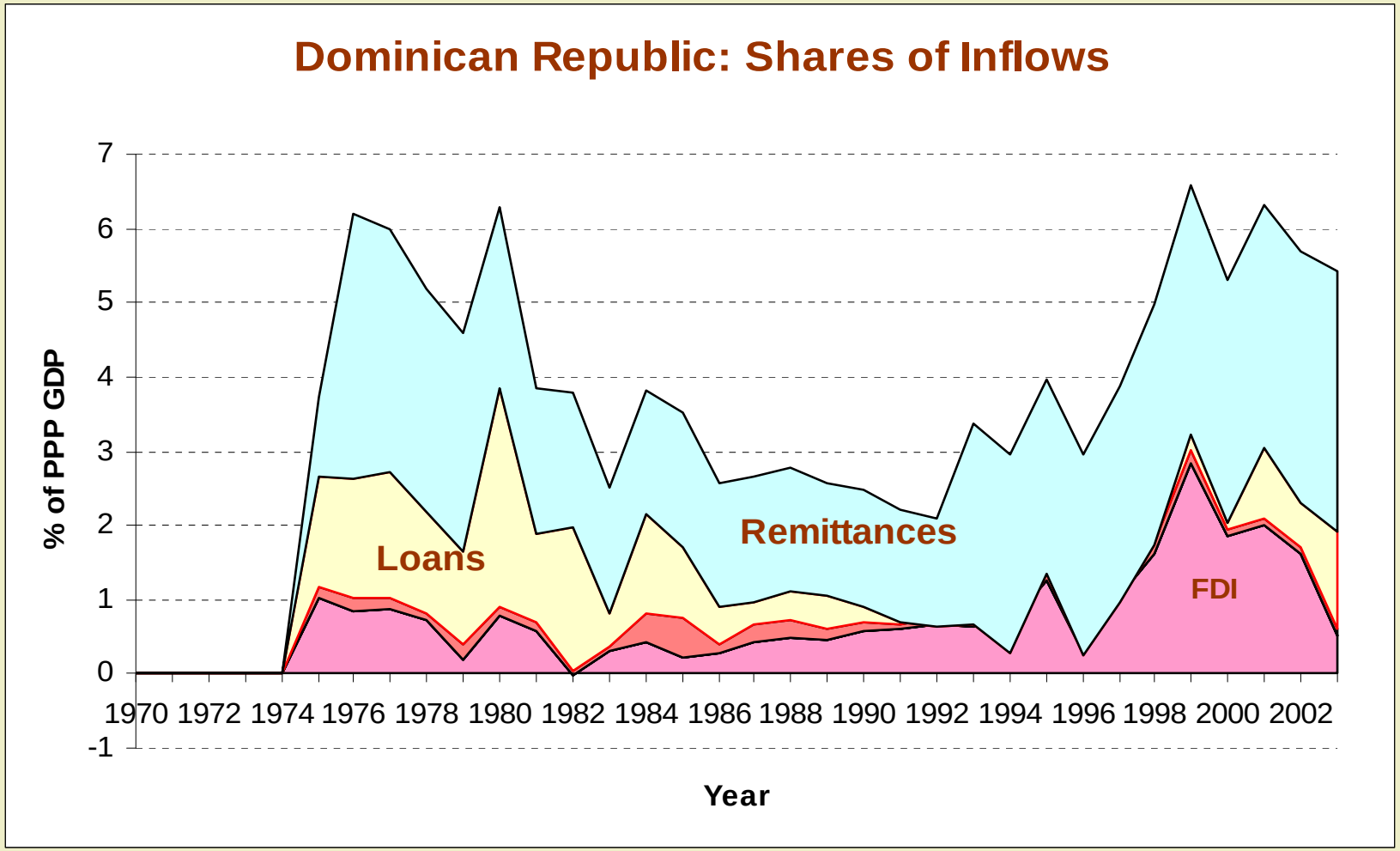
- *Los Angeles Times, April 16, 2006.*

Remittances are major source