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The Elusive Link Between FDI and Economic Growth

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Abstract

This paper revisits the link between FDI and economic growth in emerging and developing economies. When we study the early decades of our sample, we find that there is no statistically significant correlation between FDI and growth for countries with average levels of education or financial depth. In line with previous contributions, we find that this correlation is positive and statistically significant for countries with sufficiently well-developed financial sectors or high levels of human capital. However, we also find that the link between FDI and growth varies over time. For more recent periods, we find a positive and statistically significant relationship between FDI and growth for the average country, with local conditions having a *negative* effect on this link. We also develop a novel instrument aimed at addressing the endogeneity of FDI inflows. Instrumental variable estimates suggest that our results are unlikely to be driven by endogeneity.

JEL Codes: F21, F43, C21, C26
Keywords: FDI, Economic Growth, Human Capital, Financial Development

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1 Introduction

Policymakers in both developing and advanced economies agree that foreign direct investment (FDI) is a key element of a successful development strategy. For instance, the European Commission states that: *Foreign Direct Investment is a driver of competitiveness and economic development.*[1] Similarly, in the midst of the COVID-19 pandemic, the World Bank described FDI as key to crisis recovery (Pazarbasioglu 2020).

The enthusiasm of policymakers is somewhat in contrast with the academic literature. Paraphrasing Robert Solow, one can say that there is enthusiasm for FDI everywhere but its correlation with economic growth.[2] This is not for the lack of trying. A search on Google Scholar for papers with titles including the words FDI and Growth or Foreign Direct Investment and Growth yields more than 5000 articles. Many of these have gathered thousands of citations. While there are a few papers that find a positive link between FDI and economic growth, there is now a consensus that FDI flows alone are not enough and that complementary inputs such as human capital (Borensztein et al. 1998) and financial depth (Alfaro et al. 2004 and Alfaro et al. 2010) play a central role in the link between FDI and economic growth.

There are several possible reasons why the vast literature on this topic has not produced a clear answer to the question of whether FDI promotes economic growth. First, it is possible that the positive effect of FDI on GDP growth does not exist. Second, the effect may exist but it is not large enough to be measurable at the macro-level. Third, the presence of measurement error may weaken the estimated relationship between FDI and growth. Fourth, reported FDI data might be measuring activities which are unrelated with what people and researchers have in mind when they think about FDI. Finally, the surveyed studies may suffer from endogeneity biases driven by the presence of omitted variables and reverse causality.

Bruno et al. (2018) try to address some of these problems by conducting a meta-regression analysis based on the results of 175 papers (71 papers that use macro-level data and 104 that use firm-level data) which study the effect of FDI flows to emerging market countries. They conclude that most studies find a positive correlation between FDI and economic performance and that this relationship is less conditional than what is often thought.

One challenge of summarizing a vast body of work through meta-regression is that there are large differences in the quality of the papers included in the analysis. For instance, the list of studies in Bruno et al. (2018) includes articles published in prestigious journal (and with thousands of citations), working papers, master theses, and poorly cited articles published in obscure outlets.

In this paper, we reassess the literature on FDI and growth by following a different strategy. First, we re-examine the relevant evidence by replicating the results of a small set of influential papers. Second, we study how the link between FDI and GDP growth changes when we estimate those baseline models over different time periods. Third, we study the consequences of moving from purely cross-sectional data to longitudinal data. Fourth, we develop and use a new instru-

[1] https://ec.europa.eu/internal_market/scoreboard/integration_market_openness/fdi/index_en.htm

[2] Berger and Ragoussis (2022) suggest that we should rethink the narrative about FDI.

mental variable constructed using the geography of international investments and explore what happens when we take endogeneity seriously.

We find that the relationship between FDI and economic growth is far from being stable. We document that the mediating effect of human capital and financial depth which had been established in the early literature on FDI and growth no longer holds in the post-1990 period. Moreover, the estimated direct relationship between FDI and growth varies over time and across empirical methodologies used.

A possible explanation for our findings is what Baldwin (2016) calls "the second unbundling." Starting from the 1990s, better communication allowed firms to coordinate complex activities across borders. This led to the global value chain (GVC) revolution that completely changed the nature of FDIs and their potential effects on economic growth. Antràs (2019) suggests that there are two opposing effects at play. On the one hand, GVCs reduce the "capabilities" that a country requires in order to receive FDIs. On the other hand, GVCs allow multinational corporations to employ low-wage workers in poor countries while keeping the high value added components of the production process in countries with higher levels of skills. The first element reduces the barriers to industrialization, the second reduces the technological upgrading and positive spillovers associated with FDIs. The strong bargaining power of multinational corporations that have relations with firms in low-income countries may also lead to a situation that increases the profits of the large firms while squeezing the profits of small firms based in poorer countries.

The rest of the paper is organized as follows: Section 2 presents a bird's-eye view of the literature on FDI and growth; Section 3 describes the evolving relationship between FDI and growth; Section 4 describes our instrument and the results of the IV estimations; and Section 5 concludes.

2 A Snapshot of the Literature on FDI and Growth

As mentioned in the introduction, there are literally thousands of papers that study the link between FDI and economic growth (for a recent survey, see Paul and Feliciano-Cestero 2021). In this short section, we are selective and describe a small set of influential papers that focus on the role of local conditions, endogeneity, and the measurement of FDI.[3]

Early work on FDI and growth shows that there is no statistically significant link between these two variables in the average country, but that FDI can promote growth when the appropriate local conditions are in place. Borensztein et al. (1998) start from the idea that FDI can be an important vehicle for the transfer of technology, but that the host country can benefit from it

[3]In surveying the literature, we focus on the long-run growth effect of FDI flows. There is also a literature that focuses on the effect of FDI on domestic capital formation. For a survey of this literature and new evidence based on industry-level data, see Aminghini et al. (2017). Another strand of literature that we do not survey here focuses on the short-term impact of capital inflows and asks whether these inflows are expansionary or contractionary at the business cycle frequency. While typical open-macro models suggest that capital inflows are contractionary due to their effect on exchange rate appreciation and subsequent deterioration in the trade balance, the consensus in the literature is that certain types of capital flows can be expansionary while other are contractionary (Blanchard et al., 2017 and Alfaro, 2016). For a discussion of recent trends in FDI see UNCTAD (2022) and Blanchard et al. (2021).

only if it has a stock of human capital which is beyond a minimum threshold level. They test this idea using data for 1970-89 and find that gross FDI inflows are not significantly correlated with economic growth but that the interaction between FDI flows and the stock of human capital is positively and significantly correlated with economic growth. Wang and Wong (2011) corroborate the original result of Borensztein et al. (1998) by focusing on the same period but by using a measure of education quality rather than quantity.

Alfaro et al. (2004) and Alfaro et al. (2010) also explore the role of local conditions but focus on the role of the domestic financial sector. They suggest that FDI creates positive spillovers and promotes growth through backward linkages and that a well-working domestic financial sector facilitates this mechanism because it allows local entrepreneurs to start new firms that produce intermediate goods for foreign multinational companies. Alfaro et al. (2004) use cross-country data for 1975-95 and show that net FDI flows are not significantly correlated with GDP growth but that the interaction between net FDI flows and financial depth (proxied by credit to the private sector over GDP) is positively and significantly correlated with long-run growth. Azman-Saini et al. (2010) build on the work of Alfaro et al. (2004) and, using a threshold regression model and data for 91 countries over 1975-2005, also find that financial depth matters for the link between FDI and growth.

As mentioned above, a recent meta-analysis by Bruno et al. (2018) qualifies these results and suggests that there is a positive correlation between FDI and growth which does not necessarily depend on local conditions. Bruno et al. (2018) also argue that firm-level studies tend to underestimate the positive effect of FDI on economic performance. In their view, the sum of vertical and horizontal spillovers measured in microeconomic studies underestimate the overall benefits of FDI because technologies and managerial competencies may travel across industries which do not belong to the same supply chain.

There are endogeneity issues associated with measuring the link between FDI and growth. On the one hand, the fact that countries with brighter growth prospects are more likely to attract FDI flows can generate a positive bias, leading to an overestimation of the positive effect of FDI on growth. On the other hand, standard measurement error can lead to an attenuation bias. Measurement error might have become particularly important in recent years as FDI data are affected by multinational firms' strategies aimed at minimizing their global tax bill through the reallocation of headquarters, profit shifting, or the use of shell companies as special purpose vehicles. As there is no reason why these "phantom FDI" (Damgaard et al. 2019) should stimulate economic growth, their inclusion in FDI statistics is likely to create a downward bias in the estimated relationship between FDI and growth. Moreover, FDI flows also include cross-border intragroup lending, making them closer to portfolio flows (Blanchard and Acalin 2016).

Existing work tried to address endogeneity by instrumenting FDI flows with their lagged value, the real exchange rate, country size, political stability, and institutional quality (see Borensztein et al., 1998 and Alfaro et al., 2004). There are, however, doubts about the validity of these instruments as they are likely to have a direct effect on GDP growth. In this paper, we propose a new instrument that addresses this concern.

With respect to measurement, a promising area of work relates to producing more reliable

FDI statistics that control for profit shifting motives and the role of tax havens. For instance, Damgaard et al. (2019) and Damgaard and Elkjaer (2017) build an alternative measures of FDI which does not include special purpose entities, Casella (2019) develops a method aimed at uncovering the identity of ultimate investors, and Coppola et al. (2021) build a new dataset for cross-border investment by both residency and nationality.

3 FDI and Growth since the 1970s

This section describes how the relationship between FDI and growth has evolved over time. It documents that local conditions (financial depth and education) played an important role for the link between FDI and economic growth in the early years of the sample. However, this result no longer applies for more recent growth spells.

The first part of the section focuses on cross-country regressions similar to those of Borensztein et al. (1998) and Alfaro et al. (2004) but estimated over different time periods. The second part of the section explores the evolution of the relationship between FDI and growth using panel data which allow controlling for country-specific and time-invariant unobserved heterogeneity.

Our focus is on FDI received by emerging market and developing countries. Our main dependent variable is real per capita GDP growth (sourced from the World Bank Development Indicators) averaged over either 10 or 20-year periods and our key explanatory variable is net FDI inflows over GDP, also sourced from the World Bank Development Indicators. The number of countries in our regressions ranges between 72 and 96 and varies depending on the time period and the estimation strategy. The number of observations in the panel regressions ranges between 1091 and 3098. Appendix Table A.1 reports summary statistics for all variables used in the analysis and Appendix Table A.2 shows the countries included in each sample.[4]

The data show that average net FDI were just above 1% of GDP and ranged between -0.6% of GDP and 15.5% of GDP, at the beginning of the period we study (Panel A of Appendix Table A.1). Over 1995-2014, average FDI flows had increased to 5% of GDP and ranged between less than 1% of GDP and nearly 90% of GDP. Figure A.1 in the appendix shows the cross-country dispersion of average net FDI inflows in 1975-1994 and 1995-2014. Figure A.2 in the Appendix shows the year-by-year cross-country distribution of net FDI inflows. It indicates that average net inflows peaked in 2006-07.

3.1 Baseline Cross-Country Regressions

To assess the presence of a long-run link between FDI and economic growth, we start by regressing the growth rate of real GDP per capita averaged over a 20-year period (GR_i) on FDI inflows and a set of controls. Formally, we estimate the following model:

$$GR_i = \beta_0 + \beta_1 y_i + \beta_2 FDI_i + X_i B + \nu_i. \quad (1)$$

[4]For variable definitions and sources see Appendix Table A.3.

The explanatory variables are the log of initial GDP per capita (y_i), net FDI inflows to country i scaled by GDP (FDI_i), and a matrix of controls X_i that includes credit to the private sector, educational attainment, inflation, trade openness, government consumption scaled by GDP, institutional quality, the black market premium, and a dummy for Sub-Saharan Africa.[5] All explanatory variables (with the exception of initial income) are averaged over the same 20-year period as the dependent variable.

Table 1 shows the coefficient estimates for different periods. It starts from 1970-1989 (Columns 1-3). This is the earliest period for which we have a sufficiently large sample of countries covering a full 20-year period. This is also the period used by Borensztein et al. (1998). In line with the well-known findings of Borensztein et al. (1998) and Alfaro et al. (2004), column 1 reports no significant correlation between FDI inflows and economic growth. We find the same result when we estimate the model over 1975-1994 (in column 4 of Table 1), which is the period studied by Alfaro et al. (2004).[6]

Next, we follow Borensztein et al. (1998) and Alfaro et al. (2004) and augment our model with the interaction between FDI inflows and local conditions in the host economy. Formally, we estimate model

$$GR_i = \gamma_0 + \gamma_1 y_i + FDI_i(\gamma_2 + \gamma_3 \widetilde{LC}_i) + X_i\Gamma + u_i, \tag{2}$$

where LC_i is a measure of local conditions proxied by either credit to the private sector over GDP as in Alfaro et al. (2010) or educational attainment as in Borensztein et al. (1998). We demean local conditions ($\widetilde{LC}_i = LC_i - \overline{LC}$) so that γ_2 measures the correlation between FDI and economic growth when local conditions are at their mean value (the main effect of these local conditions is included in matrix X_i). All other variables are defined as in Equation 1.

Columns 2-3 and 5-6 of Table 1 show that the relationship between FDI inflows and economic growth is stronger in countries with sufficiently high levels of education or sufficiently deep credit markets. Figure 1 illustrates this result by plotting the marginal effect of FDI on growth at different levels of financial depth (panels a and c) and education (panels b and d).

