

Economic Volatility and Inequality: Do Aid and Remittances Matter?

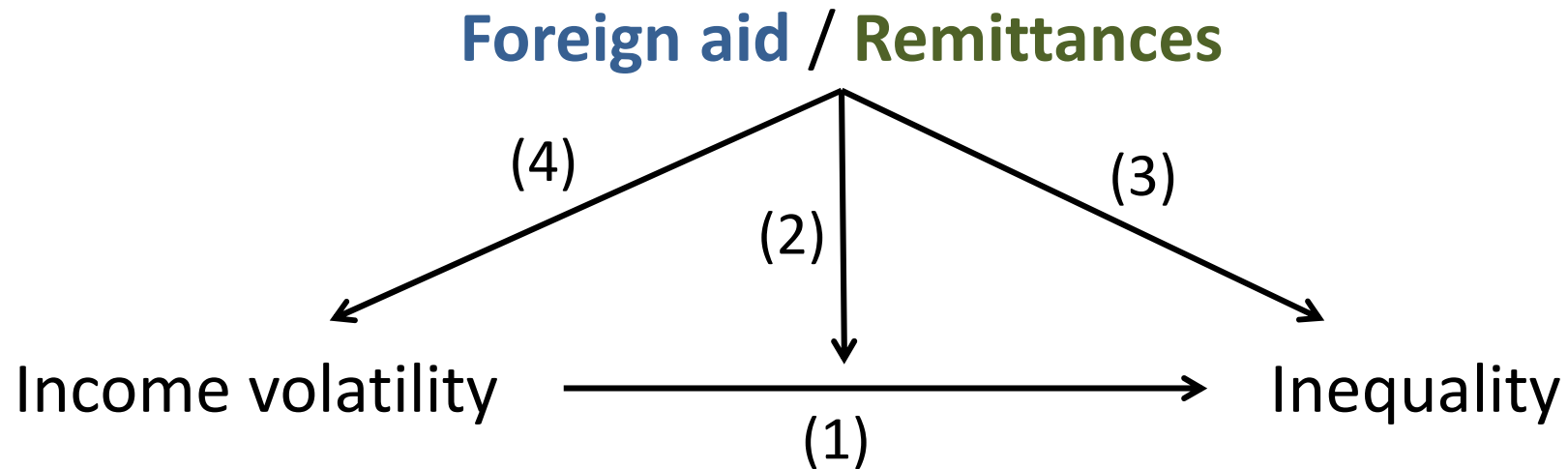
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Introduction

- Income volatility has an adverse impact on income distribution
- Aid & Remittances can mitigate the negative effect of external shocks on inequality (resilience/mitigating effect)
- Aid & Remittances can directly affect income distribution
- Aid & Remittances can reduce income volatility (stabilizing effect)

Introduction



(1) Adverse effects of income volatility on income inequality

(2) Resilience or mitigating effects of aid and remittances

(3) Direct impact of external financing flows on inequalities

(4) Stabilizing impact of flows on income volatility

Empirical Specification

1) Income volatility and inequality

$$INEQ_{i,t} = \gamma INEQ_{i,t-5} + \alpha VOLA_{i,(t,t-5)} + \gamma X_{i,(t,t-5)} + \mu_i + \tau_t + \varepsilon_{i,t}$$

2) Mitigating effect of aid and remittances

$$INEQ_{i,t} = \gamma INEQ_{i,t-5} + \alpha VOLA_{i,(t,t-5)} + \beta EXT.FINA_{i,(t,t-5)} \\ + \delta EXT.FINA_{i,(t,t-5)} \times VOLA_{i,(t,t-5)} + \gamma X_{i,(t,t-5)} + \mu_i + \tau_t + \varepsilon_{i,t}$$

- Estimations using panel fixed effects and Dynamic Sys-GMM.
- Dynamic Syst-GMM when lagged dep. var. included only
- 142 countries over 1973-2012, 5 years periods.