of fx earnings…

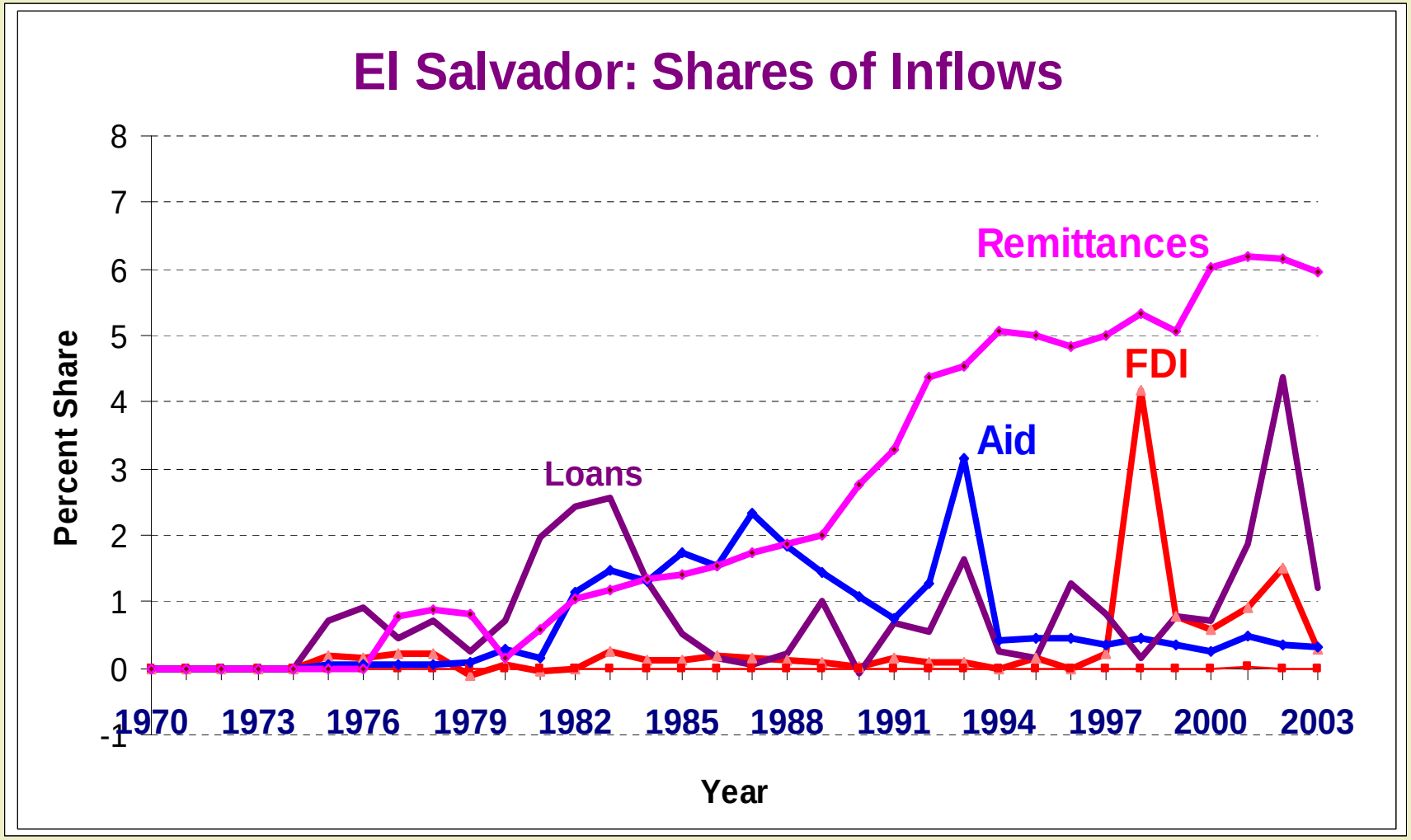


Source: Los Angeles Times, April 16, 2006.