When we estimate the model using data for 1970-89, the direct link between FDI and growth is not statistically significant when we interact FDI with credit to the private sector over GDP (Column 2 of Table 1). This result indicates that there is no significant correlation between FDI and growth when financial depth is at its cross-country mean. However, the correlation between FDI and GDP growth becomes positive and statistically significant when financial depth is 25 percentage points above the cross-country mean (panel a of Figure 1). The point estimates imply that a one-standard deviation increase in FDI is associated with 1 percentage point increase in GDP growth when credit to the private sector is 25 percentage points above the sample mean. This is a large effect if one considers that average growth in the sample is 1.5%. The correlation

[5] These are the variables used in the baseline estimations of Borensztein et al. (1998) and Alfaro et al. (2004).

[6] The vintage of the World Development Indicators data that we use is different from that used in the papers that we replicate. The more recent vintages of the WDI contains updated FDI data. In these updated data some values are different from those used in earlier studies, even when they refer to the same country-year (we would like to thank Laura Alfaro for telling us about this). It is thus reassuring that the original results can be reproduced with the new vintage of the World Development Indicators.

Table 1: FDI and Growth: Cross-country Regressions starting in 1970s

	(1)	(2)	(3)	(4)	(5)	(6)
20-year range:	1970-89	1970-89	1970-89	1975-94	1975-94	1975-94
FDI	0.057	0.211	0.559*	-0.176	0.039	0.174
	(0.213)	(0.163)	(0.303)	(0.227)	(0.218)	(0.490)
FDI × Pr. Cr.		1.161*			1.791*	
		(0.608)			(0.908)	
FDI × School			1.454*			1.029
			(0.833)			(1.233)
GDP_{t-1}	-1.363***	-1.337***	-1.341***	-0.303	-0.309	-0.285
	(0.382)	(0.364)	(0.364)	(0.504)	(0.485)	(0.481)
Pr. Cr.	3.098	0.909	1.436	11.063*	7.212	10.565*
	(2.139)	(2.067)	(1.981)	(6.341)	(5.778)	(6.128)
School	2.319**	2.775***	1.777*	-3.633**	-2.954*	-4.450**
	(0.914)	(0.865)	(1.009)	(1.619)	(1.575)	(2.170)
Infl.	0.105	-0.003	0.029	0.243	0.114	0.186
	(0.280)	(0.267)	(0.274)	(0.931)	(0.896)	(0.898)
Trade	0.539	0.051	0.240	-0.802	-1.549	-1.141
	(0.430)	(0.445)	(0.440)	(1.074)	(1.306)	(1.240)
Govt. Cons.	-0.317	0.233	0.214	2.343	3.103	2.660
	(0.557)	(0.628)	(0.590)	(2.530)	(2.782)	(2.738)
Instit.	0.679**	0.602**	0.674**	0.817	0.665	0.706
	(0.265)	(0.278)	(0.268)	(0.536)	(0.538)	(0.543)
SSA	-0.896	-0.757	-0.892	-0.744	-0.574	-0.821
	(0.574)	(0.552)	(0.549)	(1.647)	(1.636)	(1.617)
B. M. P.	-5.533*	-5.709**	-6.103**	10.894	10.365	10.271
	(2.991)	(2.844)	(2.938)	(8.049)	(7.816)	(7.691)
Constant	10.990**	12.026**	10.974**	-13.586	-11.206	-12.297
	(4.901)	(4.796)	(4.646)	(14.513)	(13.824)	(13.615)
N. Obs.	81	81	81	96	96	96
R^2	0.441	0.471	0.468	0.216	0.236	0.225

Notes: This table reports a set of cross-country regressions where the dependent variable is the average growth rate of real annual GDP per capita and the explanatory variables are: net FDI inflows as a percentage of GDP; credit to the private sector by deposit money banks as a percentage of GDP (this variables is scaled by 100); the log of average years of secondary schooling in adult population; the log of initial GDP per capita; the log inflation; the log of export plus import over GDP; the log of government expenditure over GDP; the ICRG investment risk index; the log of the black market premium; and a dummy that takes value one for countries located in Sub-Saharan Africa. Columns (1)-(3) focus on developing and emerging economies for which we have data starting in 1970. Columns (4)-(6) focus on developing and emerging economies for which we have data starting in 1975. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

between FDI and growth is instead negative (but not statistically significant and close to zero) when credit to the private sector is 25 percentage points below the sample mean.

When we interact FDI with education, we find that the correlation between FDI and growth is positive and statistical significance when schooling is at the sample mean (column 3 of Table 1) and becomes much larger as schooling increases. The point estimates imply that, when education is at its sample mean, a one standard deviation increase in FDI is associated with a 1.1 percentage points increase in GDP growth. When Education is 3 months above its sample mean, the correlation between FDI and growth increases to 1.8 percentage points. The correlation between FDI and growth becomes negative, albeit not statistically significant, when schooling is about three months below the sample mean (panel b of Figure 1).

The last three columns of Table 1 estimate the same models of columns 1-3 using data for 1975-94. There are two notable differences with respect to the results for 1970-89: (i) the direct effect of FDI turns negative (albeit not statistically significant) in the regression of column 4 and (ii) the interaction between FDI and education is no longer statistically significant (column 6 of Table 1, and bottom right panel of Figure 1).

There are two potential factors that may drive these changes: the different time span and the slightly larger country sample of columns 4-6. To probe further, we estimate the same models of Table 1 with data for 1990-2009 and 1995-2014 but with exactly the same sample of countries used in Table 1. Specifically, columns 1-3 of Table 2 use the same sample of countries of the corresponding columns of Table 1 and columns 4-6 of Table 2 use the same countries used in columns 4-6 of Table 1.

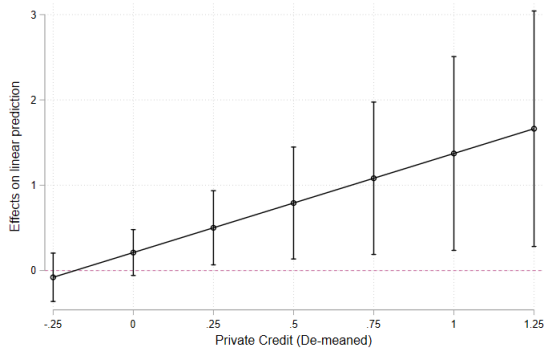
When we estimate the model for 1990-2009, we find that FDI flows are never significantly correlated with GDP growth, no matter the state of local conditions (columns 1-3 of Table 2). When we focus on 1995-2014, instead, we find that FDI flows are not significantly correlated with growth in the model without interaction (column 4). However, the main effect of FDI becomes larger (by a factor of 10) and statistically significant when the interaction effects are included in the model (columns 5 and 6). Moreover, the interactive effects are now statistically significant and negative. These latter results indicate that there is a positive and statistically significant correlation between FDI and growth for countries with average levels of education or financial depth, but that this correlation becomes *negative* in countries with high levels of education or a deep financial sector (illustrated in panels a and b in Figure 2). For instance, the point estimates of columns 5 and 6 imply that a one standard deviation increase in FDI is associated with a 1.6 percentage point increase in GDP growth (average GDP growth in this sub-sample is 2.7%), when financial depth or education is at its sample mean. However, the correlation between FDI and growth becomes negative and statistically significant when financial depth is twice the sample mean (the point estimate implies a decrease in growth of about half a percentage point; panel c of Figure 2). We find the same result for the level of education (panel d of Figure 2).

This is the *opposite* of what was found by Alfaro et al. (2010) and Borensztein et al. (1998) and of what we also find when we use data for the 1970s and 1980s. The role of local factors has clearly evolved over time.

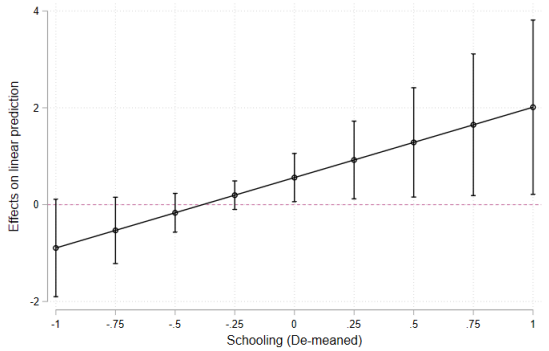
To show that we did not cherry-pick the estimation periods of Tables 1 and 2, we estimate

Figure 1: Marginal Effects of FDI (Pre-1990s)

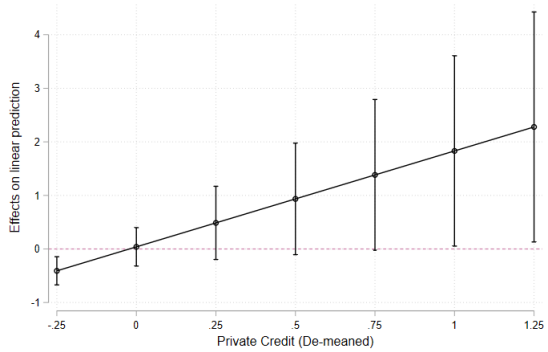
(a) 1970-1989: Private Credit



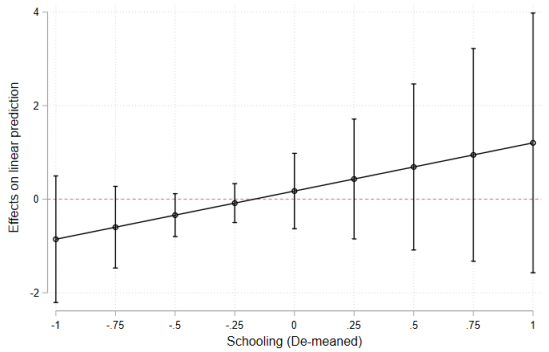
(b) 1970-1989: Schooling



(c) 1975-1994: Private Credit



(d) 1975-1994: Schooling



Notes: This figure plots the marginal effects of FDI along the distribution of either private credit or schooling, using constant samples of countries based on 20-year averages starting in 1970 or 1975 as indicated (the underlying results are those shown in Table 1). Panels (a) and (b) use the estimated results for the 20-year period 1970-1989. Panels (c) and (d) plot similar results for the period 1975-1994. Point estimates and 90-percent confidence bands are shown here.

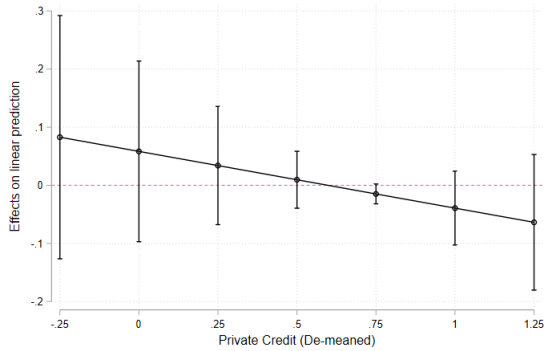
Table 2: FDI and Growth: Cross-country Regressions starting in 1990s

	(1)	(2)	(3)	(4)	(5)	(6)
	1990-2009	1990-2009	1990-2009	1995-2014	1995-2014	1995-2014
FDI	-0.008	0.058	0.116	0.017	0.188***	0.177***
	(0.011)	(0.094)	(0.116)	(0.025)	(0.034)	(0.035)
FDI × Pr. Cr.		-0.098			-0.249***	
		(0.131)			(0.046)	
FDI × School.			-0.182			-0.268***
			(0.162)			(0.056)
GDP_{t-1}	-0.672**	-0.631**	-0.647**	-1.008***	-0.818***	-0.911***
	(0.326)	(0.306)	(0.316)	(0.263)	(0.232)	(0.243)
Pr. Cr.	2.355	2.797	2.489*	1.536	2.945**	1.774
	(1.458)	(1.691)	(1.441)	(1.310)	(1.324)	(1.243)
School.	0.486	0.344	0.813	1.340**	0.879	2.188***
	(0.809)	(0.772)	(0.968)	(0.653)	(0.543)	(0.621)
Infl.	-0.119	-0.110	-0.107	0.120	0.219	0.200
	(0.193)	(0.184)	(0.179)	(0.255)	(0.219)	(0.213)
Trade	-0.160	-0.345	-0.485	-0.116	-0.667	-0.581
	(0.494)	(0.630)	(0.630)	(0.470)	(0.468)	(0.441)
Govt. Cons.	-0.027	-0.058	-0.022	-0.578	-0.677	-0.640
	(0.612)	(0.604)	(0.579)	(0.540)	(0.504)	(0.484)
Instit.	0.333	0.374	0.413	0.333**	0.397***	0.428***
	(0.243)	(0.286)	(0.293)	(0.164)	(0.143)	(0.135)
SSA	-1.752***	-1.745***	-1.781***	-0.900*	-1.059**	-1.089**
	(0.593)	(0.605)	(0.603)	(0.472)	(0.467)	(0.459)
B. M. P.	1.342	1.818	2.400	5.066	5.088	5.315
	(11.095)	(11.587)	(11.711)	(6.588)	(6.181)	(6.109)
Constant	5.321	5.046	4.848	5.946	5.848	5.802
	(7.523)	(7.763)	(7.778)	(4.544)	(4.021)	(3.904)
N. Obs.	81	81	81	96	96	96
R^2	0.394	0.401	0.413	0.298	0.408	0.401

