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REMITTANCES, POVERTY AND INEQUALITY

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This paper explores the effect of remittances across the distribution of income. Based on a panel of 46 countries that covers the period between 1970 and 2000, we find that the effect of remittances is non-monotone across the distribution of income and strongest in low income countries. The impact of remittances is positive and decreasing in income for the bottom 70 percent of the population, and negative and increasing in income in the top 20 percent of the population. All else equal, remittances decrease inequality as their effect is mostly felt among the poor and they are negatively related to the income of the rich. We estimate that for low income countries a 1 percent increase in remittances would increase the first decile's income by approximately 0.43 percent, while the same change would increase in remittances is associated with a 0.10 percent decrease in the income of the top 10 percent of the population.

Keywords: Remittances, Poverty, Inequality, Migration *JEL classification*: F22, F40, O15

1. INTRODUCTION

Among the many dimensions of greater global economic integration, international migration is probably the most controversial and debated one. People moving across borders, and countries being either sources or recipients of migrants, imply that there are not only economic but also social consequences from migration, which fuel most of the debate.

The focus of this paper is on the distributional effects of migrants' remittances to their home countries. In particular, we explore income changes in the home country along the distribution of income. This in turn allows us to quantify the impact of remittances on the migrants' home country inequality.

Our main finding is that the impact of remittances on income is strongest in low income countries and non-monotone along the distribution of income. In other words,

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the effect of remittances is either positive or negative depending on the level of income. In particular, we find that the poor are the greater beneficiaries from migrants' remittances. As one moves up on the distribution of income, the sensitivity of income to remittances tends to zero and becomes negative for the top 20 percent of the population. From a macroeconomic perspective this implies that remittances decrease inequality as the income of the poor increases, while the income of the rich decreases.

The contribution of the study is two-fold. First, we construct a new database on remittances and inequality, which combines a new dataset on remittances data from the World Bank (2007) and a recently revised version of the World Income Inequality Database from UN-WIDER (2007). And second and foremost, the paper calculates the effect of remittances at the decile level. This allows for a better understanding of remittances as a poverty reduction mechanism as it decomposes their effect on the bottom, middle and top of the distribution of income.

Our distribution-wide approach to the effect of remittances is consistent with, and complements previous studies that calculate the impact of remittances on poverty. For instance, Adams and Page (2005) and IMF (2005) document that remittances reduce headcount poverty based on cross-country samples. Survey based studies of individual countries confirm similar effects in Ghana and Guatemala (Adams (2004, 2005), respectively), and in Latin America analyzed by Acosta *et al.* (2007).¹

Furthermore, we provide new insights into the effect of remittances on inequality. While the consensus in the literature is that remittances reduce poverty, there is conflicting evidence in regard to the effect of remittances on inequality. McKenzie and Rapoport (2004) find that remittances have decreased inequality in Mexico; Adams (2005) reports that they increased inequality in Ghana; De and Ratha (2005) document a decrease in inequality in Sri Lanka due to remittances; and Acosta *et al.* (forthcoming) find that remittances decreased inequality in Latin America.

By quantifying the effect of remittances at the decile level, we can determine their relative effect by income decile, and whether that implies a decrease or increase in inequality. We estimate that the effect of remittances in low income countries is positive (and decreasing) for the bottom 70 percent of the population and negative (and increasing) for the top 2 deciles, implying that remittances reduce inequality. For richer countries we find that remittances increase the income of the bottom 20 percent of the population, thus they are negatively related to inequality too. We believe this approach provides a more accurate picture of the distributional effects of remittances than those based on aggregate measures of inequality such as the Gini coefficient.

To conduct the analysis we run a set of econometric tests that control for other determinants of income, and identify the contribution of remittances to income at the decile level. Of particular interest is to determine whether a differential effect across

¹ For a comprehensive overview on trends and statistics on world migration and remittances see World Bank (2006).

deciles exists. We exploit the symmetry across decile income regression equations to separate the decile-specific effect of remittances through a system of Seemingly Unrelated Regressions (SUR).

An important part of the literature on migration has focused on the welfare and distributional effects of migration from a factor market perspective. That is, it has mostly been concerned with the impact of migration on wages in both the home and host countries, and the price of other factors of production that are either complements or substitutes of migrant labor. This paper abstracts from those effects as well as from any exchange rate or Balance of Payments implications from remittances.