Remittances are very important for some countries…



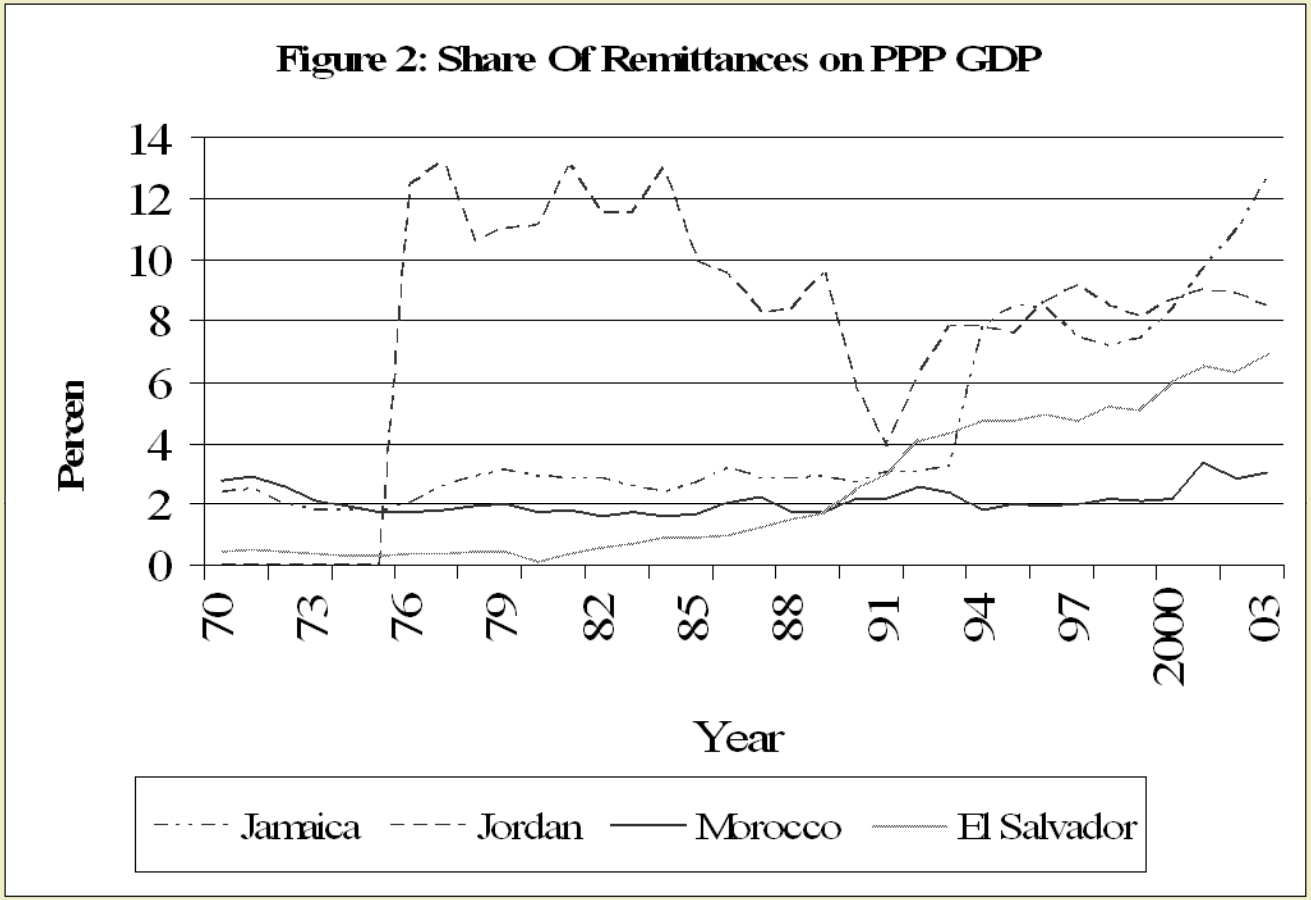
Remittances are very important to some countries



Individually

- Dominican Republic, El Salvador, Jordan, Cape Verde, Yemen and Jamaica have remittance shares on GDP and in some of these countries the share is actually increasing.

Individual Countries Graphically



Source: World Development Indicators Online, 2005, and author's calculations.

Studying Remittances

- Remittances can be viewed as transfers:
  - Rainy transfers create moral hazard problems
  - Apparent altruism not well understood and perhaps not reliable…
- So, mainly the causes of remittances, as most of the effects were considered negative only until recently.
- We study the impact of remittances on savings, investment, and school enrollment in those LDCs most affected by remittances.

Previous Empirical Studies

- IMF WEO (2005): Estimates impact of remittances on poverty, growth and investment.
- Bouhga-Hagbe, Jacques (2004) Estimates determinants and impacts of remittances on the construction sector in Morocco.
- Chami, Fullenkamp, & Jahjah (2003) estimate impact of remittances on economic growth and find a negative impact.
- Stark et.al. (1986) study remittances flows and immigration on income in two Mexican villages.
- Stark and Wang (2003) “turn the brain drain argument on its head” by showing theoretically that remittances can positively impact schooling decisions.

Remittances as capital inflows

- Gruben & McLeod(1998), Bosworth and Collins (1999); the GDF (2001) Mody and Murshid (2002) model capital flows starting with the identity: CA = S – I where savings and investment as a share of GDP are regressed on components of the capital account, now augmented by remittances (endogeneity problems dealt with… using lags, IVs or dynamic panel methods)

Rich and poor have incentives to migrate

- Normally the key focus skilled workers, or the so-called brain drain, our overlapping generations model focuses poor and less skilled workers…
- Workers in this “transnational” family consider two countries home; education, savings and labor decisions reflect relative returns to education in both countries. These multinational family decisions affect labor, financial markets and investment in both countries.

Consider a Worker. . .