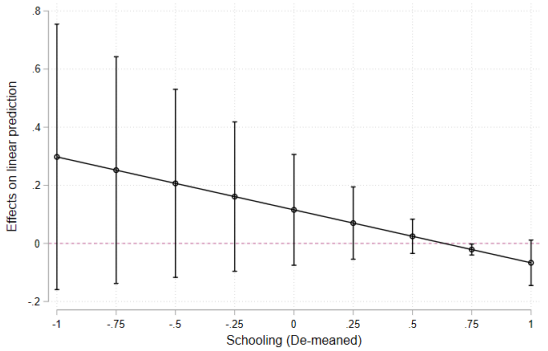
Notes: This table reports a set of cross-country regressions where the dependent variable is the average growth rate of real annual GDP per capita and the explanatory variables are: net FDI inflows as a percentage of GDP; credit to the private sector by deposit money banks as a percentage of GDP (this variables is scaled by 100); the log of average years of secondary schooling in adult population; the log of initial GDP per capita; the log inflation; the log of export plus import over GDP; the log of government expenditure over GDP; the ICRG investment risk index; the log of the black market premium; and a dummy that takes value one for countries located in Sub-Saharan Africa. Columns (1)-(3) focus on developing and emerging economies for which we have data starting in 1970. Columns (4)-(6) focus on developing and emerging economies for which we have data starting in 1975. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Figure 2: Marginal Effects of FDI (Post-1990s)

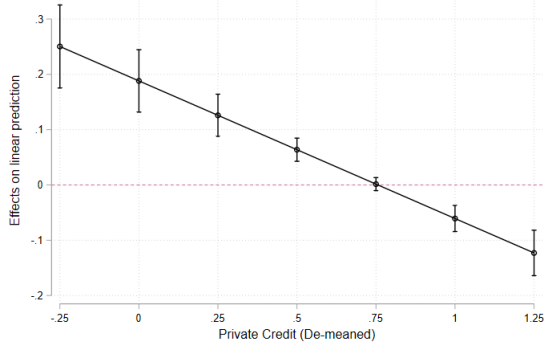
(a) 1990-2009: Private Credit



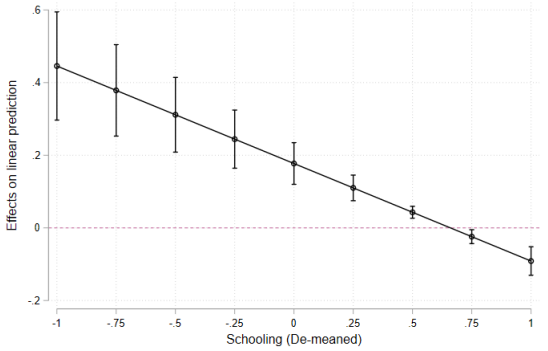
(b) 1990-2009: Schooling



(c) 1995-2014: Private Credit



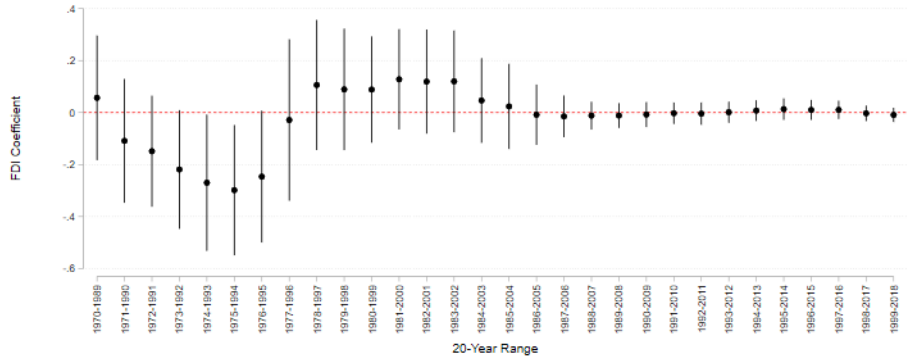
(d) 1995-2014: Schooling



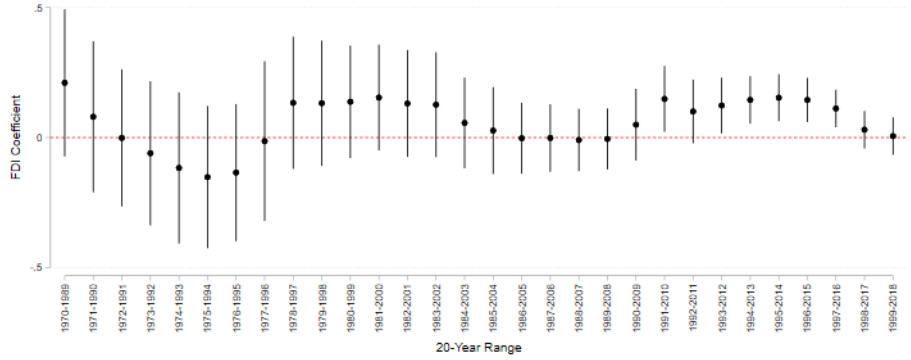
Notes: This figure plots the marginal effects of FDI along the distribution of either private credit or schooling, using constant samples of countries based on 20-year averages starting in 1970 or 1975 (the underlying results are those shown in Table 2). Panels (a) and (b) use the estimated results for the 20 year period 1990-2009, over the constant country sample from 1970. Panels (c) and (d) plot similar results for 1995-2014. Point estimates and 90-percent confidence bands are shown here.

Figure 3: FDI Coefficients with 20-Year Growth Spells

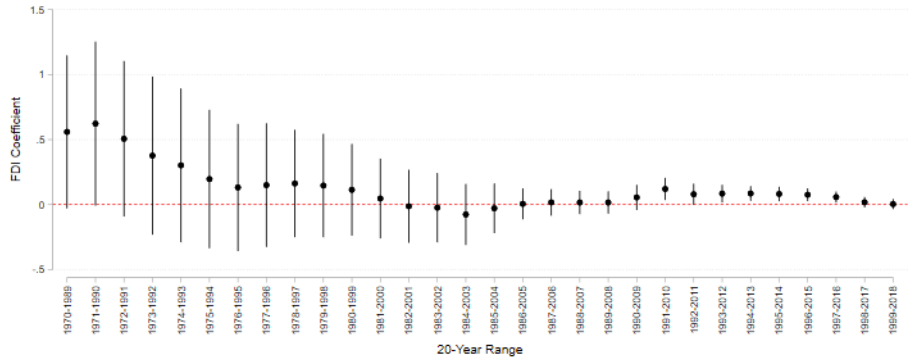
(a) Regression without Interaction Terms



(b) When FDI × Private Credit Included as Regressor



(c) When FDI × Schooling Included as Regressor



Notes: This figure plots the coefficients on FDI in cross-sectional regressions using averages over 20-year periods. Panel (a) shows results when no interaction terms are controlled for, Panel (b) shows results when the interaction between FDI and Private Credit is controlled for, and Panel (c) shows results when the interaction between FDI and Schooling is controlled for. Both private credit and schooling are demeaned. The results shown here correspond to the constant sample of developing and emerging economies over the period 1970-1989. The points denote the cross-sectional point estimates for rolling regressions and the bands display 95-percent confidence intervals.

our model for all possible 20-year periods between 1970-89 and 2000-18 and then plot the results for both the direct correlation between FDI and growth and the interactive terms.

Figure 3 shows the evolution of the coefficients for the main effect of FDI. Each point represents a point estimate for a given 20-year period with its respective confidence interval. Panel a shows the result for the model without interactions (hence, the first point of panel a plots the FDI coefficient of column 1 in Table 1; Panel b plots the main effect of FDI in the model that includes the interaction between FDI and financial depth; and panel c plots the main effect of FDI in the model that includes the interaction between FDI and education (hence, the first points in panels b and c plot the FDI coefficients in columns 2 and 3 of Table 1, respectively).

The correlation between FDI and growth goes from being negative for 20-year growth spells that start in the 1970s to positive for growth spells that start in the mid 1980s and 1990s. The majority of these coefficients are not statistically significant. However, there are periods in the mid 1970s during which the coefficients are negative and statistically significant and periods in the 1990s during which the coefficients are positive and statistically significant.

Figure 4 plots the interaction terms. While the interactive effects also show substantial time variation, they exhibit a clear downward trend. The interactions between FDI and each of financial depth and education are positive and statistically significant for growth spells starting in the 1970s and negative and statistically significant for growth spells starting in 1990s. Figures B.1 and B.2 in the Appendix show that we obtain similar results if we focus on 10-year growth spells.

In summary, cross-country regressions focusing on the direct effect of FDI and its indirect effect through financial depth or education levels yield results that depend on the time frame.

Early periods are associated with an indirect positive link between FDI and growth through high credit levels and education. Latter periods show the opposite pattern with high levels of financial depth or education leading to a negative correlation between FDI and economic growth, but a positive correlation between FDI and growth for countries with average levels of education and financial depth.

The latter results could be explained by the fact that the average country has now reached a level of education and financial depth which allows it to benefit from FDI. The former result (i.e., the fact that the correlation between FDI and Growth becomes negative at high level of education and financial depth) is more difficult to rationalize.

3.2 Panel Data

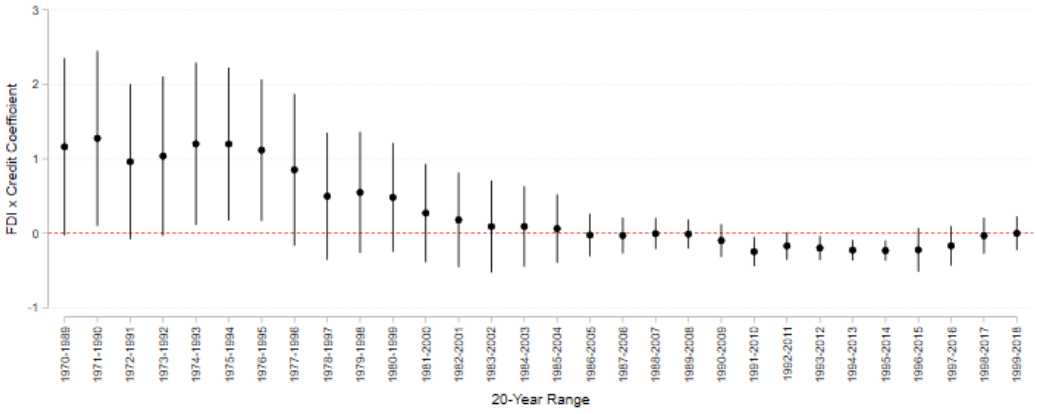
The cross-sectional OLS regressions of Tables 1-2 cannot say much about the causal effect of FDI on growth. While estimating such causal effects requires an instrumental variable strategy, panel data with country fixed effects can attenuate omitted variable bias by controlling for all time-invariant variables that are jointly correlated with FDI flows and GDP growth.

This section takes this approach and estimates several variants of the following model:

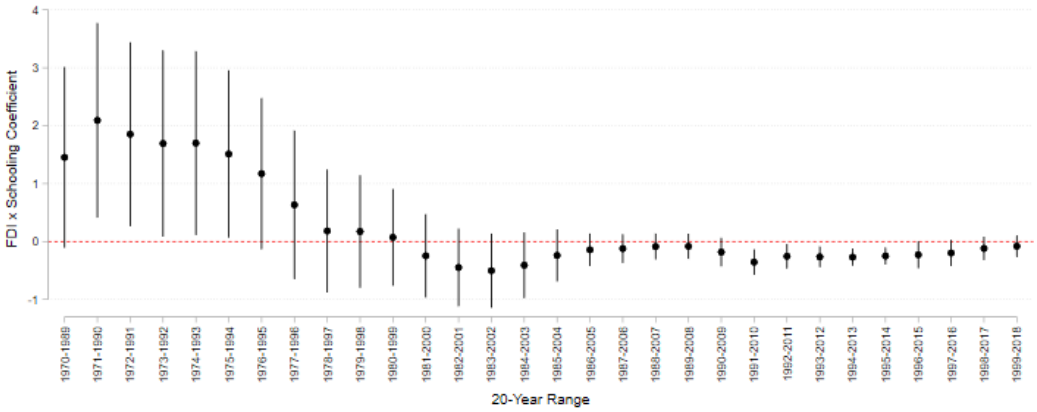
$$GR_{i,t/t-10} = \alpha_i + \tau_t + \beta_1 y_{i,t-10} + \beta_2 FDI_{i,t-10} + X_{i,t-10}B + \nu_{i,t}, \tag{3}$$

Figure 4: Interaction Coefficients

(a) FDI × Private Credit



(b) FDI × Schooling



Notes: Panel (a) plots the coefficients on FDI × Private Credit in cross-sectional regressions using averages over 20-year periods. Panel (b) does the same for the coefficients on FDI × Schooling. Both private credit and schooling are demeaned. The results shown here correspond to the constant sample of development and emerging economies over the period 1970-1989. The points denote the cross-sectional point estimates for rolling regressions and the bands display 95-percent confidence intervals.

where $GR_{i,t/t-10}$ is average real GDP per capita growth in country i between year $t-10$ and year t (we use 10-year growth spells to have a sufficient number of non-overlapping periods), α_i and τ_t are country and year fixed effects, and all other variables are defined as in Equation 1.[7]

To avoid choosing an arbitrary starting point, we estimate Equation 3 by including all possible 10-year spells. Given that the presence of overlapping spells creates a moving average in the errors, we correct for arbitrary departures from independence within each country and year by clustering the standard errors by country and year.

We start by estimating the model with all available data and only include year fixed effects. We find a positive and statistically significant link between FDI inflows and GDP growth (column 1 of Table 3). However, the correlation between FDI and growth goes to basically zero when we include country fixed effects (column 2).

[7]The set of controls does not include institutional quality because this variable has limited within-country variability and it is thus highly correlated with the country fixed effects.