The paper is organized as follows. In section 2 we lay out the empirical strategy to analyze our data; section 3 describes the dataset; section 4 presents the estimation results; and section 5 concludes.

2. EMPIRICAL STRATEGY

This section describes the empirical strategy used to estimate the effect of remittances on the distribution of income at the decile level. To assess such effect we work with a parsimonious specification in which mean decile income is determined by a country's level of income, openness to trade, macroeconomic stability, and human capital. Following UN-WIDER (2007), throughout the analysis the first decile is defined as the bottom 10 percent of the population, the second decile as the subsequent 10 percent of the population, and so on until the tenth decile which corresponds to the top 10 percent of the population.

In order to quantify the effect of remittances on inequality, we use a cross-section of countries to identify the sensitivity of household income to remittances flows. In doing so, we control for the country's average income level, human capital, inflation, imports and exports as fraction of GDP, and other country-specific characteristics. For each country, we estimate income by decile following Dollar and Kraay (2002), where decile mean income is given by the decile's share of income multiplied by mean income divided by $0.1.^2$

The reduced form model for quantifying the effect of remittances on the j^{th} decile (log) income of country *i* at time *t* is given by:

$$y_{dj,i,t} = \beta_0 + \beta_1 r_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}.$$
(1)

² To see this let y_{d1} represent the average income within the first income decile, and let Y and s_1 stand for total income (or GDP) and the income share of the first decile, respectively. Then, it must be the case that $s_1 * Y = (0.1 * \text{population}) * y_{d1}$. This way, $y_{d1} = (s_1 / 0.1) * (Y/\text{population})$, is the average decile income consistent with $s_1 * Y$.

In this specification, r is the log of real remittances; X is a vector of country-specific characteristics (which includes mean income, human capital, openness to trade); and ε is a zero-mean disturbance term.

Based on the definitions above, β_1 represents the elasticity of decile income y_{dj} with respect to remittances. Furthermore, any systematic pattern in the estimates of β_1 will determine whether remittances increase or decrease inequality. For instance, if β_1 is positive and decreasing in income, then remittances decrease inequality as they have a larger effect on the income of the poor, all else equal.

In section 4, we present the coefficient estimates of Equation 1 with variations on the set of controls, inclusion of time dummies; and estimation techniques such as pooled OLS, seemingly unrelated regressions, and fixed effects.

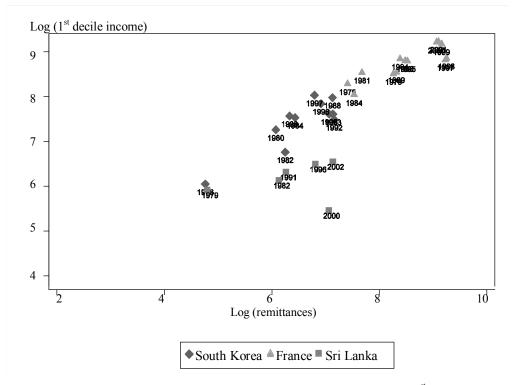
3. DATA SET

To analyze the effect of remittances on income across the distribution of income, we construct a panel of countries that draws on several sources of data. In regard to the main variables, remittances and inequality, we use remittances data from World Bank (2007), and take the inequality series (income shares by decile) from UN-WIDER (2007) World Income Inequality Database (V 2.0b). Real GDP per capita in purchasing power parity is drawn from Heston *et al.* (2002).

In order to control for other determinants of income such as human capital (secondary school enrollment relative to secondary school age group), degree of trade openness (sum of imports and exports relative to GDP), and inflation, we use the World Bank's World Development Indicators. Finally, to transform the remittances data, which is originally reported in nominal terms, into real terms, we use the base year 2000 Implicit Price Deflator series from BEA (2007).

The unbalanced panel contains observations for the period between 1960 and 2006, for 207 countries. The maximum number of observations for a country is 57 and the minimum 1. Contemporaneous observations for all variables reduce the sample to fewer countries and fewer years. In the Appendix we report the sample used for the estimates reported in section 4.