Panel fixed effects results

1. Income volatility and Inequality

Fixed effects estimator	1	2	3	4	5
Dependent variables (in log)	Gini	Q1	Q2	Q1/Q5	(Q1+Q2)/Q5
GDP per capita volatility	0.052*** (0.015)	-0.079*** (0.025)	-0.066*** (0.013)	-0.123*** (0.033)	-0.116*** (0.024)
GDP per capita (in log)	0.514* (0.262)	-1.135*** (0.405)	-0.573*** (0.219)	-1.563*** (0.522)	-1.172*** (0.398)
GDP per capita squared (in log)	-0.032** (0.015)	0.072*** (0.026)	0.035** (0.013)	0.100*** (0.034)	0.074*** (0.025)
Population growth	-0.011 (0.018)	0.018 (0.039)	0.014 (0.021)	0.023 (0.049)	0.021 (0.037)
Rural population (in log)	-0.023 (0.037)	0.080 (0.059)	0.018 (0.032)	0.091 (0.075)	0.048 (0.056)
Inflation (in log)	0.010 (0.011)	-0.017 (0.024)	0.001 (0.010)	-0.020 (0.030)	-0.007 (0.020)
Secondary school enrollment (gross, in log)	-0.118** (0.055)	0.284*** (0.102)	0.182*** (0.061)	0.395*** (0.136)	0.322*** (0.109)
Government expenditures (over GDP, in log)	0.062 (0.048)	-0.221** (0.102)	-0.144*** (0.051)	-0.274** (0.130)	-0.241** (0.093)
Consumption dummy	-0.029 (0.028)	0.064 (0.057)	0.031 (0.035)	0.078 (0.076)	0.049 (0.062)
Number of observations	520	477	475	477	475
Number of countries	142	140	140	140	140

Income volatility is a robust and negative determinant of income inequality.

Panel fixed effects results

2. Mitigating and direct effect of aid and remittances

Fixed effects estimator	1	2	3	4	5	6	7	8	9	10
Dependent variables (in log)	Gini	Q1	Q2	Q1/Q5	(Q1+Q2)/Q5	Gini	Q1	Q2	Q1/Q5	(Q1+Q2)/Q5
GDP per capita volatility	0.062*** (0.017)	-0.106*** (0.033)	-0.077*** (0.016)	-0.160*** (0.043)	-0.144*** (0.032)	0.084*** (0.030)	-0.183*** (0.060)	-0.125*** (0.034)	-0.275*** (0.080)	-0.241*** (0.063)
Net ODA (over GDP, in log)	-0.008 (0.010)	-0.035* (0.021)	-0.006 (0.011)	-0.040+ (0.026)	-0.020 (0.020)					
No ODA dummy	-0.048 (0.135)	-0.381 (0.291)	0.012 (0.195)	-0.419 (0.371)	-0.148 (0.305)					
Volatility x ODA	-0.004 (0.004)	0.013** (0.006)	0.005+ (0.003)	0.017** (0.008)	0.013* (0.007)					
Remittances (over GDP, in log)						0.015+ (0.010)	-0.061*** (0.017)	-0.033*** (0.010)	-0.081*** (0.022)	-0.062*** (0.018)
Volatility x Remittances						-0.024+ (0.016)	0.057* (0.029)	0.035** (0.018)	0.084** (0.041)	0.072** (0.033)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	514	471	469	471	469	470	435	433	435	433
Number of countries	142	140	140	140	140	136	135	135	135	135

- Aid in itself isn't significant, but interactive term = positive and significant
- Remittances in itself is significant and inequality-increasing, and offset when volatility is high
- Endogeneity concerns + Persistence in income inequality ==> GMM estimators