- Who faces employment prospects in the home country with a production function:

$$PQ = AH^{\alpha}L^{1-\alpha}$$

- And thus, the value of the marginal productivity of labor will be (in the home country):

$$PA(1-\alpha)\frac{H^{\alpha}}{L^{\alpha}} = PA(1-\alpha)h^{\alpha} = \psi$$

- Since the worker wants to maximize his or her net earnings, the worker's maximization problem gives us the net wages of the worker:

$$w_h = A\alpha(1-\alpha)h^{\alpha-1} - \gamma$$

- Where… P, Q, A, H, …

The migrant anticipates the return to education implied by foreign wages, w*…

- The real net earnings any time area function of the worker-migrant's marginal product of labor minus the costs of schooling and migrating:

$$w^* = A^*(1-\alpha)h^{\alpha} - \gamma h - rM$$

- Therefore, the same worker now faces an *h* that depends on the foreign productivity:

$$\tilde{h} = \left(\frac{A^*\alpha(1-\alpha)}{\gamma}\right)^{\frac{1}{1-\alpha}}$$

- Here I follow (with modifications) Stark and Wang (2003), McLeod, et al (2005), and Kremer and Chen (2002).

And. . .

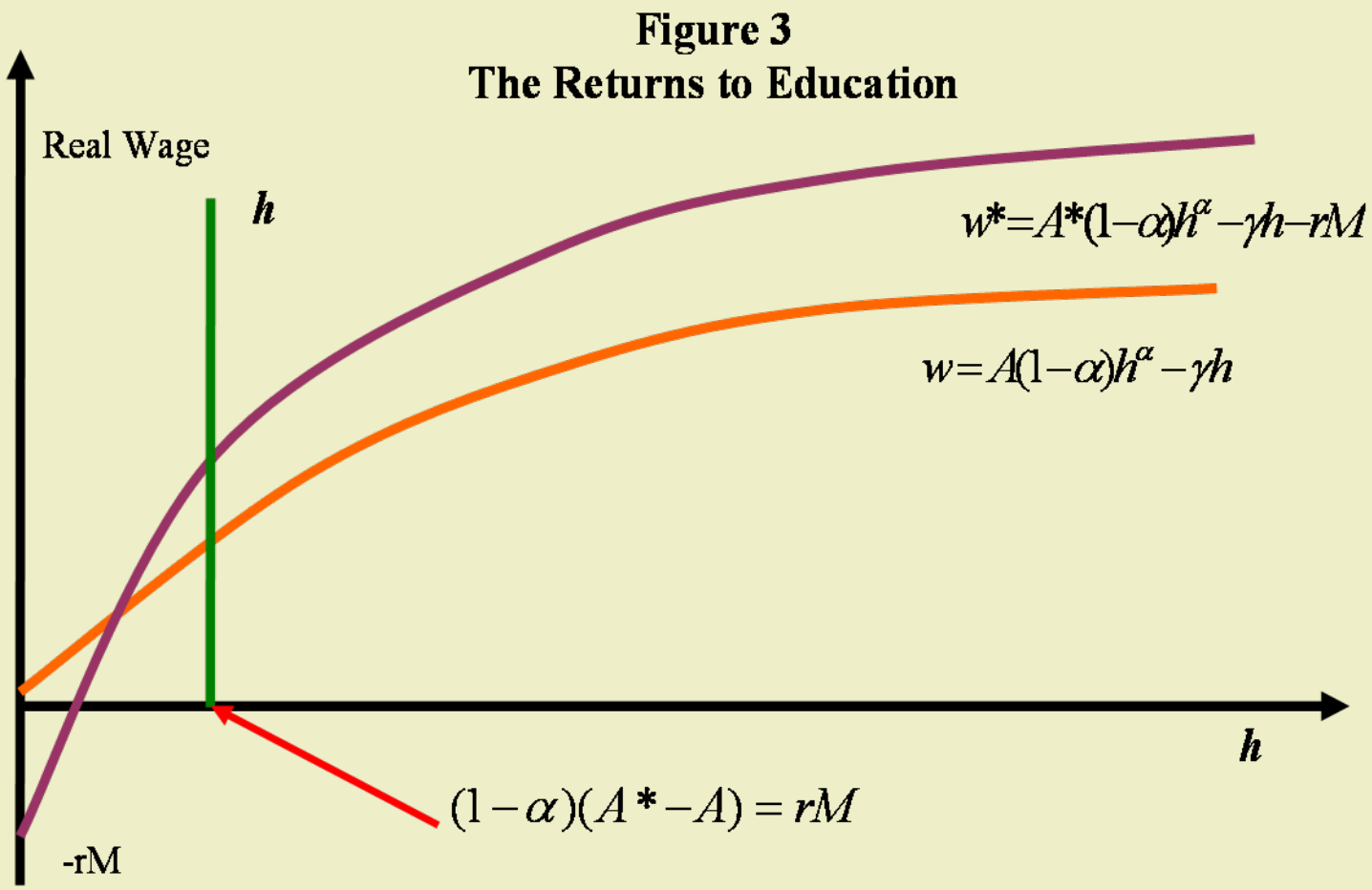
- Formally, as long as $(1-\alpha)(A^*-A) > rM$

people migrate north.