Next, we split the sample in two time periods: 1970-99 and 1999-2018. When we look at 1970-99, we find that the correlation between FDI flows and GDP growth is positive and remains statistically significant also when we control for country fixed effects (columns 3 and 4 of Table 3). This positive and statistically significant link is still present in the first two decades of the 21st century but only in the model that does not include country fixed effects (column 5). When we control for country fixed effects, the correlation between FDI and growth becomes negative, albeit not statistically significant (column 6). Panel data regression with country fixed effects thus confirm that the relationship between FDI and growth varies over time.

As before, we experiment with different time periods. The various panels in Figure 5 plot the FDI coefficients in panel regressions like those of Equations 3 and 4 estimated over a 30-year window than ends in the year reported in the x axis (thus, the first regression covers all 10-year growth spells between 1970-1979 and 1990-1999). Panel a shows the results for models that only include year fixed effects and panel b shows the results for the model that includes both year and country fixed effects.

We find a downward trend for the coefficients capturing the main effect of FDI on growth. For models with year fixed effects only, the point estimates are always statistically significant but fall from 0.3 to 0.06 (as also reported in columns 3 and 5 of Table 3). This negative trend still emerges when we control for country fixed effects (with the coefficient becoming negative towards the end of the period). However, the estimates are less precise and the coefficients are rarely statistically significant.

In line with the cross-sectional estimates, we augment our baseline model by including interaction effects between FDI flows and local conditions. Formally, we estimate the following equation:

$$GR_{i,t/t-10} = \alpha_i + \tau_t + \gamma_1 y_{i,t-10} + FDI_{i,t-10}(\gamma_2 + \gamma_3 \widetilde{LC}_{i,t-10}) + X_{i,t-10}\Gamma + u_{i,t}, \qquad (4)$$

where $\widetilde{LC}$ is either the demeaned value of credit to the private sector or the demeaned value of educational attainment. All other variables are as in Equation 3.

Rather than reporting tables with estimations over a specific time window, we plot how the results vary when we estimate the model over different time windows.[8] The mid and bottom panels of Figure 5 report the coefficient estimates for the main effects of FDI on growth when we include the interaction terms with credit and education, respectively. Charts on the left hand side are based on models including year fixed effects only, while those on the right hand side include both year and country fixed effects.

As before, we find a downward trend. However, when we include the interaction between FDI and financial depth, the main effect of FDI is statistically significant for early estimation windows, even when we control for country fixed effects (panel d). The country fixed effects regressions, instead, rarely yield a significant coefficient when we include the interaction between FDI and education (panel f).

[8] Full results for the same time windows used in Table 3 are however available in Tables B.1 and B.2 in the Appendix, including private credit and schooling interactions, respectively.

Table 3: FDI and Growth: Panel Data Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
FDI	0.079**	0.001	0.321***	0.063**	0.063**	-0.014
	(0.035)	(0.017)	(0.105)	(0.026)	(0.029)	(0.015)
GDP_{t-1}	-0.747***	-4.959***	-1.092***	-6.758***	-0.672***	-5.750***
	(0.199)	(0.493)	(0.351)	(0.754)	(0.198)	(0.840)
Pr. Cr.	0.567**	0.242	0.985**	0.511*	0.389	0.003
	(0.258)	(0.174)	(0.377)	(0.270)	(0.256)	(0.166)
School.	2.284***	-1.393	4.219***	2.402	2.102***	-1.275
	(0.488)	(0.850)	(1.105)	(2.000)	(0.451)	(1.127)
Infl.	-0.123	-0.125*	-0.108	-0.060	-0.095	-0.111*
	(0.089)	(0.065)	(0.116)	(0.070)	(0.109)	(0.060)
Trade	-0.278	0.701***	-0.056	0.496	-0.505	0.349
	(0.335)	(0.242)	(0.329)	(0.305)	(0.297)	(0.299)
Govt. Cons.	-0.627*	-0.004	-0.490	-0.368	-0.684*	0.324
	(0.315)	(0.264)	(0.484)	(0.286)	(0.341)	(0.365)
B. M. P.	0.386	0.048	0.814	0.242	-0.003	0.045
	(0.866)	(0.654)	(1.036)	(0.617)	(1.013)	(0.711)
N. Obs	3,098	3,098	1,092	1,091	2,079	2,079
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes	No	Yes
Sample	All Years	All Years	1970-99	1970-99	1999-2018	1999-2018

Notes: This table reports a set of panel data regressions where the dependent variable is the average growth rate of real annual GDP per capita over a 10-year period and the explanatory variables are the lagged values of: net FDI inflows as a percentage of GDP; credit to the private sector by deposit money banks as a percentage of GDP (this variables is scaled by 100); the log of average years of secondary schooling in adult population; the log of initial GDP per capita; the log of inflation; the log of export plus import over GDP; the log of government expenditure over GDP; and the log of the black market premium. The first 10-year panel starts in 1970, and we include data up to 2018. Columns 1, 3, and 5 include year fixed effects, columns 2, 4, and 6 include country and year fixed effects. Robust standard errors double clustered at the country and year level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Figure 6 reports the coefficient estimates for the interaction terms themselves. Panels a and b show the coefficients for the interaction between FDI and credit. These are never statistically significant when only year fixed effects are included. However, they are significant in the early estimation windows when we include both country and year fixed effects (panel b).[9]

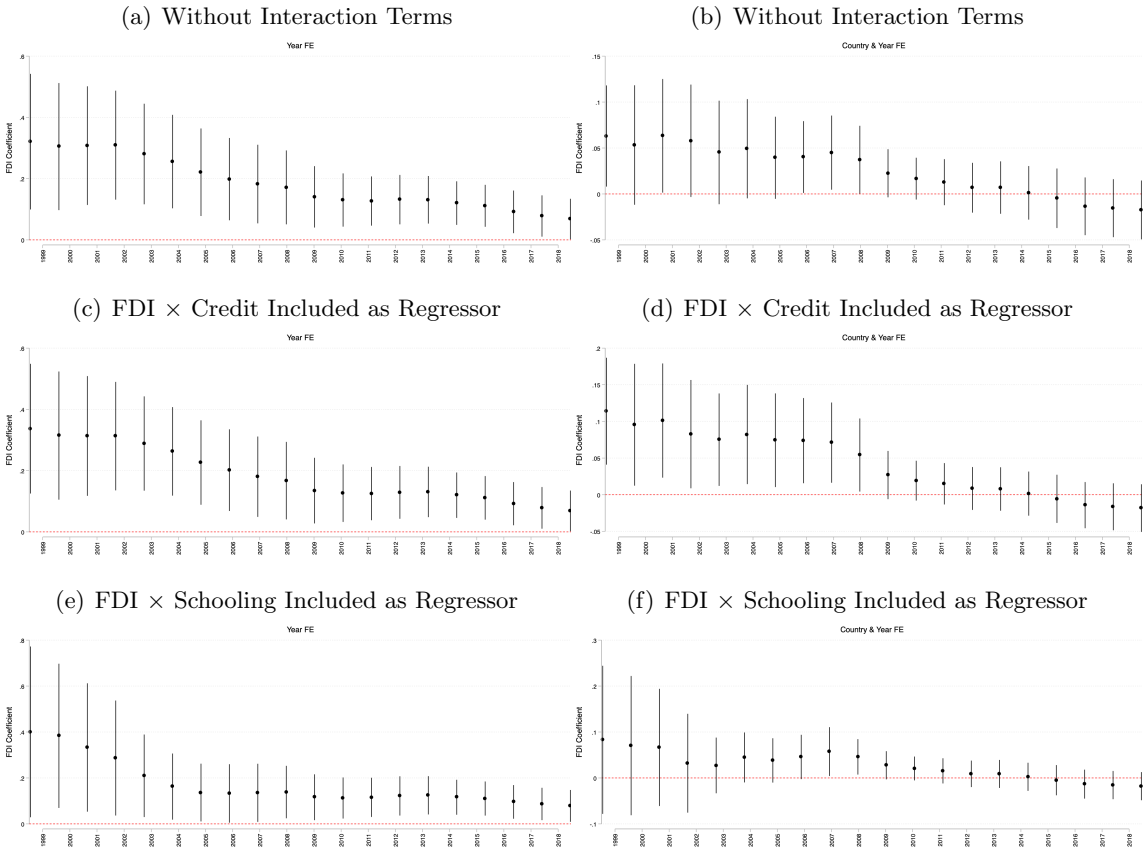
When we look at the interaction between FDI and schooling (panels c and d), we find that the coefficient is never statistically significant. In the regressions without country fixed effects, it becomes close to being marginally significant towards the end of the period. It is however negative, indicating that high levels of education reduce the correlation between FDI and growth (panel c).

4 Endogeneity

Regressions with country fixed effects allow to control for time-invariant factors that are jointly correlated with FDI inflows and GDP growth. However, they cannot fully address endogeneity because they do not allow controlling for unobserved variables that change over time and are jointly correlated with FDI flows and GDP growth. Here, we address this issue with a new instrument for FDI inflows.

[9]The interaction effect is never statistically significant when we use all possible 10-year growth spells between 1970 and 2018, see columns 1 and 2 of Appendix Table B.1.

Figure 5: FDI Coefficients from Panel Regressions



Notes: This figure plots the coefficients on FDI in panel regressions like those of Equations 3 and 4 estimated over a 30-year window than ends in the year reported in the x axis (thus, the first regression covers all 10-year growth spells starting in 1970-1979, up to 1990-1999, while the last regression covers all 10-year growth spells starting in 1989-1998, up to 2009-2018). The left panels (sub-figures a, c, and e), show the results of models that only include year fixed effects and the right panels (sub-figures b, d, and f), show the results of models that include year and country fixed effects. Panels (a) and (b) show results when no interaction terms are controlled for, panels (c) and (d) show results when the interaction between FDI and Private Credit is controlled for, and panels (e) and (f) show results when the interaction between FDI and Schooling is controlled for. Both private credit and schooling are demeaned. The points denote the panel point estimates and the bands display 95-percent confidence intervals.

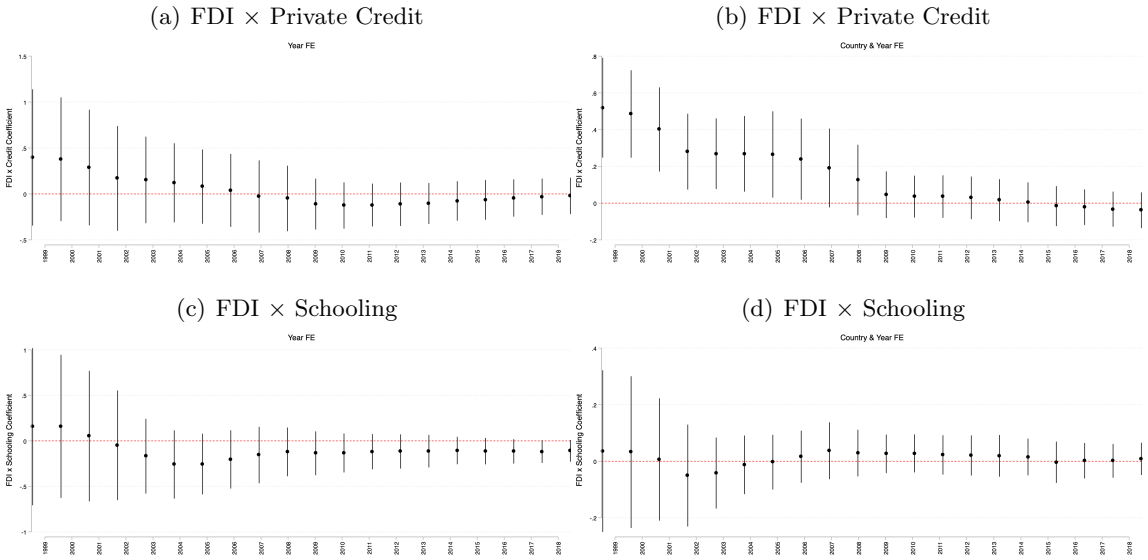
Our approach builds on Frankel and Romer (1999) who construct measures of the geographic component of trade to identify the causal effect of trade on GDP growth. Besides the fact that we focus on FDI and they focus on trade, we depart from Frankel and Romer (1999) by explicitly allowing our instrument to account for the interaction between time-invariant geographic factors and time-variant source-country push factors.[10]

4.1 A New Instrument for FDI

Our aim is to build an instrument that captures the exogenous (push) determinants of FDI flows to a given country while stripping out the endogenous (pull) factors. To do so, we start by using the Poisson Pseudo Maximum Likelihood (PPML) model developed by Silva and Tenreyro (2006)

[10] Gao (2004) also follows Frankel and Romer (1999) by constructing an instrument that uses the geographic components of FDI. However, Gao (2004)'s instrument is not time-varying like ours.

Figure 6: Interaction Terms from Panel Data Regressions



Notes: This figure plots the coefficients of the interaction between FDI and credit to the private sector (panels (a) and (b)) and FDI and schooling (panels (c) and (d)) obtained by estimating Equation 4 over a 30-year window that ends in the year reported in the x-axis (thus, the first regression covers all 10-year growth spells starting between 1970-1979, up to 1990-1999). The left panels (sub-figures (a) and (c)) show the results of models that only include year fixed effects and the right panels (sub-figures (b) and (d)) show the results of models that include year and country fixed effects. Both private credit and schooling are demeaned. The points denote the panel point estimates and the bands display 95-percent confidence intervals.

to estimate a gravity equation that only includes time-invariant bilateral variables, time-variant source variables, and the interaction between the two. Formally, we estimate the following model:

$$\phi_{ijt} = e^{(\alpha+\beta W_{ij}+\gamma X_{jt}+\delta(W_{ij}\times X_{jt})+\varepsilon_{ijt})}. \tag{5}$$

Where $\phi_{ijt} = \frac{\Delta FDI_{ijt}}{GDP_{it}}$ is the annual change in the stock of bilateral FDI from source country j to host country i scaled by host country GDP.[11] W_{ij} is a matrix of standard time invariant bilateral gravity controls such as common official language, common colonizer post-1945, colonial relationship post-1945, land border, distance, and time difference. X_{jt} is a matrix of source-country specific time variant variables including capital account openness, credit to the private sector, GDP and GDP growth, current account balance, foreign assets and liabilities scaled by GDP, and a dummy indicating whether the source country is an emerging market. We also include the interaction between W_{ij} and X_{jt}. These interaction terms allow for the effect of time invariant bilateral variables to adjust with source country shocks. Note that we do not include any host country time-variant variables as these are likely to be endogenous.