Syst-GMM results

2. Mitigating and direct effect of aid and remittances

System-GMM estimators	1	2	3	4	5	6	7	8	9	10
Dependent variables (in log)	Gini	Q1	Q2	Q1/Q5	(Q1+Q2)/Q5	Gini	Q1	Q2	Q1/Q5	(Q1+Q2)/Q5
Lagged dependent	0.509*** (0.105)	0.311** (0.127)	0.380*** (0.125)	0.293** (0.126)	0.369*** (0.107)	0.475*** (0.116)	0.492*** (0.106)	0.468*** (0.155)	0.517*** (0.111)	0.558*** (0.126)
GDP per capita volatility	0.059** (0.027)	-0.086 (0.068)	-0.057+ (0.039)	-0.114+ (0.069)	-0.095* (0.055)	0.094 (0.079)	-0.084 (0.226)	-0.137+ (0.090)	-0.073 (0.272)	-0.148 (0.184)
Net ODA (over GDP, in log)	0.019* (0.010)	0.001 (0.025)	0.002 (0.016)	-0.007 (0.030)	0.006 (0.025)					
No ODA dummy	0.208* (0.121)	0.262 (0.292)	0.119 (0.200)	0.208 (0.360)	0.241 (0.321)					
Volatility x ODA	-0.015* (0.009)	0.030 (0.021)	0.019+ (0.012)	0.041* (0.022)	0.033* (0.018)					
Remittances (over GDP, in log)						0.008 (0.016)	0.020 (0.035)	-0.016 (0.016)	0.030 (0.043)	-0.006 (0.033)
Volatility x Remittances						-0.008 (0.028)	-0.100 (0.108)	0.032 (0.046)	-0.126 (0.150)	-0.010 (0.097)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	415	354	351	354	351	387	335	332	335	332
Number of countries	122	116	115	116	115	117	111	110	111	110
AR1 (p-value)	0.000	0.055	0.003	0.046	0.005	0.001	0.049	0.004	0.026	0.004
AR2 (p-value)	0.430	0.837	0.471	0.965	0.886	0.774	0.487	0.445	0.576	0.570
Hansen test (p-value)	0.687	0.586	0.563	0.523	0.621	0.439	0.617	0.564	0.463	0.352

- Income volatility is less significant but still negative for inequality
- The interactive variable aid*volatility remains slightly significant
- There is no more significant effect for remittances

Robustness checks

- Results for the interactive term (aid*volatility) are robust to:
 - The restriction of the sample to the only aid receiving countries.
 - The introduction of a control for the level of democracy (Polity IV) and the interactive aid*democracy (insignificant).
 - The introduction of a remittances (over GDP) and the interactive remittances*volatility (insignificant).
 - The use of 10 years periods instead of 5 years.
 - The use of the standard dev. of the growth rate of income per capita

→ MITIGATING EFFECT OF FOREIGN AID
- Results for the interactive term (remittances*volatility) remain however not significant.

→ NO MITIGATING EFFECT OF REMITTANCES

Discussion

What are the mechanisms that may be at play and explain why aid mitigates the negative effect of output volatility on inequality?

1 – Asymmetric effects of volatility on the poor.

- In time of output contractions, the poorest people cut their investments in physical and human capital. This has long term effects on income distribution which are difficult to reverse in time of expansion.
- Aid allows more public spending in favour of the poor.

2 – Direct effect of aid on volatility.

- Aid mitigates the negative effect of volatility on the poor by decreasing income volatility directly by stabilizing the flow of external resources.
- Aid is countercyclical.

Asymmetric effects

- High output volatility is associated with lower education outcomes.
- The negative relationship between output volatility and education.

FIGURE 1

- The negative relationship appears only for the sample of countries receiving small amounts of aid.

FIGURE 3

→ MITIGATING EFFECT OF FOREIGN AID ON EDUCATION OUTCOMES

Direct effect of aid

- Aid reduce the positive impact of income volatility on inequality by allowing more public spending in favour of the poor.

FIGURE 5

- Augmented Chauvet and Guillaumont (2009) model:

$$VOLY_{i,(t,t-5)} = VOLY_{i,(t-5,t-10)} + aX_{i,(t,t-5)} + bX_{i,(t,t-5)} \cdot VOLX_{i,(t,t-5)} + \mathbf{bX}_{i,(t,t-5)} \cdot \mathbf{VOLX}_{i,(t,t-5)} \cdot \mathbf{AID}_{i,(t,t-5)} + gAID_{i,(t,t-5)} + dAID_{i,(t,t-5)} \times VOLA_{i,(t,t-5)} + vX_{i,(t,t-5)} + m_i + t_t + e_{i,(t,t-5)}$$

- Triple interaction term of export volatility weighted by the share of exports in GDP and multiplied by aid.
- A negative coefficient of this variable = aid dampens the output volatility inducing effect of export instability.