Notice that the worker maximizes U(..) by choosing *h* given A and A^* .

Later I solve the model for different relevant variables in each chapter.

The Threshold of Migration



Empirical Approach

- Remittances may be viewed as alternative, intra-family form of grants in aid – as such they have macro and distributional impacts at the macro-level.
- So, if we view remittances as a capital inflow, as a potential source of foreign generated savings (i.e.. Aid vs. FDI vs. remittances)
- Use a different sample of countries and a different measures of remittances than the IMF WEO 2005 (which presented OLS estimates only).
- The remittances data has several shortcomings studied elsewhere in the literature (measurement issues, counting or including, reported vs. unreported, etc.). I sidestep this issue by focusing on the remittances variable given by the WDI.

Estimation and Results

- Regress 3-year average savings and investment shares of GDP and 5-yr average for enrollment rates on remittances.
- Simultaneity problems are met with instrumental variables and lagged variables and using several estimation methods.
- My sample includes only countries where remittances average more than ½% of GDP during the period 1970-2003.
- Data sources include the WDI, IFS, PWT, GDF, WEO, EdStats.

The Model and Gross National Saving

The maximization problem for a worker with migration prospects is:

$$\underset{h}{Max} V(c) = c_1 + \beta c_2$$

With: $c_1 = [1-\lambda]w^* L(1-\phi)$

And $c_2 = (1+r)e[\lambda w^* L(1-\phi) - \mu F]$

Where c, e, μ, and φ are . . .

Solving to obtain lifetime consumption and saving

- Solving for c_1, we obtain:

$$\frac{w_N^* L(1-\phi)}{1+\beta(1+r)e(1-\lambda)} = c_1$$

- c_1 depends positively on wages as well as on exchange rates as does the quantity of remittances (savings). Note, however, the migrant sends a fixed % of his or her earnings irrespective of income levels. The interest rate negatively affects c_1.

Results for Savings shares

Table 2.1 The Determinants of Gross National Savings as a Share of GDP

Estimation Method:	Fixed Effects /1				
	Dependent Variable GNS: as % of PPP GDP				
	Eq. 2.1.11	**Eq. 2.1.12**	**Eq. 2.1.13**	**Eq. 2.1.14**	**Eq. 2.1.15**
(White robust errors t-statistics)					
Remittances % of PPP GDP /2	**0.43** (5.2)	**0.36** (5.3)	**0.27** (3.0)	**0.27** (3.1)	**0.23** (2.6)
Aid as % of PPP GDP		**0.63** (10.6)	**0.19** (0.5)	**0.19** (0.5)	**0.04** (0.1)
Interaction (Remittances*Aid)			**0.05** (1.6)	**0.05** (1.6)	**0.06** (2.4)
Net FDI flows % of PPP GDP				**-0.04** -(0.11)	**-0.08** -(0.22)
Exports % of PPP GDP /2					**0.35** (3.2)
Constant	**6.51** (27.5)	**5.92** (47.4)	**6.41** (15.9)	**6.44** (10.8)	**2.75** (2.7)
Number of Countries	55	55	55	55	55
Numbers of Observations	401	401	401	401	401
Estimation Method	FE	FE	FE	FE	FE
Fixed Effects Likelihood ratio F-test /3	10.1	10.9	8.7	7.9	6.3
Prob. Value (%)	0%	0%	0%	0%	0%
Adjusted R-Squared	0.6	0.6	0.6	0.6	0.7
Mean of dependent Variable	7.4	7.4	7.4	7.4	7.4
St. Error of Regression	3.4	3.3	3.3	3.3	3.1

Using Lagged Variables decrease the size of the effects and makes them insignificant