With data from countries with multiple contemporaneous observations for decile income and remittances, we are able to provide an initial assessment on the relation between remittances and decile income. We expect that as remittances rise, decile income increases as well. In particular, Figure 1 shows that for three countries at different levels of development such relation seems to exist.



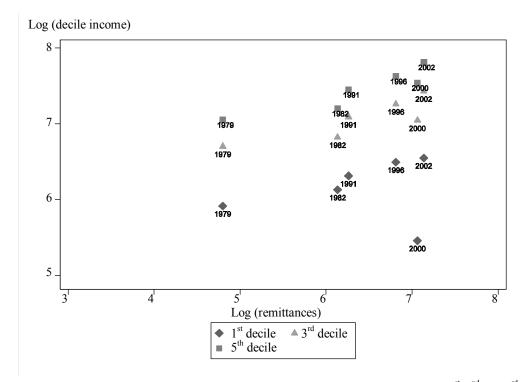
Note: This figure plots the natural logarithm of remittances against natural logarithm of 1st decile income in Sri Lanka, South Korea and France.

Figure 1. Remittances and Decile Income

Observations from Sri Lanka, South Korea, and France suggest a positive effect of remittances on the income of the first decile. Moreover, Figure 1 highlights how remittances have increased over time, as well as the first decile's income in those countries. The graph also shows how the inflow of remittances and first decile income in France are larger than in the other two countries.

Another dimension that the dataset allows us to explore is the strength of this channel across deciles. That is, we can ask the question which decile benefits more from remittances? For instance, in Figure 2 we plot remittances and the income of the 1^{st} , 3^{rd} , and 5^{th} deciles' in Sri Lanka. The graph suggests that a similar positive connection exists across deciles.³

 $^{^{3}}$ Though not related to this study, Figure 2 shows how the bottom decile was the hardest hit by the decrease in income in the year 2000.



Notes: This figure plots the natural logarithm of remittances against natural logarithm of the 1st, 2nd, and 3rd income deciles in Sri Lanka. Across deciles both remittances and income have increased over time, except for the drop in income in the year 2000.

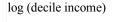
Figure 2. Remittances and Decile Income: Sri Lanka

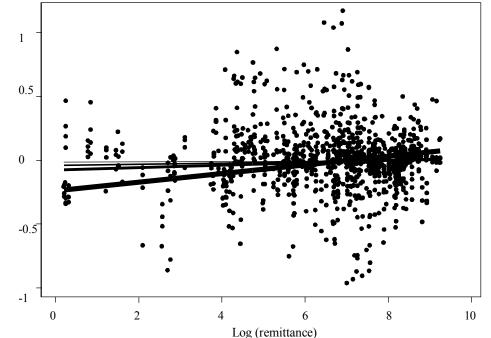
It is important to note that these figures only provide rough correlations that do not control for other factors behind decile income growth. Furthermore, they cannot help to determine whether the effect of remittances on income is uniform across deciles or not. These issues are carefully assessed in the next section.

4. RESULTS

Based on the model outlined in section 2, our objective is to quantify the effect of remittances across the distribution of income once we control for other determinants of decile income. These include variables such as human capital, macroeconomic stability, and openness to trade.

We begin by presenting the relationship between remittances and decile income based on the pooled sample. Figure 3 shows a controlled scatter plot of remittances against the income of the first, third, fifth, and seventh deciles. The diagram plots the residuals of decile income regressed on secondary school enrollment, inflation, per capita GDP, and the sum of exports and imports relative to GDP versus remittances.





Notes: This figure plots remittances controlled for secondary enrollment, inflation, real per capita GDP and the share of exports and imports relative to GDP against income for the first, third, fifth and seventh deciles. Observations corresponding to the bottom decile are represented by the thickest markers; higher deciles are represented by progressively thinner markers.

Figure 3. Remittances and Decile Income

In Figure 3 the slopes of the lines represent the coefficient estimates for β_1 in Equation 1. We portray higher income deciles by increasingly thinner regression lines. For instance, the thickest line (steepest) corresponds to the first decile, while the thinnest (flattest) corresponds to the seventh decile. Hence, our first finding is that remittances seem to have positive, but decreasing impact within the distribution of income.