Direct effect of aid

	Dependent variables: GDP per capita volatility											
Sys-GMM – Internal instruments	1	2	3	4	5	6	7	8	9	10	11	12
Lagged dependent	0.111 (0.101)	0.032 (0.102)	0.123 (0.117)	0.224 (0.195)	0.088 (0.124)	0.070 (0.071)	-0.031 (0.115)	0.239 (0.233)	0.060 (0.122)	0.114 (0.146)	-0.004 (0.091)	0.304 (0.242)
ODA (over GDP)	-0.008 (0.006)	-0.003 (0.014)	-0.009 (0.008)	0.001 (0.013)	-0.005 (0.020)	0.019 (0.018)	0.022 (0.024)	-0.009 (0.009)	-0.010 (0.063)	0.048 (0.049)	0.016 (0.022)	0.018 (0.043)
ODA (over GDP) * ODA volatility	0.003 (0.004)	0.020*** (0.006)	0.006 (0.004)	-0.000 (0.007)	0.000 (0.004)	-0.003 (0.006)	0.003 (0.008)	-0.003 (0.011)	0.012 (0.021)	-0.008 (0.020)	0.006 (0.010)	-0.004 (0.022)
No ODA dummy	0.044 (0.086)	-0.332+ (0.207)	0.078 (0.129)	0.043 (0.327)	0.461 (0.512)	-0.185 (0.183)	0.076 (0.453)	-0.090 (0.296)	0.329 (0.358)	-0.246 (0.266)	0.051 (0.344)	0.128 (0.398)
Exports (over GDP)	0.002 (0.001)	0.003 (0.004)	0.000 (0.002)	-0.006* (0.003)	0.001 (0.002)	0.002 (0.003)	-0.001 (0.010)	-0.006 (0.006)	0.001 (0.003)	0.002 (0.003)	-0.001 (0.006)	0.000 (0.003)
Exports (over GDP) * Exports volatility	0.005*** (0.002)	-0.006 (0.011)	0.003+ (0.002)	0.006** (0.003)	0.006** (0.002)	-0.000 (0.006)	0.017 (0.021)	0.005* (0.003)	0.005 (0.007)	-0.000 (0.008)	0.016 (0.011)	-0.003 (0.007)
Exports (over GDP) * Exports volatility * ODA (over GDP)					-0.000* (0.000)	-0.000* (0.000)	-0.002** (0.001)	0.001 (0.001)	-0.002*** (0.000)	-0.001* (0.000)	-0.002*** (0.001)	0.000 (0.001)
GDP per capita (in log)	-0.160** (0.081)	-0.012 (0.240)	-0.167* (0.099)	-0.799 (0.636)	-0.291 (0.208)	-0.079 (0.200)	-0.259** (0.127)	-1.068* (0.633)	-0.226* (0.117)	-0.021 (0.233)	-0.219* (0.118)	-0.471 (0.477)
Number of observations	642	483	447	329	642	483	447	329	642	483	447	329
Number of countries	174	155	118	102	174	155	118	102	174	155	118	102
Developing countries only	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Additional controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
AR1 (p-value)	0.487	0.037	0.564	0.122	0.260	0.005	0.125	0.141	0.171	0.041	0.133	0.249
AR2 (p-value)	0.329	0.354	0.263	0.249	0.603	0.303	0.352	0.163	0.822	0.265	0.343	0.695
Hansen test (p-value)	0.237	0.702	0.871	0.331	0.356	0.683	0.689	0.273	0.143	0.530	0.776	0.544

- Exports volatility tends to increase income fluctuations.
- Weak evidence that aid volatility plays a similar role on income volatility.
- Aid significantly reduces income volatility in exporting countries with important exports volatility.

Conclusions

- Volatility has a robust and positive impact on inequality.
- Aid dampens the positive impact of volatility on inequality.
- Aid also tends to reduce volatility.
- The effect of remittances is more uncertain.
- Two main reasons for the mitigating effect of aid: increase of public expenditures in favour of the poor and counter-cyclical aid flows.