using instrumental variables

Table 2.2 The Determinants of Gross National Savings as a Share of GDP

Dependent Variable: Gross National Saving as a share of PPP GDP					
Method	**Two Staged Least Squares with Fixed Country and Period Effects**				
(t-statistics)	**Eq. 2.2.11 /1**	**Eq. 2.2.12 /1**	**Eq. 2.2.13 /1**	**Eq. 2.2.14 /1**	**Eq. 2.2.15 /1**
(White robust errors t-statistics)					
Remittances % of PPP GDP /3	**0.30** (1.2)	**0.25** (1.1)	**0.26** (0.9)	**0.41** (1.0)	**0.15** (0.3)
Aid as % of PPP GDP		**0.68** (6.8)	**0.78** (0.3)	**1.97** (0.4)	**-0.41** -(0.1)
Interaction (Remittances*Aid)			**-0.01** -(0.3)	**-0.12** -(0.3)	**0.11** (0.3)
Net FDI flows % of PPP GDP				**-0.17** -(0.4)	**-0.23** -(0.6)
Exports % of PPP GDP /3					**0.40** (2.6)
Constant	**6.61** (14.1)	**5.97** (18.4)	**4.92** (1.3)	**4.92** (1.3)	**2.77** (0.8)
Number of Countries	55	55	55	55	55
Number of Observations	341	341	341	341	341
Adjusted R-Squared	0.59	0.62	0.60	0.60	0.67
Mean of dependent Variable	3.2	3.1	3.2	3.2	2.9
St. Error of Regression	7.2	7.2	7.2	7.2	7.2

But for the larger countries only,

Table 2.4 The Determinants of Gross National Saving as a Share of PPP GDP in Selected Countries [1]

Dependent Variable: Gross national Saving as a share of PPP GDP						
Method	**OLS-FE** [2]		**2SLS-FE** [3]		**GMM** [3]	
	Eq. 2.4.11	**Eq. 2.4.12**	**Eq.2.4.21**	**Eq. 2.4.22**	**Eq. 2.4.31**	**Eq. 2.4.32**
(White robust errors t-statistics)						
Lagged Savings *(previous 3 yr period)*					**0.31** (6.3)	**0.34** (6.7)
Remittances as % of PPP GDP [4]	**0.99** (5.2)	**0.73** (6.2)	**1.15** (4.2)	**0.84** (5.4)	**-0.14** -(0.7)	**-0.18** -(0.8)
Aid as % of PPP GDP		**0.62** (8.5)		**0.62** (15.4)		**0.51** (2.7)
FDI as a % of PPP GDP		**0.10** (0.24)		**-0.12** -(0.29)		**0.20** (1.45)
Constant	**6.33** (23.5)	**6.10** (18.2)	**5.85** (14.3)	**5.90** (28.4)		
Number of Countries	37	37	37	37	37	37
Numbers of Observations	303	303	262	262	225	225
Adjusted R-Squared	0.66	0.67	0.66	0.68		
St. Error of Regression	3.27	3.19	2.97	2.87	2.90	2.86
Mean of dependent Variable	7.75	7.75	7.58	7.58	-0.42	-0.42
Fixed Effects Test [5]	12.11	10.66				
Degrees of Freedom	47	47				
prob values	0%	0%				
Sargan test					0.88	0.94

Investment Gives Clearer Results

Table 2.5 Determinants of Investment as a Share of PPP GDP

Method	Dependent Variable: Investment share of PPP GDP Pooled Ordinary Least Squares With Fixed Effects					
(t-statistics)	Eq.2.5.11 /1	Eq.2.5.13 /1	Eq.2.5.14 /1	Eq.2.5.21 /1	Eq.2.5.22 /1	Eq.2.5.23 /1
(White robust errors t-statistics)						
Current Account	**-0.01**	**-0.02**	**-0.02**	**-0.04**	**-0.02**	**0.02**
(previous 3 yr period)	-(0.2)	-(0.5)	-(0.4)	-(0.8)	-(0.5)	(0.4)
Remittances as % of PPP GDP /2	**0.46**	**0.37**	**0.32**	**0.28**	**0.26**	**0.35**
	(2.2)	(2.0)	(1.6)	(1.6)	(1.4)	(2.2)
Aid as % of PPP GDP		**0.59**	**0.24**	**0.28**	**0.14**	**0.19**
		(4.4)	(0.8)	(1.0)	(0.5)	(0.7)
Interaction (Remittances*Aid)			**0.03**	**0.03**	**0.05**	**0.03**
			(1.1)	(1.3)	(2.0)	(1.6)
FDI as a % of PPP GDP				**0.78**	**0.73**	**0.65**
				(3.0)	(2.7)	(2.4)
Exports as % of PPP GDP /2					**0.22**	**0.19**
					(1.7)	(1.5)
Loans						**0.54**
						(3.7)
Portfolio Flows						**3.09**
						(2.2)
Constant	**8.39**	**7.86**	**8.21**	**7.39**	**5.24**	**4.98**
	(24.0)	(38.3)	(19.9)	(14.7)	(3.5)	(3.6)
Number of Countries	55	55	55	55	55	55
Numbers of Observations	370	370	370	370	370	370
Adjusted R-Squared	0.67	0.69	0.69	0.71	0.73	0.75
Mean of dependent Variable	9.3	9.3	9.3	9.3	9.3	9.3
St. Error of Regression	3.0	2.9	2.9	2.8	2.7	2.6