To construct the instrument, we follow two steps. First, we estimate Equation (5) taking a 5-year window over the period 1992-2015. Second, we recover the predicted values $\hat{\phi}_{ijt}$ and aggregate them at the host country-year level:

[11] Data on the stock of bilateral FDI are sourced from IMF CDIS and are available for 22 advanced source countries, 91 emerging market or developing source countries and 95 emerging market or developing host countries for the period 1990-2017.

$$z_{it} = \sum_{j=1}^{N} \hat{\phi}_{ijt}. \tag{6}$$

For each country-year we build three instruments. The first is the exogenous components of all FDI flows, regardless of their source. This is the main instrument used in the analysis. The second instrument only includes flows from advanced economies to emerging market and developing countries ("North-South" flows). The third instrument only includes flows among emerging markets and developing economies ("South-South" flows).[12] As we build more than one instrument for FDI, we can use multiple instruments in the same regression and then test for their validity with over-identifying restrictions tests.

A good instrument for FDI should only capture exogenous push factors driving FDI inflows. We think that our instrument meets this requirement because it only uses variables that are exogenous with respect to the recipient country. A more challenging requirement for a good instrument is that the instrument should not have a direct effect on GDP growth in the host country. One possible criticism to our instrument is that the factors that drive FDI inflows also drive trade. This would be the case if the main source countries for FDI are also the main trading partners of the host countries. To allay this concern, all our regressions control for trade. We discuss this potential violation in the next section. The third requirement for a good instrument is relevance. An instrument is relevant when there is a strong partial correlation between the instrument and the endogenous variable. Unlike the exclusion restrictions, relevance can be tested. To this aim, we report first stage F statistics on the instrument and a standard weak instrument test.

4.2 Cross-Country IV Regressions

We start by estimating a set of cross-sectional regressions similar to those described before using z_{it} as the instrument for FDI. As in the previous cross-section analysis, we estimate the sample over different 20-year growth spells.

Since the bilateral data on FDI flows that are necessary to build our instrument are only available from 1990, we test if the time variation of the FDI coefficient emerges also in the IV regressions by estimating the model separately for five 20-year periods: 1990-2009; 1992-2011; 1994-2011; 1996-2015 and 1998-2017. As the sample of countries for which we are able to compute the instrument is different from that of the OLS regressions described before, we show the IV results together with OLS results estimated over the same country sample.

In the baseline regressions, we use an exactly identified model in which net FDI inflows are instrumented with the value of z_{it} computed using the exogenous components of all FDI flows, regardless of their source (Table 4).

IV regressions suggest that FDI is positively associated with economic growth when we estimate the model over 1990-2009 and 1992-2011 (columns 2 and 4 of Table 4). However, the FDI

[12] Appendix Figure C.1 shows the share of North-South and South-South FDI received by developing and emerging countries over our period of analysis.

coefficients are no longer statistically significant when we estimate the model over 1994-2013, 1996-2015, and 1998-2017 (columns 6, 8, and 10). The point estimates indicate that the association between FDI and growth is about four times larger in the IV estimations than in the OLS estimations (compare columns 1 and 3 with columns 2 and 4). This is also the case when the OLS estimates are statistically significant (columns 5 and 7) and the IV estimates are not significant (compare columns 5 and 7 with columns 6 and 8).

These results could be driven by the presence of measurement error which leads to attenuation bias in the OLS estimates. However, it is unlikely that correcting attenuation bias would lead to such a large difference. This is especially so because endogeneity bias should lead to OLS estimates that amplify the positive correlation between FDI and growth. Hence, correcting for endogeneity should lead to lower point estimates. One possible explanation for our result has to do with the fact that our instrument is not very strong. To explore this possibility, we start by describing the first stage estimations associated with Table 4 to then discuss possible sources of bias.

Table C.1 in the Appendix shows first stage results. The instrument is strongly correlated with FDI for the 1990-2009 and 1992-2011 samples. However, the correlation becomes weaker for the 1994-2013 and 1996-2015 samples and it is not statistically significant for the 1998-2017 sample. Standard methods for assessing underidentification and the presence of weak instruments are the Cragg-Donald Wald F-Statistics on the excluded instrument and the Kleibergen-Paap rk LM statistics for underidentification. For the models estimated over 1990-2009 and 1992-2011, we find that the F statistics place our model in what Stock and Yogo (2002) call "the range of ambiguity." There is no clear evidence that the instrument is very strong or very weak (the statistics are consistent with a 5% test that the worst-case relative bias is 20% or less). The Kleibergen-Paap rk LM statistics indicate that we can reject the null hypothesis that the equation is underidentified, with a 5% confidence level (the p-values are 0.026 and 0.029, respectively). The weak instrument and underindentification statistics, suggest that our instrument does not work well when we estimate the model over the 1994-2013, 1996-2015, and 1998-2017 periods.

There are two sources of bias related to the presence of a weak instrument. First, even if the exclusion restrictions are valid, the presence of weak instruments leads IV estimates to be biased towards the OLS estimates. Second, the presence of a weak instrument amplifies the bias of even small violations of the exclusion restriction.

One way to assess how serious the weak instrument problem is, is to estimate the reduced form model. Given that the reduced form is estimated with OLS, it does not suffer from IV bias. Finding that the instrument is strongly correlated with the dependent variable does not guarantee that the instrument is valid, but at least it tells us that it has some strength. It is thus comforting that the reduced form regressions always show a strong correlation between our instrument and GDP growth (Table C.2 in the Appendix).

If more than one instrument is available, it is also possible to estimate the overidentified model with both two-stage least squares (TSLS) and limited information maximum likelihood (LIML) and compare these two sets of estimates. Finding LIML estimates which are very different from TSLS is an indication that the instruments are problematic. We are thus reassured that, in our

Table 4: OLS vs. IV with Cross-Sectional Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1990-2009		1992-2011		1994-2013		1996-2015		1998-2017	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
FDI	0.150*	0.597**	0.187**	0.652**	0.154**	0.821	0.161**	0.883	0.107	0.934
	(0.088)	(0.296)	(0.080)	(0.322)	(0.070)	(0.501)	(0.072)	(0.574)	(0.066)	(0.681)
GDP_{t-1}	-1.175***	-1.108***	-1.168***	-1.093***	-1.295***	-1.167***	-1.286***	-1.182**	-1.349***	-1.389***
	(0.262)	(0.309)	(0.248)	(0.311)	(0.251)	(0.442)	(0.283)	(0.516)	(0.282)	(0.516)
Pr. Cr.	2.813**	2.275**	2.895**	2.511**	2.627**	1.958	2.227*	2.397*	2.317*	3.043*
	(1.071)	(1.040)	(1.168)	(1.074)	(1.173)	(1.378)	(1.185)	(1.430)	(1.179)	(1.678)
School	1.436**	1.297*	1.760***	1.518**	2.272***	2.036**	2.426***	2.097**	2.690***	2.726***
	(0.585)	(0.697)	(0.560)	(0.719)	(0.563)	(0.917)	(0.655)	(0.961)	(0.681)	(0.966)
Infl.	0.041	-0.149	0.148	-0.013	0.292	-0.144	0.166	0.049	0.077	0.005
	(0.170)	(0.188)	(0.185)	(0.216)	(0.261)	(0.430)	(0.341)	(0.474)	(0.343)	(0.530)
Trade	-1.181**	-2.611***	-1.374**	-2.849***	-1.289**	-3.543**	-1.222**	-3.861**	-1.009*	-4.536*
	(0.567)	(0.916)	(0.537)	(0.985)	(0.501)	(1.568)	(0.536)	(1.892)	(0.570)	(2.598)
Govt. Cons.	0.279	0.332	-0.218	-0.063	-0.363	0.001	-0.582	-0.318	-0.628	-0.367
	(0.549)	(0.671)	(0.534)	(0.668)	(0.519)	(0.778)	(0.553)	(0.882)	(0.535)	(1.046)
Instit.	0.700***	0.587**	0.628***	0.536**	0.603***	0.400	0.489***	0.336	0.407**	0.276
	(0.194)	(0.244)	(0.174)	(0.231)	(0.160)	(0.323)	(0.155)	(0.350)	(0.164)	(0.400)
SSA	-1.502***	-1.449***	-1.185***	-1.276***	-0.842**	-1.264*	-0.856*	-1.497*	-0.926*	-1.766*
	(0.433)	(0.491)	(0.412)	(0.495)	(0.379)	(0.675)	(0.444)	(0.824)	(0.510)	(1.022)
B. M. P.	13.703	14.213*	13.949*	14.359*	15.231**	14.428	12.286	10.707	13.048	15.184
	(9.531)	(8.057)	(7.397)	(7.974)	(7.152)	(11.111)	(9.057)	(13.726)	(10.120)	(15.000)
Constant	-1.560	3.715	0.022	4.970	-0.463	8.549	2.790	12.856	2.421	13.477
	(7.027)	(7.055)	(5.518)	(7.233)	(5.213)	(11.153)	(5.851)	(13.005)	(6.280)	(14.875)
N. Obs	72	72	72	72	72	72	72	72	72	72
R^2	0.505	0.317	0.526	0.295	0.531	-0.122	0.489	-0.502	0.502	-0.982
CD F-test		7.286		6.558		4.554		3.909		2.805
Underid-test		4.934		4.810		3.581		2.989		2.358
P. val.		0.026		0.029		0.058		0.084		0.125

Notes: The dependent variable is the average annual GDP per capita growth rate. The columns alternate between OLS and IV regressions results. The instrument for FDI is constructed from bilateral flows from all countries to emerging or developing countries (see Table A.2). The 20-year time span is indicated in each column heading. All variables are as in Table A.3. The bottom rows show the Cragg-Donald F-statistic for the first stage results and the underidentification test with its associated p-value. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

case, the results of overidentified TSLS estimates are comparable with those of LIML estimates (see Tables C.3 and C.4 in the Appendix).

Next, we follow Andrews et al. (2019) and build Anderson-Rubin confidence sets that are robust to weak identification and are efficient when the model is just-identified. We find that our instrument generates weak-instrument-robust confidence intervals which exclude zero for all 20-year periods (see Figure 7).[13]

Finally, we explore how the presence of a weak instrument can amplify the consequence of a small violation of the exclusion restriction. This is important because exclusion restrictions are never airtight and we want to make sure that a small violation of the restriction does not lead us completely astray. To fix ideas, consider the following model in which we want to assess the effect of FDI on growth (GR) and we want to use Z as an instrument for FDI:

$$GR_i = \alpha + \beta FDI_i + \gamma Z_i + \epsilon_i \tag{7}$$

$$FDI_i = \pi_0 + \pi_1 Z_i + \nu_i \tag{8}$$

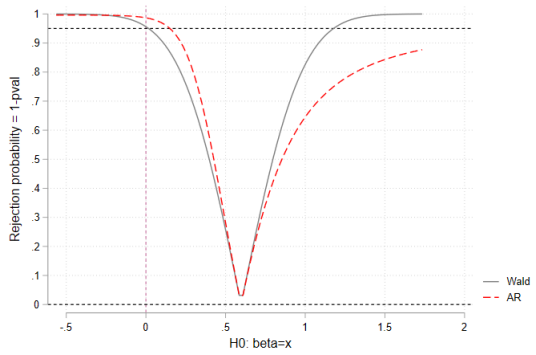
In our setting, we need to assume that the instrument has no direct effect on growth: $\gamma = 0$. The strength of the instrument is instead given by π_1.

Now, let us consider a small violation of the exclusion restriction, so that $\gamma \neq 0$. It is possible

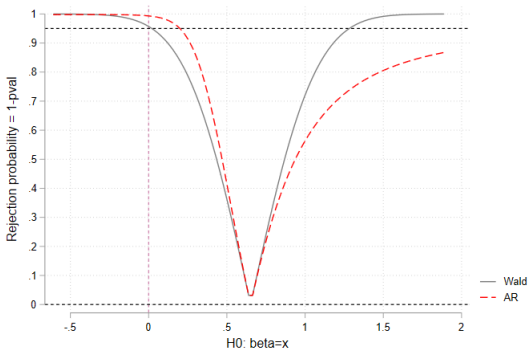
[13] We also confirm the weak-instrument robust confidence intervals exclude zero for other 20-year periods not shown in the main results (see Appendix Figure C.2).