Figure 1. Enrolment rate and income volatility, 1973-2012, five-year averages

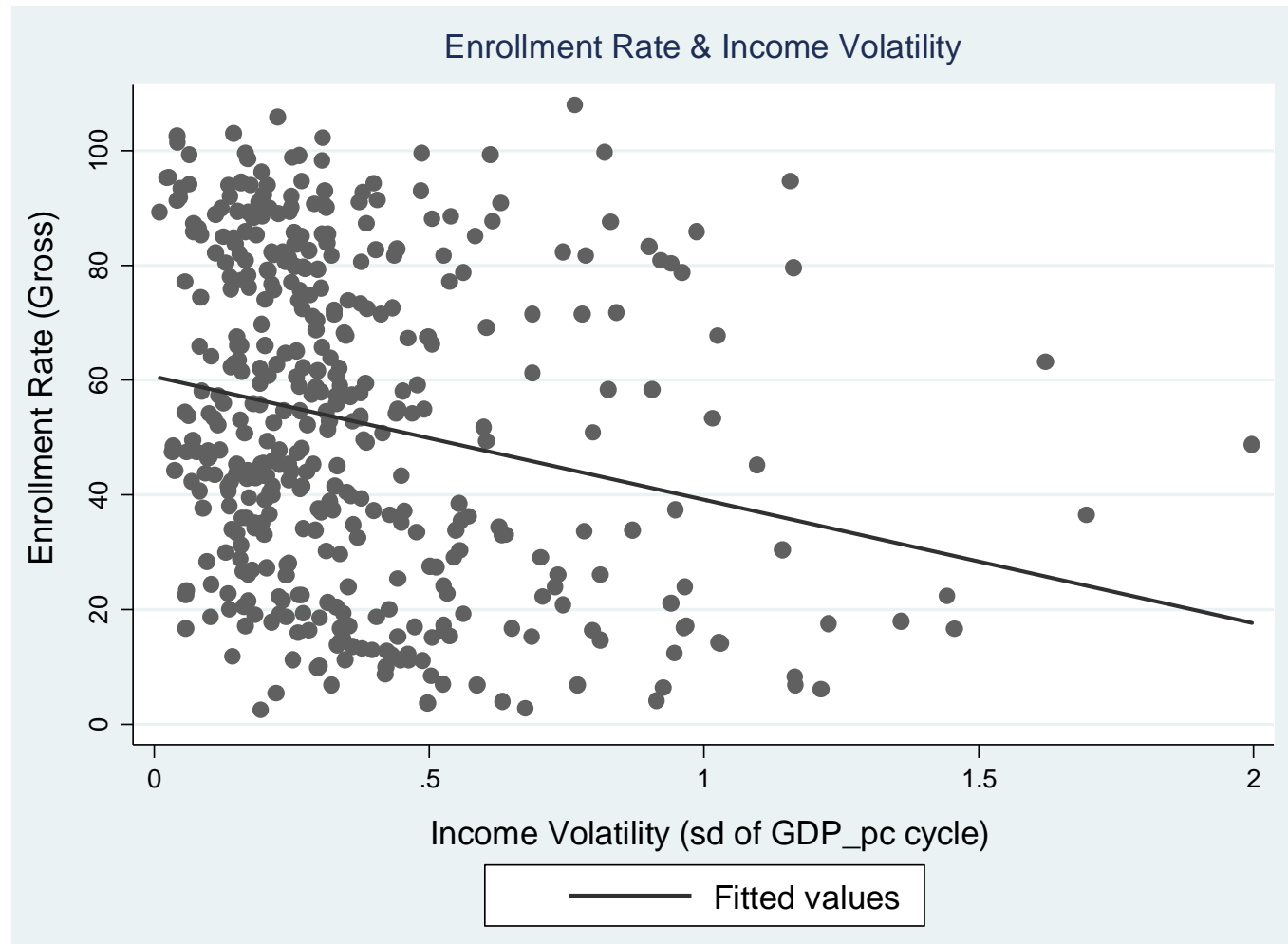


Figure 3. Enrolment rate and income volatility, by levels of aid to the social sectors, 1998-2012, five-year averages