With instrumental variables

Determinants of Investment as a Share of PPP GDP

	Dependent Variable: Investment share of PPP GDP				
Method (FE: fixed effects) /1	2SLS-FE	2SLS-FE	2SLS-FE	2SLS-FE	2SLS-FE
(t-statistics)	**Eq. 2.6.11**	**Eq. 2.6.12**	**Eq. 2.6.13**	**Eq. 2.6.14**	**2.6.15**
(White robust errors t-statistics)					
Current Account	**0.14**	**1.08**	**-0.07**	**0.09**	**0.09**
(previous 3 yr period)	(3.1)	(5.5)	-(0.4)	(1.8)	(1.9)
Remittances % of PPP GDP /2	**1.19**	**0.12**	**0.89**	**0.80**	**0.83**
	(5.5)	(2.9)	(5.7)	(4.7)	(5.2)
Aid as % of PPP GDP		**0.44**	**0.49**	**0.48**	**0.46**
		(4.6)	(4.2)	(5.1)	(5.2)
Net FDI flows % of PPP GDP			**0.81**	**0.73**	**0.74**
			(2.4)	(2.9)	(3.0)
Exports % of PPP GDP /2				**-0.02**	**-0.02**
				-(0.5)	-(0.4)
Portfolio Flows					**3.24**
					(1.7)
Constant	**7.56**	**7.24**	**5.84**	**7.11**	**6.96**
	(13.1)	(14.1)	(5.2)	(9.9)	(10.5)
Number of Countries	55	55	55	55	55
Numbers of Observations	309	309	305	309	309
Adjusted R-Squared	0.74	0.75	0.76	0.77	0.78
Mean of dependent Variable	9.1	9.1	9.1	9.1	9.1
St. Error of Regression	2.5	2.5	2.5	2.4	2.4

Remittances and School Enrollment

- In the OLG Model with remittances,

$$R = \lambda w^{*}(h)$$

- And so, h affects the wages the migrant earns from which he or she sends money.
- This means that, after maximization:

$$\bar{h} = \left(\frac{A^{*}\alpha(1-\alpha)(1-\lambda)}{\gamma[(1-\lambda) + \frac{A}{A^{*}}\beta(1+r)\lambda]} \right)^{\frac{1}{1-\alpha}}$$

The Empirics of Remittances and School Enrollment

- The Regressions for school enrollment are very encouraging for primary and secondary schooling.
- In all cases remittances significantly contribute to higher school enrollment.
- I build upon micro-based studies that consider female adult literacy as the mother's schooling.
- It is interesting to see the role of female literacy. . .

Table 3.1 The Determinants of School Enroolment

Estimation Method:	OLS Fixed Effects with cross section standard errors /1					
Dependent Variable: Log of Gross Enrollment	Primary			Secondary		
	Eq. 3.1.11	Eq.3.1.12	Eq.3.1.13	Eq. 3.1.21	Eq. 3.1.22	Eq. 3.1.23
(White robust errors t-statistics)						
Log of Total Gross Primary Enrollment	**0.53**	**0.56**	**0.56**	**0.65**	**0.61**	**0.61**
(Previous 5 yr period)	(8.5)	(8.4)	(8.2)	(10.2)	(7.1)	(7.5)
Log of Adult Female Literacy Rate	**0.23**	**0.01**	**0.01**	**0.03**	**0.01**	**0.01**
(Previous 5 yr period)	(5.5)	(2.5)	(2.5)	(0.3)	(3.3)	(3.4)
Expenditures on Education as % of Public Budget	**0.01**	**0.03**	**0.03**	**0.01**	**0.04**	**0.04**
(Previous 5 yr period)	(2.7)	(6.4)	(5.6)	(2.8)	(3.9)	(4.4)
Remittances as % of PPP GDP /2	**0.02**	**0.23**	**0.22**	**0.04**	**0.06**	**0.04**
(Previous 5 yr period)	(4.5)	(5.5)	(4.7)	(3.7)	(0.7)	(0.5)
Aid as % of PPP GDP		**0.005**	**0.004**		**-0.09**	**-0.09**
(Previous 5 yr period)		(0.6)	(0.5)		-(1.8)	-(1.9)
FDI as a % of PPP GDP			**-0.01**			**-0.01**
(Previous 5 yr period)			-(0.9)			-(0.9)
Interaction (Remittances*Aid)		**-0.001**	**-0.001**		**0.007**	**0.007**
(Previous 5 yr period)		-(1.7)	-(1.8)		(1.5)	(1.6)
Constant	**1.18**	**1.06**	**1.07**	**0.62**	**0.77**	**0.79**
	(4.4)	(3.7)	(3.8)	(1.1)	(1.5)	(1.6)
Number of Countries	46	46	46	46	46	46
Numbero f Observations	155	155	155	154	154	154
Method /1	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE	OLS-FE
Fixed Effects Likelihood ratio F-test /3	1.95	1.93	1.94	14.27	13.65	13.23
Prob. Value (%)	0.002	0.003	0.003	0%	0%	0%
Adjusted R-Squared	0.95	0.95	0.95	0.96	0.96	0.96
Mean of dependent Variable	4.51	0.34	0.34	3.71	3.71	3.71
St. Error of Regression	0.08	0.08	0.08	0.13	0.12	0.12