Figure 7: Weak IV Confidence Intervals

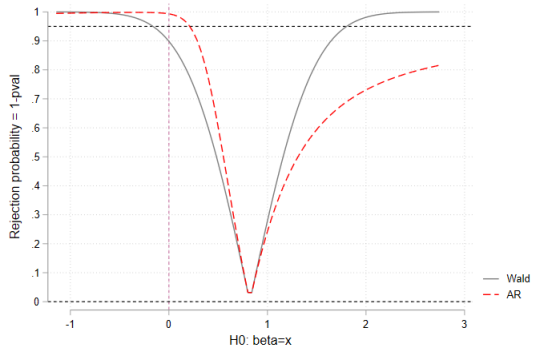
(a) 1990-2009



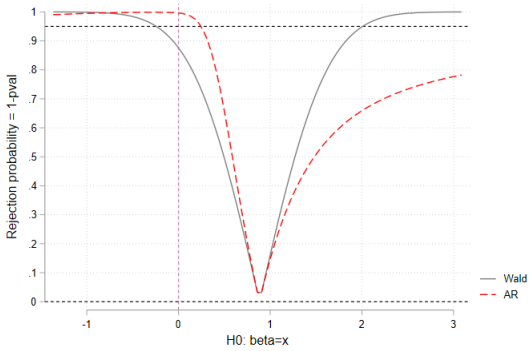
(b) 1992-2011



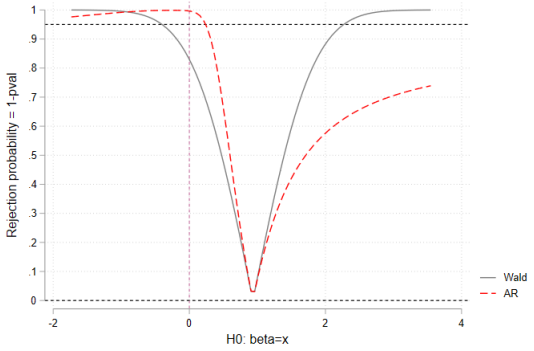
(c) 1994-2013



(d) 1996-2015



(e) 1998-2017



Notes: This figure plots the un-adjusted IV and weak-instrument robust confidence intervals. This is based on the results shown in Table 4, where the instrument is built from bilateral FDI from all countries to emerging or developing countries (see Table A.2). Each sub-figure shows a range of dates which corresponds to the range over which 20-year averages were constructed prior to running a cross-sectional regression. The y-axis shows the rejection probability. The x-axis corresponds to confidence intervals where the solid and dashed lines cross the horizontal line at y=0.95, showing the un-adjusted IV and weak-instrument robust confidence intervals, respectively.

to show that:

$$\beta_{IV} = \beta + \gamma \frac{var(Z_i)}{cov(FDI_i, Z_i)} = \beta + \frac{\gamma}{\pi_1} \tag{9}$$

Hence, the bias of the IV is given by γ/π_1 and the bias increases as π_1 becomes smaller. Alternatively, the consequences of any small violation of the exclusion restriction are amplified by the presence of a weak instrument.

We can use Equation (9) for a back-of-the-envelope calculation of the possible bias linked to the joint presence of a weak instrument and the violation of the exclusion restriction. To do so, we need to find values for π_1 and γ. For π_1, we can use the first stage estimates of Table C.1 and set $\pi_1 = 1.2$. Choosing a value for γ is more difficult.

We proceed as follows. We use Jaimovich and Panizza's (2007) estimate of the effect of a real external shock on GDP growth which is 1.7.[14] We then set $\gamma = 1.7 \times \frac{\sigma_{SHOCK}}{\sigma_{IV}}$. We are thus making the extreme assumption that *all* the variation of our instrument is driven by the real shock.[15] This yields $\frac{\gamma}{\pi_1} = \frac{1.1}{1.2} = 0.9$. If we were to subtract this back-of-the-envelope estimate of the bias from the IV point estimates of columns (2) and (4) of Table 4, we would find that FDI has a *negative* effect on growth (the point estimates would be between -0.25 and -0.3).

However, we obtained this correction by assuming that the exclusion restriction is completely violated. If we relax this extreme assumption and assume that half of the real external shock affects GDP growth through our instrument, we get that $\frac{\gamma}{\pi_1} = \frac{1.1}{1.2} = 0.45$ which is exactly the difference between the OLS estimates of columns (1) and (3) of Table 4 and the IV estimates of columns (2) and (4). We thus think that the OLS coefficients provide a reasonable estimate of the causal effect of FDI on growth.

4.3 Panel IV Regressions

In our last exercise, we use our instrument to estimate a panel data model that uses overlapping 10-year growth spells. We estimate two types of models: one that only includes year fixed effects (Columns 1 and 2 of Table 5) and one that includes both year and country fixed effects (columns 3 and 4). As before, we estimate the model for the same sample using both OLS (columns 1 and 3) and TSLS (columns 2 and 4).

When we only include time fixed effects, we find that FDI inflows are associated with higher growth and, as in the cross-sectional estimates, the effect is about three times larger in the IV estimations. We also find high values for both the Cragg-Donald Wald F-Statistics and the Kleibergen-Paap rk LM statistics. We are thus confident that, for the model of column (3), weak instruments or underidentification are not an issue. The first stage regression (column 1, Table C.5) shows that there is a significant correlation between the IV and FDI inflows, and the IV is

[14] Jaimovich and Panizza (2007) build the real external shock by using the weighted average of GDP growth in country i's export partners. Formally: $SHOCK_{it} = \frac{EXP_i}{GDP_i} \sum_j \phi_{ij,t-1} GR_{j,t}$. Where where $GR_{j,t}$ measures real GDP growth in country j in period t, $\phi_{ij,t-1}$ is the fraction of exports from country i going to country j, and $\frac{EXP_i}{GDP_i}$ measures country i's average exports expressed as a share of GDP. Jaimovich and Panizza (2007) find that in emerging and developing countries $GR_{i,t} = 1.7 \times SHOCK_{i,t}$.

[15] We adjust by the relative standard deviations so that a one standard deviation shock to the instrument ($\sigma_{IV} = 1.1$) is equivalent to one standard deviation shock of the real shock ($\sigma_{SHOCK} = 0.7$).

Table 5: Panel IV Regressions

	(1) OLS	(2) IV	(3) OLS	(4) IV
FDI	0.110**	0.303**	-0.005	-0.036
	(0.050)	(0.145)	(0.021)	(0.140)
GDP_{t-1}	-0.891***	-0.929***	-7.563***	-7.523***
	(0.250)	(0.087)	(1.256)	(0.363)
Pr. Cr.	1.490	1.406***	0.491	0.463
	(1.103)	(0.297)	(0.818)	(0.352
School	2.741***	2.591***	-0.779	-0.690
	(0.553)	(0.254)	(1.479)	(0.685)
Infl.	-0.044	0.002	0.058	0.061
	(0.112)	(0.079)	(0.055)	(0.037)
Trade	-0.578	-0.973***	0.154	0.119
	(0.418)	(0.329)	(0.359)	(0.253)
Govt. Cons.	0.094	0.122	0.502	0.533**
	(0.441)	(0.196)	(0.283)	(0.225)
B. M. P.	-1.697	0.882	1.326	1.154
	(9.934)	(5.481)	(3.402)	(2.136)
N. Obs.	709	709	705	705
Year FE	Yes	Yes	Yes	Yes
Country FE	No	No	Yes	Yes
CD F-Test		19.14		4.37
Underid test		18.87		4.41
P value		0.00		0.04

Notes: The dependent variable is average growth rate of GDP per capita over a 10-year spell (the first spell covers 1995-2005, restricted to this start due to instrument availability). All explanatory variables are measured at the beginning of the growth spells. The instruments for FDI are built using bilateral FDI from all countries to emerging and developing countries (see Table A.2). All other variables are as in Table A.3, included in these results at their value in the initial year of the 10-year growth spell. The bottom rows show the Cragg-Donald F-statistic for the first stage results, the underidentification test, and its associated p-values. Robust standard errors clustered at the country and year level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

also significant in the reduced form regression (column 3, Table C.5).

The results change once we include country fixed effects. In this case we find that in both OLS and IV regressions the coefficient associated with FDI inflows is negative, not statistically significant and close to zero.

The fact that the country fixed effects OLS regression of Table 5 find that there is no significant relationship between FDI and growth is not surprising, given that our instrument is only available since the 1990s. Thus, the regression of Table 5 are similar to the regressions of the last column of Table 3.

However, we also find that our instrument does not work when we include country fixed effects. The first stage regression shows that the instrument is significantly correlated with FDI inflows (however, the point estimate is about half what we find in the model without country fixed effects; compare columns 1 and 2 of Table C.5). However, the Cragg-Donald Wald F-Statistics suggests that we are likely to have a weak instrument problem. Moreover, the reduced form regression shows that, when we include country fixed effects, the instrument is not significantly correlated with GDP growth (column 4 of Table C.5). These results indicate that our instrument does a better job at explaining the cross sectional variation of FDI than its within country variation.

5 Conclusions

This paper revisits the relationship between FDI and economic growth in emerging and developing economies. To this end, we start by replicating the influential work by Borensztein et al. (1998) and Alfaro et al. (2004). In line with their findings, we report that there is no statistically significant correlation between FDI and growth for spells starting in the 1970s and for countries with average levels of education or financial depth. The correlation between FDI and growth is, however, positive for countries with sufficiently high levels of education or well-developed financial sectors.

In addition, we show that the relationship between FDI and growth, as well as the conditioning effect of education and financial depth, vary over time. For growth spells starting in the 1990s, we find a positive correlation between FDI and growth for the average economy. However, this correlation becomes negative for countries with high levels of education or financial depth. The first result can be explained by the average country surpassing the threshold levels of financial depth or education necessary to benefit from FDI in the 1990s. The fact that FDI is negatively correlated with economic growth in countries with higher levels of education or better developed financial sectors is harder to explain. This is especially the case if one considers that we do not find a significant correlation between FDI and growth during the 2000s, even for countries with average levels of education and financial depth.

As mentioned in the introduction, this vanishing effect could be due to the change in the nature of FDI associated with the GVC revolution. In this paper, we combine all sectors and all forms of FDI. However, the second unbundling was mostly about manufacturing. Thus, a possible way to test the role of GVCs is to study the difference between manufacturing FDI and service

and commodity FDI.[16] More in general, it would be interesting to explore all possible sources of heterogeneity, focusing on both sectors and classification of FDIs (Alfaro, 2003, Cipollina et al., 2012 and Harms and Méon, 2018).

The paper also develops a novel instrument for FDI based on the geography of FDI flows. The instrument works well for growth spells starting in the early 1990s and also for panel regressions that do not include country fixed effects. In these cases, the instrumental variable regressions corroborate the OLS results and suggest that endogeneity bias is unlikely to be an important issue. However, the instrument does not work well when we use it for more recent growth spells or panel data models with country fixed effects. As new data for the post-Covid period become available it would be interesting to further explore the performance of this instrument.

[16] We would like to thank Richard Baldwin for suggesting this possible research avenue.

References

Alfaro, L. (2003). Foreign Direct Investment and Growth: Does the Sector Matter? *Mimeo*.

Alfaro, L. (2016). Gains from Foreign Direct Investment: Macro and Micro Approaches. *The World Bank Economic Review*, 30(Supplement 1):S2–S15.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., and Sayek, S. (2004). FDI and Economic Growth: The Role of Local Financial Markets. *Journal of International Economics*, 64(1):89–112.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., and Sayek, S. (2010). Does Foreign Direct Investment Promote Growth? Exploring the Role of Financial Markets on Linkages. *Journal of Development Economics*, 91(2):242–256.

Aminghini, A., McMillan, M., and Sanfilippo, M. (2017). FDI and Capital Formation in Developing Economies: New Evidence from Industry-Level Data. NBER Working Paper 23049, National Bureau of Economic Research, Inc.

Andrews, I., Stock, J., and Sun, L. (2019). Weak Instruments in Instrumental Variables Regression: Theory and Practice. *Annual Review of Economics*, pages 563–753.

Antràs, P. (2019). Conceptual Aspects of Global Value Chains. NBER Working Paper 26539, National Bureau of Economic Research, Inc.

Azman-Saini, W., Law, S. H., and Ahmad, A. H. (2010). FDI and Economic Growth: New Evidence on the Role of Financial Markets. *Economics Letters*, 107(2):211–213.

Baldwin, R. (2016). *The Great Convergence*. Harvard University Press.

Barro, R. J. and Lee, J. W. (2013). A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics*, 104:184–198.

Berger, A. and Ragoussis, A. (2022). Is Foreign Direct Investment Losing Clout in Development? *Briefing Paper 2/2022, German Development Institute /Deutsches Institut für Entwicklungspolitik (DIE)*, 2/2022.

Blanchard, E., Santos-Paulino, A. U., Trentini, C., and Milet, E. (2021). Implications of Rising Trade Tensions for FDI Projects. *Transnational Corporations*, 28(2):161–183.

Blanchard, O. and Acalin, J. (2016). What Does Measured FDI Actually Measure? *Policy Brief 16–17, Peterson Institute for International Economics (October)*.

Blanchard, O., Ostry, J. D., Ghosh, A. R., and Chamon, M. (2017). Are Capital Inflows Expansionary or Contractionary? Theory, Policy Implications, and Some Evidence. *IMF Economic Review*, 65(3):563–585.

Borensztein, E., De Gregorio, J., and Lee, J.-W. (1998). How Does Foreign Direct Investment Affect Economic Growth? *Journal of International Economics*, 45(1):115–135.

Bruno, R. L., Campos, N. F., and Estrin, S. (2018). Taking Stock of Firm-level and Country-Level Benefits from Foreign Direct Investment. *Multinational Business Review*, 26(2):126–144.

Casella, B. (2019). Looking Through Conduit FDI in Search of Ultimate Investors–A Probabilistic Approach. *Transnational Corporations Journal*, 26(1):109–146.

Chinn, M. D. and Ito, H. (2006). What Matters for Financial Development? Capital Controls, Institutions, and Interactions. *Journal of Development Economics*, 81(1):163–192.