Next, in order to provide an estimate of the magnitude of such effect we refine our specification from Equation 1 in two respects. First, we add a dummy variable that distinguishes observations before and after 1995, to account for observed world trends in

within country inequality;⁴ and second, we include a slope dummy for remittances in low income countries. We include the low income country interaction dummy variable to determine whether relative to other countries, remittances have particularly stronger or weaker effects in low income countries. We also include an intercept dummy variable for low income countries.

Under the new specification we pool the data and estimate the parameters by OLS. The pooled data provides a cross-section of observations on decile income, remittances and the other control variables. In Table 1 we report the coefficient estimates, with (log) mean decile income used as the dependent variable for the bottom half of the distribution.

		Table I.	Distribution	al Effects o		-CS	
In	In	In	In (GDP	sec	inflation	openness	(after) 1994
(income)	(rem)	(rem*LIC)	per capita)				dummy
1st Decile	0.036**	0.397***	1.121***	0.831***	-0.142***	0.079	-0.230***
	(0.017)	(0.037)	(0.092)	(0.180)	(0.036)	(0.093)	(0.065)
2 nd Decile	0.015*	0.266***	1.198***	0.550***	-0.176***	0.060	-0.185***
	(0.009)	(0.023)	(0.054)	(0.112)	(0.023)	(0.057)	(0.035)
3 rd Decile	0.009	0.206***	1.185***	0.399***	-0.176***	0.031	-0.146***
	(0.007)	(0.016)	(0.038)	(0.083)	(0.023)	(0.045)	(0.026)
4 th Decile	0.007	0.158***	1.167***	0.300***	-0.160***	0.017	-0.112***
	(0.006)	(0.010)	(0.028)	(0.065)	(0.021)	(0.037)	(0.021)
5 th Decile	0.005	0.113***	1.151***	0.217***	-0.146***	0.012	-0.095***
	(0.005)	(0.010)	(0.021)	(0.051)	(0.022)	(0.029)	(0.017)

Table 1. Distributional Effects of Remittances

Notes: This table reports the estimated coefficients and robust standard errors (in parenthesis) of Equation 1, for the dependent variable reported in the first column. ***, **, * represents 1%, 5%, 10% significance. Observations: 277. The estimates for the intercept and low income country dummy variable are omitted. The goodness of fit for these regressions is increasing in income and ranges from 0.81 to 0.98. Given that the distribution of income is skewed to the right in most countries, and that mean income is part of the set of regressors, the higher the decile the better the fit.

Based on our cross-country sample, we find that remittances have a positive and significant effect on the income of the first and second income deciles. This effect is stronger for the first decile and declines across the bottom half of the distribution of income.

Furthermore, the impact of remittances in low income countries is an order of

⁴ Firebaugh (2003, p. 164) documents a significant increase in global (within-country) income inequality after 1995.

magnitude larger than that of the average effect on the whole sample. Table 1 suggests that this effect is statistically significant in the bottom half of the distribution. Quantitatively, our results imply that a 1 percent increase in remittances to a low income country would raise income of the first decile by approximately 0.4 percent. This effect decreases as one moves up in the distribution. This elasticity is approximately 0.11 percent for the fifth decile.

In	In	In	In (GDP	sec	inflation	openness	(after) 1994
(income)	(rem)	(rem*LIC)	per capita)				dummy
6 th Decile	0.003	0.075***	1.139***	0.127***	-0.109***	0.012	-0.077***
	(0.005)	(0.008)	(0.016)	(0.040)	(0.012)	(0.023)	(0.013)
7 th Decile	0.002	0.039***	1.118***	0.045	-0.088***	0.012	-0.055***
	(0.004)	(0.008)	(0.012)	(0.029)	(0.009)	(0.019)	(0.010)
8 th Decile	0.000	0.007	1.069***	-0.020	-0.057***	0.000	-0.030***
	(0.003)	(0.007)	(0.011)	(0.023)	(0.006)	(0.013)	(0.008)
9 th Decile	-0.001	-0.019***	1.007***	-0.119***	-0.004	-0.011	0.012
	(0.002)	(0.007)	(0.010)	(0.022)	(0.005)	(0.014)	(0.008)
10 th Decile	-0.002	-0.095***	0.801***	-0.293***	0.124***	-0.031	0.132***
	(0.007)	(0.013)	(0.025)	(0.061)	(0.014)	(0.036)	(0.020)

 Table 2.
 Distributional Effects of Remittances

Notes: This table reports the estimated coefficients and robust standard errors (in parenthesis) of Equation 1, for the dependent variable reported in the first column. ***, **, * represents 1%, 5%, 10% significance. Observations: 277. The estimates for the intercept and low income country dummy variable are omitted. The goodness of fit for these regressions ranges from 0.94 to 0.99 and is decreasing in income.