Table 3.2 The Determinants of School Enroolment

Estimation Method:	Instrumental Variables /1					
Dependent Variable: Log of Total Gross Enrollment	Gross Primary Enrollment			Gross Secondary Enrollment		
	Eq. 3.2.11	Eq. 3.2.12	Eq.3.2.13	Eq. 3.2.22	Eq. 3.2.23	Eq. 3.2.24
(White robust errors t-statistics)						
Log of Total Gross Primary Enrollment	**0.57**	**0.54**	**0.54**	**0.60**	**0.59**	**0.59**
(Previous 5 yr period)	(6.6)	(5.3)	(5.2)	(3.4)	(4.0)	(4.0)
Log of Adult Female Literacy Rate	**0.18**	**0.27**	**0.28**	**0.12**	**0.18**	**0.19**
(Previous 5 yr period)	(2.5)	(2.7)	(2.6)	(0.5)	(0.7)	(0.8)
Expenditures on Education as % of Public Budget	**-0.001**	**0.01**	**0.01**	**0.07**	**0.07**	**0.07**
(Previous 5 yr period)	-(0.1)	(0.9)	(0.9)	(3.8)	(4.4)	(4.6)
Remittances as % of PPP GDP /2	**0.02**	**0.05**	**0.05**	**0.07**	**0.10**	**0.10**
(Previous 5 yr period)	(2.2)	(2.3)	(2.2)	(9.9)	(4.6)	(3.8)
Aid as % of PPP GDP		**-0.013**	**-0.012**		**-0.030**	**-0.031**
(Previous 5 yr period)		-(1.1)	-(1.1)		-(2.1)	-(2.1)
FDI as a % of PPP GDP			**0.002**			**0.004**
(Previous 5 yr period)			(0.1)			(0.3)
Constant	**1.25**	**0.95**	**0.95**	**0.29**	**0.01**	**-0.03**
	(3.1)	(1.9)	(1.8)	(0.3)	(0.01)	-(0.03)
Number of Countries	45	45	41	41	41	41
Number of Observations	137	105	105	104	104	104
Method	2SLS-FE	2SLS-FE	2SLS-FE	2SLS-FE	2SLS-FE	2SLS-FE
Adjusted R-Squared	4.53	4.53	4.53	3.77	3.77	3.77
Mean of dependent Variable	0.94	0.95	0.95	0.96	0.96	0.96
St. Error of Regression	0.07	0.07	0.07	0.12	0.12	0.12

Conclusions

- Remittances affect sending countries like many other forms of capital inflows: these effects need to be considered when policies affect international migration…
- The evidence suggests that remittances have a weak effect on savings but a stronger positive effect on investment and school enrollment rates.
- These effects are consistent with an OLG model in which workers invest to migrate, and use remittances to finance investment and retirement in their home county.

What all this Means

- This paper shows that two channels help increase the kinds of capital most lacking in developing countries: human and physical.
- The results regarding remittances and poverty have been interesting. The impact of remittances seems to be in general positive and important. However, the results show the lack of robustness regarding the measures of remittances used, and especially when aid is introduced.
- However, the impact of remittances as well as other variables appears to be significantly different from zero at the primary and secondary school level yet not at the tertiary school level.
- Here is also where the implications for policy may also be important. Countries can encourage workers remitting foreign exchange by showing them how children's education can be improved or extended by their remittances. Developing programs that directly link those remitting to schools or other social institutions would also yield important results.
- **Offering saving and investment incentives to those remitting is another way in which countries can enhance the developmental impact of remittances in developing countries, especially if those funds are used to help the poorest of the poor.**

Further issues…

- Determine whether better reporting and lower costs of sending money back home explain rising remittances or whether it is higher migration rates.

- Focus on the link between financial development and remittances in a particular regions (e.g., the CAFTA countries: Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and the Dominican Republic.
- Consider individual countries and see how each of the issues touched upon develop, especially from the perspective of development.

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