Cipollina, M., Giovannetti, G., Pietrovito, F., and Pozzolo, A. F. (2012). FDI and Growth: What Cross-Country Industry Data Say. *The World Economy*, 35(11):1599–1629.

Conte, M., Cotterlaz, P., and Mayer, T. (2021). The CEPII Gravity Database. CEPII.

Coppola, A., Maggiori, M., Neiman, B., and Schreger, J. (2021). Redrawing the map of global capital flows: The role of cross-border financing and tax havens. *The Quarterly Journal of Economics*, 136(3):1499–1556.

Damgaard, J. and Elkjaer, T. (2017). The Global FDI Network: Searching for Ultimate Investors. IMF Working Paper 17/258, International Monetary Fund.

Damgaard, J., Elkjaer, T., and Johannesen, N. (2019). The Rise of Phantom Investment. *Finance & Development*, 56(3).

Frankel, J. A. and Romer, D. H. (1999). Does Trade Cause Growth? *American Economic Review*, 89(3):379–399.

Gao, T. (2004). FDI, Openness and Income. *The Journal of International Trade & Economic Development*, 13(3):305–323.

Gramacy, R., Malone, S. W., and Horst, E. T. (2014). Exchange Rate Fundamentals, Forecasting, and Speculation: Bayesian Models in Black Markets. *Journal of Applied Econometrics*, 29(1):22–41.

Harms, P. and Méon, P.-G. (2018). Good and Useless FDI: The Growth Effects of Greenfield Investment and Mergers and Acquisitions. *Review of International Economics*, 26(1):37–59.

Jaimovich, D. and Panizza, U. (2007). Procyclicality or Reverse Causality? Research Department Publications 4508, Inter-American Development Bank, Research Department.

Lane, P. and Milesi-Ferretti, G. M. (2017). International Financial Integration in the Aftermath of the Global Financial Crisis. IMF Working Paper 17/115, International Monetary Fund.

Paul, J. and Feliciano-Cestero, M. M. (2021). Five Decades of Research on Foreign Direct Investment by MNEs: An Overview and Research Agenda. *Journal of Business Research*, 124:800–812.

Pazarbasioglu, C. (2020). Reviving FDI Flows is Crucial to Economic Recovery in Developing Economies. World Bank Blogs, World Bank.

Silva, J. M. C. S. and Tenreyro, S. (2006). The Log of Gravity. *The Review of Economics and Statistics*, 88(4):641–658.

Stock, J. H. and Yogo, M. (2002). Testing for Weak Instruments in Linear IV Regression. NBER Technical Working Paper No. 284 0284, National Bureau of Economic Research, Inc.

UNCTAD (2022). *The World Investment Report*. UNCTAD.

Wang, M. and Wong, M. S. (2011). FDI, Education, and Economic Growth: Quality Matters. *Atlantic Economic Journal*, 39(2):103–115.

A Data

Our empirical analysis relies on two sets of data. The first involves annual-country level data and the second involves annual-bilateral data. We describe both main sets of variables below. A list of countries included in the sample together with the definition of the key variables and their sources can be found in Tables A.2 and A.3, respectively.

Our dependent variable is real per capita GDP growth from the World Bank's Development Indicators (WDI). Our key explanatory variables are net FDI inflows over GDP sourced from the WDI, financial depth as measured by credit to the private sector over GDP from the World Bank's Global Financial Development database, and human capital measured using Barro and Lee (2013) data on average years of secondary schooling. Additional controls include: initial GDP per capita, government consumption/GDP, inflation, trade/GDP, black market premium, and a measure of institutional quality. Table A.1 reports summary statistics for the three main cross-sectional samples used in the analysis.

To build our instrument, we use information on bilateral FDI stocks from the IMF's Coordinated Direct Investment Survey, a set of gravity variables sourced from CEPII, and a set of macroeconomic control variables (see list and sources in Table A.3). These gravity variables include: common official language, common colonizer post-1945, colonial relationships post-1945, shared land border, distance, and time difference. We also use country-level data on capital account openness, credit to the private sector, GDP and GDP growth, current account balance, and international assets and liabilities.

Table A.1: Summary Statistics

Panel A: 1970-1989	Obs	Mean	Median	Std. Dev.	Min	Max
GDP per capita growth	81	1.507	1.360	2.467	-4.661	9.747
FDI Net Inflows (%GDP)	81	1.136	0.534	2.077	-0.605	15.422
Private Credit	81	0.211	0.195	0.139	0.003	0.666
Schooling	81	0.550	0.516	0.316	0.040	1.562
Inflation	81	2.858	2.541	1.222	-0.080	6.754
Trade	81	4.011	3.992	0.629	2.522	5.770
Govt. Consumption	81	2.624	2.623	0.392	1.585	3.596
Institutions	81	5.610	5.600	1.348	3.067	9.863
SSA	81	0.370	0.000	0.486	0.000	1.000
Black Market Premium	81	0.716	0.693	0.058	0.693	0.975
Panel B: 1990-2009	Obs	Mean	Median	Std. Dev.	Min	Max
GDP per capita growth	81	1.972	1.923	1.994	-4.111	9.220
FDI Net Inflows (%GDP)	81	4.007	2.376	8.786	0.136	77.833
Private Credit	81	0.292	0.213	0.247	0.012	1.099
Schooling	81	0.915	0.923	0.371	0.100	1.747
Inflation	81	2.592	2.228	1.296	0.997	7.458
Trade	81	4.228	4.164	0.510	3.090	5.884
Govt. Consumption	81	2.588	2.582	0.330	1.592	3.512
Institutions	81	7.082	7.100	1.239	3.027	9.913
SSA	81	0.370	0.000	0.486	0.000	1.000
Black Market Premium	81	0.696	0.693	0.016	0.693	0.826
Panel C: 1975-1994	Obs	Mean	Median	Std. Dev.	Min	Max
GDP per capita growth	96	-0.102	0.483	5.252	-37.002	7.777
FDI Net Inflows (%GDP)	96	1.392	0.754	2.011	-0.745	14.989
Private Credit	96	0.231	0.201	0.168	0.005	0.707
Schooling	96	0.727	0.704	0.408	0.036	1.767
Inflation	96	3.211	2.693	1.696	-1.604	8.422
Trade	96	4.071	4.044	0.557	2.700	5.814
Govt. Consumption	96	2.653	2.732	0.401	1.507	3.492
Institutions	96	5.531	5.600	1.176	3.075	9.008
SSA	96	0.313	0.000	0.466	0.000	1.000
Black Market Premium	96	0.711	0.693	0.053	0.693	0.975
Panel D: 1995-2014	Obs	Mean	Median	Std. Dev.	Min	Max
GDP per capita growth	96	2.668	2.641	1.869	-1.046	8.873
FDI Net Inflows (%GDP)	96	5.006	3.459	9.411	0.002	88.812
Private Credit	96	0.316	0.248	0.253	0.020	1.154
Schooling	96	1.064	1.116	0.432	0.121	2.041
Inflation	96	2.223	2.078	0.878	1.023	7.207
Trade	96	4.319	4.268	0.471	3.158	5.917
Govt. Consumption	96	2.623	2.638	0.330	1.624	3.534
Institutions	96	7.640	7.408	1.430	2.492	11.058
SSA	96	0.313	0.000	0.466	0.000	1.000
Black Market Premium	96	0.695	0.693	0.014	0.693	0.826

Notes: This table reports summary statistics for various samples of 20-year annual averages. Panel A focuses on all developing and emerging economies for which we have data starting in 1970 and shows averages for 1970-89. Panel B uses the same set of countries but shows averages for 1990-2009. Panel C uses all countries for which we have data starting in 1975 and shows averages over 1975-94. Panel D uses the same sample of countries as in Panel C but shows averages for 1995-2014.

Table A.2: Countries in Each Regression Sample

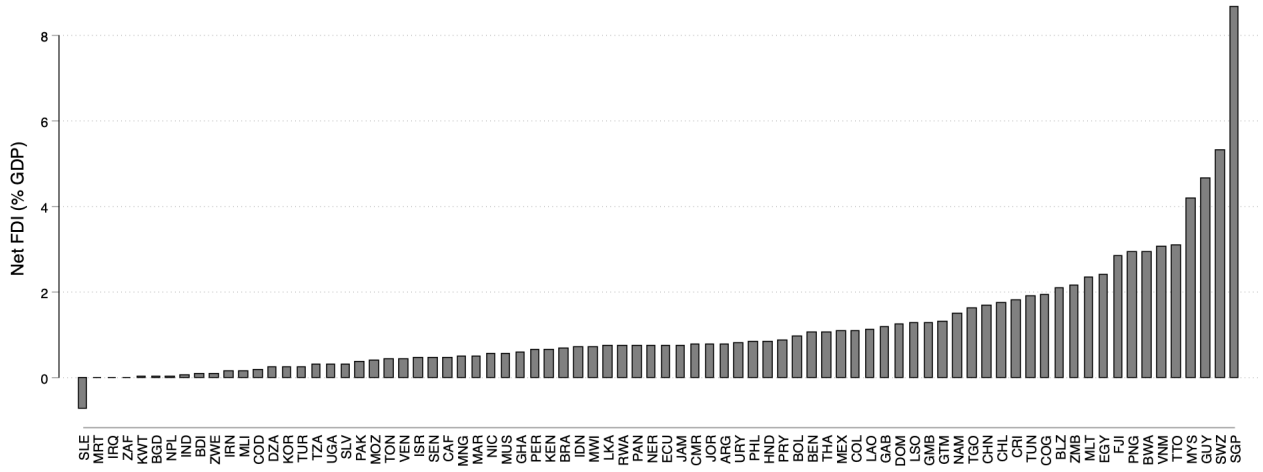
Country	1970 Sample	1975 Sample	IV Sample	Country	1970 Sample	1975 Sample	IV Sample
ALB		X	X	LTU			X
ARG	X	X	X	LVA			X
ARM		X	X	MAR	X	X	X
BDI	X	X		MDA			X
BEN	X	X	X	MEX	X	X	X
BGD	X	X	X	MLI	X	X	X
BGR		X		MLT	X	X	
BLZ	X	X		MMR		X	
BOL	X	X	X	MNG	X	X	
BRA	X	X	X	MOZ	X	X	X
BRN		X		MRT	X	X	
BWA	X	X	X	MUS	X	X	
CAF	X	X		MWI	X	X	X
CHL	X	X	X	MYS	X	X	X
CHN	X	X	X	NAM	X	X	
CMR	X	X	X	NER	X	X	X
COD	X	X		NIC	X	X	X
COG	X	X	X	NPL	X	X	X
COL	X	X	X	PAK	X	X	X
CRI	X	X		PAN	X	X	
CZE		X	X	PER	X	X	X
DOM	X	X	X	PHL	X	X	X
DZA	X	X	X	PNG	X	X	
ECU	X	X		POL		X	X
EGY	X	X	X	PRY	X	X	X
EST			X	ROU		X	
FJI	X	X	X	RUS		X	X
GAB	X	X	X	RWA	X	X	
GHA	X	X	X	SEN	X	X	X
GMB	X	X		SGP	X	X	X
GTM	X	X	X	SLE	X	X	
GUY	X	X		SLV	X	X	X
HND	X	X	X	SVK		X	X
HRV			X	SVN			X
HUN		X	X	SWZ	X	X	
IDN	X	X	X	TGO	X	X	X
IND	X	X	X	THA	X	X	X
IRN	X	X	X	TJK		X	
IRQ	X	X		TON	X	X	
ISR	X	X	X	TTO	X	X	
JAM	X	X	X	TUN	X	X	X
JOR	X	X	X	TUR	X	X	X
KAZ		X	X	TZA	X	X	X
KEN	X	X	X	UGA	X	X	X
KGZ		X		UKR		X	X
KHM		X	X	URY	X	X	X
KOR	X	X	X	VEN	X	X	X
KWT	X	X		VNM	X	X	X
LAO	X	X		YEM		X	X
LBR	X	X		ZAF	X	X	X
LKA	X	X	X	ZMB	X	X	X
LSO	X	X		ZWE	X	X	