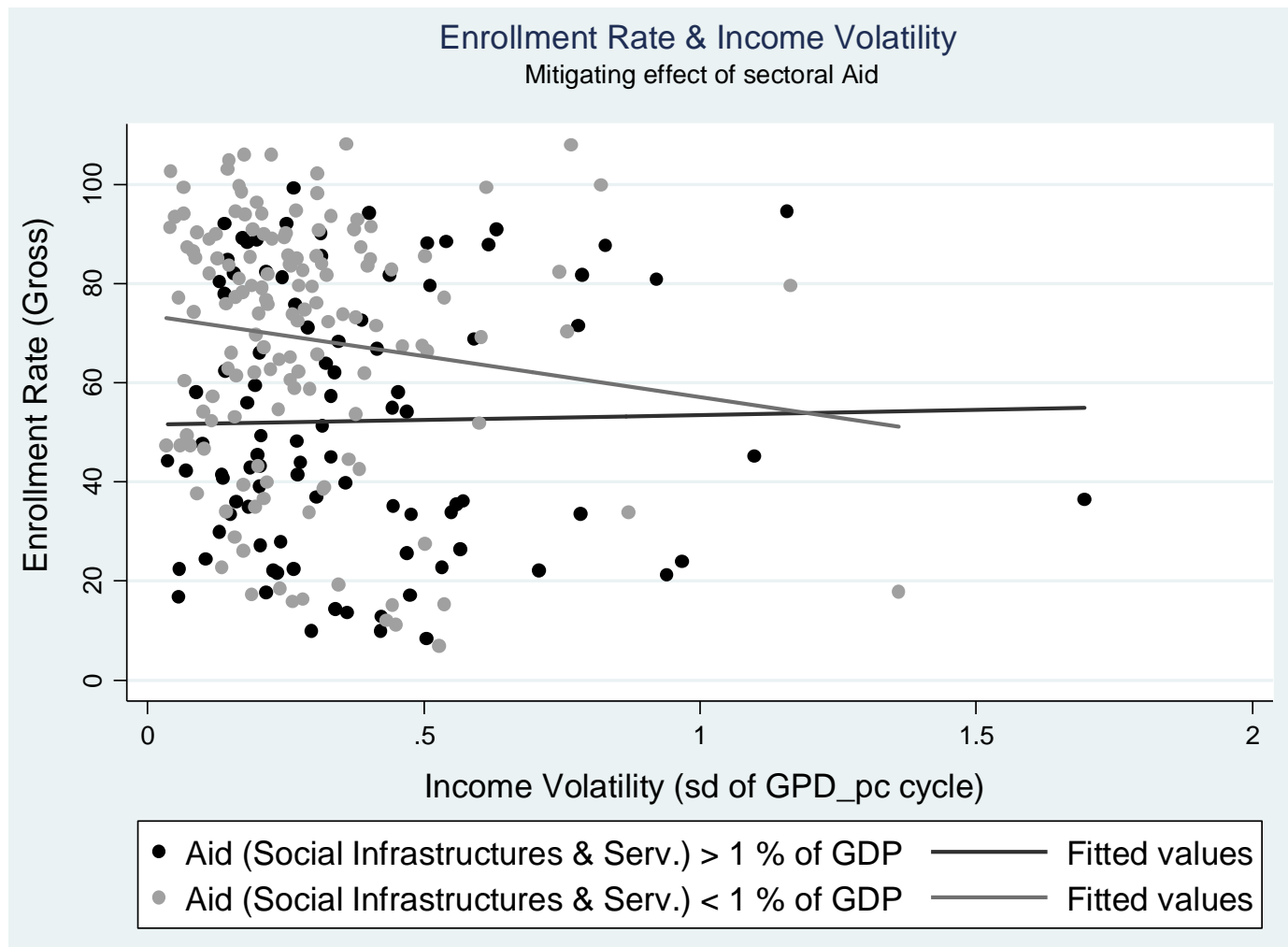


Figure 5. Inequality and exports volatility, depending on counter-cyclicality of aid, 1973-2012, five-year averages