In Table 2 we present the coefficient estimates for top 50 percent of the population. Consistent with the trend from Table 1, the effect of remittances in low income countries remains positive and significant in the sixth and seventh deciles. However, for the eighth decile this effect becomes insignificant and negative and significant in the ninth and tenth deciles.

The negative effect of remittances at the top of the distribution could be associated to lower growth due to the outflow of high-skilled workers. For instance, the World Bank (2006) cites among other negative effects of high-skilled migration on origin countries, the difference in private and social returns when educated workers interact with other skilled workers, thus hampering growth and the income of non-migrant skilled workers.

In terms of the other regressors we find a positive effect of secondary education in the bottom 60 percent of the population.⁵ In parallel to other studies, we find that

⁵ The non-significant estimates on the 7th and 8th deciles, along with the negative estimate for the top 10

inflation is a form of a regressive tax as it has a larger negative effect among the poor. In regard to the effect of trade openness on income, we find no significant effect (neither positive nor negative) in decile income. We interpret this finding as further evidence on the contested effects of globalization on income and inequality.⁶ Finally, we find a monotone decrease in income in the first eight deciles, no effect on the ninth decile, and an increase in income of the top ten percent of the distribution since 1995. This trend is consistent with Firebaugh (2003), who documents an increase in inequality around the world. All else equal, lower income shares at the bottom of the distribution and a larger share at the top imply larger inequality.

An important empirical question is whether for low income countries the difference in the estimated effect of remittances across deciles reported in Tables 1 and 2, is statistically significant. For this purpose, we estimate the set of regressions captured in Equation 1 as seemingly unrelated regressions (SUR). The SUR estimates allow us to perform joint hypothesis tests across equations by exploiting any correlation among the residuals, although the point estimates and standard errors are the same as those obtained through OLS.

	(Hypothes	sis: β_1 (LIC), $dk = \beta_1$ (LIC), dl)
De	cile	p-value
k	l	
1	2	0.122
2	3	0.013
3	4	0.001
4	5	0.000
5	6	0.001
6	7	0.001
7	8	0.004
8	9	0.058
9	10	0.043

Table 3.SUR Estimation Cross-Equation Test

Notes: This table reports the cross-equation hypothesis test that the effect of remittances on decile income is equal in subsequent deciles, based on the SUR estimates of Equation 1. The last column presents the probability of the hypothesis being true.

percent of the population, suggest that other proxies for human capital linked to higher education may have better explanatory power for household income at the top of the distribution.

⁶ See Dollar and Kraay (2005) and Rodrik (2005) for two views on the issue.

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Table 3 reports the likelihood that the effect of remittances on decile income is equal in subsequent deciles for low income countries. Although the difference of the effect between the first and second deciles is statistically indistinguishable at a 10 percent significance level, these tests confirm that the effect is positive, decile specific and decreasing in income for at least 70 percent of the population (see Tables 1 and 2). Furthermore, the negative effect of remittances at the top 20 percent of the distribution is increasing in income.

A possible concern about the OLS estimates reported above is whether they are biased due to measurement error, some sort of unobserved country-specific characteristics correlated with say, income per capita; or reverse causality between inequality and per capita income.

The econometric model specified in Equation 1, suggests that taking the path of aggregate income as given, remittances increase the income of the poor and decreases inequality. However, there is no theoretical connection from decile income to aggregate growth. From an empirical standpoint the literature has yet to reach a consensus on the relationship between inequality and growth.⁷

Since our econometric specification is silent about the effect of inequality on mean income, we test for endogeneity through a series of Hausman tests that validate the use OLS as our preferred estimator. This is because OLS estimates are more efficient than those from Instrumental Variables when the explanatory variables are exogenous. Following Dollar and Kraay (2002), we instrument real GDP per capita with the growth rate of real GDP per capita over the preceding five years. Then, we run a series of heteroskedasticity-robust Hausman tests on Equation 1 with decile income as the dependent variable. In these tests we fail to reject the null hypothesis of 'no endogeneity'.⁸

5. CONCLUSION

This paper quantifies the impact of remittances along the distribution of income. Based on a panel of countries we find that the effect of remittances is positive and monotone decreasing for the bottom 70 percent of the population in low income countries. In contrast, we find that at the top of the distribution, larger remittances are

⁷ Barro (2000) and Forbes (2000) discuss the channels through which inequality affects growth. While Barro's findings suggest that inequality slows growth, Forbes' suggest the contrary.

⁸ In addition to income group dummies that attempt to control for unobserved country characteristics, we computed the fixed effects estimates of the coefficients of Equation 1 to eliminate time-invariant country specific characteristics. However, because there are few observations, and little time variation in remittances by country, large standard errors render the coefficient estimates on remittances statistically indistinguishable from zero.

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associated with lower decile income for the top 20 percent of the population.

Quantitatively, for a representative country the effect of remittances on the bottom 10 percent of the population is marginal, as a 1 percent increase in remittances would raise the first decile income by 0.04 percent. However, the same percentage increase in remittances to a low income country would be associated with a 0.4 percent increase on the first decile mean income.

From a policy perspective, our findings imply that, all else equal, remittances not only reduce poverty, but also reduce inequality since the income at the bottom of the distribution increases, while the income at the top declines; particularly so in low income countries.

In terms of welfare, future research ought to explore whether remittances also reduce consumption inequality, and furthermore how effective are they to smooth consumption across the income distribution.

Appendix. Sample

		Country List
Country	Observations	Years
Argentina	10	1980, 1986, 1992-1996, 1998-2000
Australia	4	1981, 1985, 1986, 1989
Austria	9	1983, 1987, 1994-2000
Belgium	5	1985, 1988, 1992, 1995, 1996
Bangladesh	4	1981, 1983, 1986, 1988, 1996
Bolivia	4	1993, 1996, 1999, 2000
Brazil	16	1979, 1981, 1983-1993, 1995, 1996, 1999
Chile	4	1987, 1989, 1990, 2000
China	2	1995, 1998
Colombia	6	1992, 1995, 1996, 1998-2000
Costa Rica	1	1981
Denmark	4	1992, 1997-1999
Ecuador	5	1994, 1995, 1998-2000
Finland	18	1976, 1977, 1981, 1985, 1987-2000
France	12	1975, 1979, 1981, 1984, 1989, 1994-2000
Great Britain	14	1987-2000
Greece	6	1995-2000
Guatemala	2	1998, 2000
India	1	1975

The list of countries below comprise the sample used for the estimates reported in Tables 1 and 2.

Indonesia	4	1984, 1990, 1993, 1996
Ireland	4	1994-1997
Israel	4	1979, 1986, 1992, 1997
Italy	20	1970, 1975-1982, 1986, 1987, 1989, 1991, 1993, 1995-2000
Latvia	2	1996, 1998
Madagascar	1	1993
Mexico	7	1984, 1989, 1992, 1994, 1996, 1998, 2000
Malaysia	6	1979, 1984, 1987, 1989, 1992, 1995
Netherlands	12	1977, 1983, 1987, 1990, 1991, 1994-2000
Norway	10	1982, 1984-1992, 1994-2000
Panama	1	1979
Peru	2	1994, 1998
Philippines	4	1988, 1991, 1994, 2000
Portugal	8	1980, 1990, 1995-2000
Paraguay	2	1995, 1999
Slovenia	3	1998-2000
South Korea	10	1976, 1980, 1982, 1984, 1988, 1992, 1993, 1995-1997
Spain	8	1980, 1990, 1995-2000
Sri Lanka	4	1979, 1982, 1991, 1996
Sweden	9	1979, 1981, 1987, 1991, 1992, 1995, 1996, 1999, 2000
Switzerland	1	1992
Thailand	8	1975, 1981, 1986, 1988, 1990, 1992, 1994, 1996
Trinidad and Tobago	1	1992
Uganda	1	2000
United States	5	1986, 1991, 1994, 1997, 2000
Venezuela	6	1989, 1992, 1995-1998, 2000

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