Table A.3: Variables and Sources

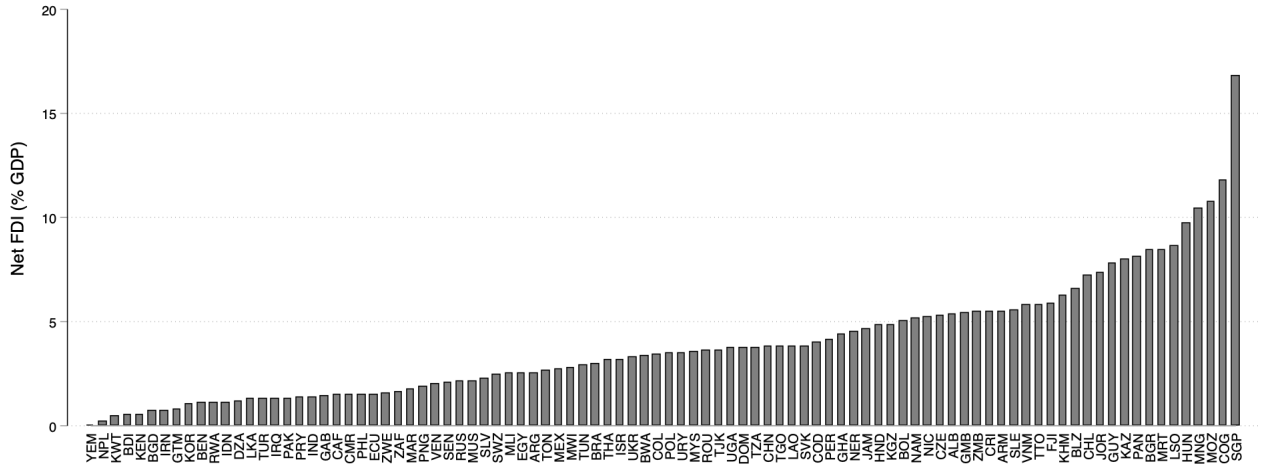
Main Variables	
GDP per capita growth rate (%)	WDI
Log(Initial GDP)	WDI
Net FDI, % GDP	WDI
Private Credit, % GDP (scaled by 100)	GFDD
Log(1+Av. Years of Schooling)	Barro and Lee (2013)
Log(1+Inflation)	WDI
Log(Trade/GDP)	WDI
Log(Govt Exp/GDP)	WDI
ICRG investment risk index (1-12)	ICRG
Sub Saharan African indicator	WB List
Log(1+Black Market Premium)	Gramacy et al. (2014)
Gravity Variables	
Bilateral FDI Stocks	IMF CDIS
Chinn-Ito Index (scaled)	Chinn and Ito (2006)
Private credit	GFDD
GDP	PWT
Annual GDP Growth	PWT
Current Account, % GDP	IMF
Foreign assets and liabilities, % GDP	Lane and Milesi-Ferretti (2017)
Dummy equal to one if common official language	CEPII, Conte et al. (2021)
Dummy equal to one if common colonizer	CEPII, Conte et al. (2021)
Dummy equal to one if colonial history	CEPII, Conte et al. (2021)
Time difference	CEPII, Conte et al. (2021)
Dummy equal to one if countries share a border	CEPII, Conte et al. (2021)
Log of distance	CEPII, Conte et al. (2021)
Log of total area scaled by 1000000	CEPII, Conte et al. (2021)

Figure A.1: Net FDI Inflows by Country

(a) 1970-1989

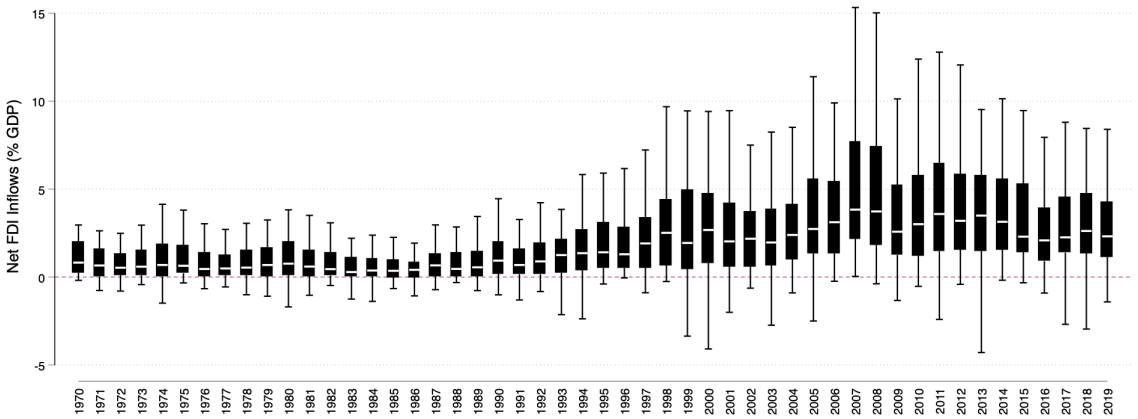


(b) 1995-2014



Notes: This figure plots the distribution of net FDI inflows (% of GDP) for the countries in Panels A and D of Table A.1. Liberia is omitted from sub-figure (a) as it's value of FDI is 15 %, while both Liberia and Malta are omitted from sub-figure (b) with FDI values of 35 % and 90 %, respectively.

Figure A.2: Distribution of Annual Net FDI Inflows



Notes: This figure shows the annual evolution of the distribution of net FDI inflows (% of GDP) using the sample of countries of Panels A and B of Table A.1. The white lines are the annual median, the lower and upper ends of the black boxes are the 25th and 75th percentiles, the whiskers extend to the upper and lower adjacent values.

B Supplementary Results

Table B.1: Panel Data Regressions with Private Credit Interactions

	(1)	(2)	(3)	(4)	(5)	(6)
FDI	0.081**	0.001	0.337***	0.114***	0.063**	-0.017
	(0.036)	(0.018)	(0.101)	(0.035)	(0.029)	(0.016)
FDI× Pr. Cr.	-0.086	-0.019	0.397	0.519***	-0.018	-0.058
	(0.097)	(0.058)	(0.353)	(0.129)	(0.090)	(0.045)
GDP_{t-1}	-0.731***	-4.936***	-1.133***	-6.986***	-0.672***	-5.775***
	(0.204)	(0.495)	(0.347)	(0.709)	(0.203)	(0.837)
Pr. Cr.	0.619**	0.250	0.939**	0.424	0.396	0.010
	(0.261)	(0.178)	(0.379)	(0.269)	(0.248)	(0.176)
School.	2.268***	-1.364	4.249***	2.591	2.077***	-1.008
	(0.488)	(0.874)	(1.101)	(1.865)	(0.451)	(1.168)
Infl.	-0.123	-0.123*	-0.095	-0.063	-0.098	-0.104*
	(0.089)	(0.067)	(0.118)	(0.069)	(0.112)	(0.060)
Trade	-0.267	0.695***	-0.112	0.527*	-0.518*	0.250
	(0.344)	(0.242)	(0.327)	(0.304)	(0.300)	(0.288)
Govt. Cons.	-0.661**	-0.006	-0.374	-0.342	-0.700*	0.331
	(0.322)	(0.263)	(0.482)	(0.288)	(0.354)	(0.371)
B. M. P.	0.395	0.056	0.802	0.298	-4.101	2.733
	(0.870)	(0.652)	(1.007)	(0.608)	(6.043)	(2.804)
N. Obs	3,098	3,098	1,092	1,091	2,006	2,006
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes	No	Yes
Sample	All Years	All Years	1970-99	1970-99	1999-2018	1999-2018

Notes: This table reports a set of panel data regressions where the dependent variable is the average growth rate of real annual GDP per capita over a 10-year period and the explanatory variables are the lagged values of: net FDI inflows as a percentage of GDP; credit to the private sector by deposit money banks as a percentage of GDP (this variables is scaled by 10); the log of average years of secondary schooling in adult population ; the log of initial GDP per capita; the log of inflation ; the log of export plus import over GDP ; the log of government expenditure over GDP ; and the log of the Black Market Premium. Columns 1, 3, and 5 include year fixed effects, columns 2, 4, and 6 include country and year fixed effects. Robust standard errors double clustered at the country and year level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

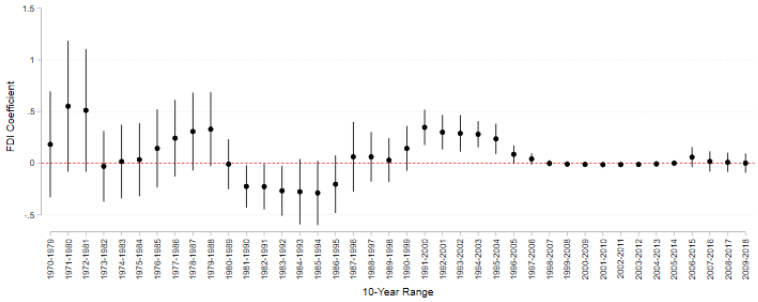
Table B.2: Panel Data Regressions with Schooling Interactions

	(1)	(2)	(3)	(4)	(5)	(6)
FDI	0.090**	0.002	0.401**	0.083	0.074**	-0.015
	(0.037)	(0.017)	(0.177)	(0.077)	(0.031)	(0.014)
FDI×School.	-0.190***	-0.026	0.156	0.036	-0.095*	0.000
	(0.064)	(0.028)	(0.411)	(0.136)	(0.051)	(0.027)
GDP_{t-1}	-0.775***	-4.930***	-1.105***	-6.778***	-0.682***	-5.860***
	(0.204)	(0.495)	(0.349)	(0.753)	(0.200)	(0.847)
Pr. Cr.	0.571**	0.245	0.981**	0.510*	0.388	-0.021
	(0.256)	(0.174)	(0.377)	(0.270)	(0.254)	(0.171)
School.	2.927***	-1.267	4.110***	2.360	2.426***	-1.147
	(0.558)	(0.863)	(1.159)	(2.022)	(0.513)	(1.180)
Infl.	-0.141	-0.127*	-0.101	-0.060	-0.105	-0.112*
	(0.089)	(0.065)	(0.119)	(0.070)	(0.113)	(0.061)
Trade	-0.322	0.683***	-0.079	0.495	-0.535*	0.272
	(0.322)	(0.240)	(0.330)	(0.304)	(0.288)	(0.288)
Govt Cons.	-0.651**	-0.015	-0.443	-0.363	-0.720**	0.335
	(0.308)	(0.264)	(0.490)	(0.284)	(0.341)	(0.372)
B. M. P.	0.442	0.063	0.800	0.247	-3.841	2.805
	(0.884)	(0.657)	(1.030)	(0.617)	(6.013)	(2.820)
N. Obs	3,098	3,098	1,092	1,091	2,006	2,006
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes	No	Yes
Sample	All Years	All Years	1970-99	1970-99	1999-2018	1999-2018

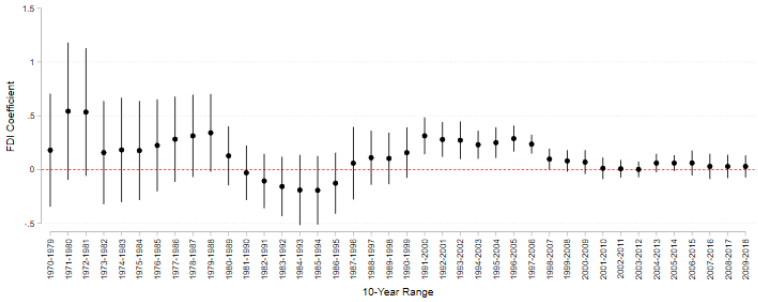
Notes: This table reports a set of panel data regressions where the dependent variable is the average growth rate of real annual GDP per capita over a 10-year period and the explanatory variables are the lagged values of: net FDI inflows as a percentage of GDP; credit to the private sector by deposit money banks as a percentage of GDP (Private Credit, this variables is scaled by 10); the log of average years of secondary schooling in adult population; the log of per capita GDP; the log of inflation ; the log of export plus import over GDP; the log of government expenditure over GDP; and the log of the black market premium. Columns 1, 3, and 5 include year fixed effects, columns 2, 4, and 6 include country and year fixed effects. Robust standard errors double clustered at the country and year level are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Figure B.1: FDI Coefficients with 10-Year Growth Spells

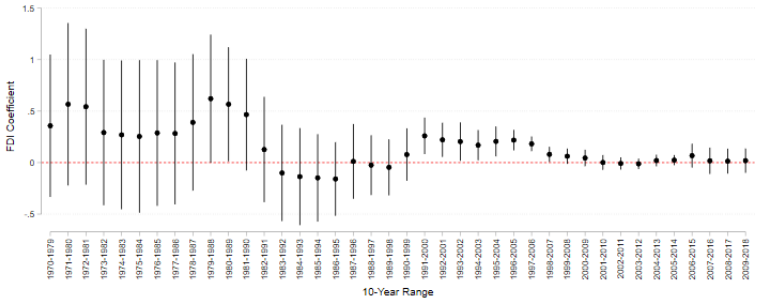
(a) Regression without Interaction Terms



(b) When FDI × Private Credit Included as Regressor



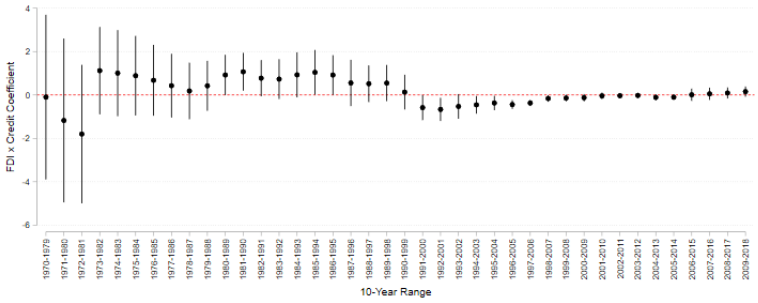
(c) When FDI × Schooling Included as Regressor



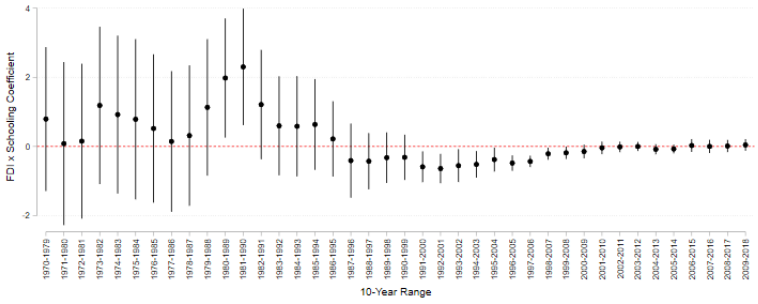
Notes: This figure plots the coefficients on FDI in cross-sectional regressions using averages over 10-year periods. Panel (a) shows results when no interaction terms are controlled for, Panel (b) shows results when the interaction between FDI and Private Credit is controlled for, and Panel (c) shows results when the interaction between FDI and Schooling is controlled for. Both private credit and schooling are demeaned. The results shown here correspond to the constant sample of emerging and developing countries starting in 1970. The points denote the cross-sectional point estimates for rolling regressions and the bands display 95-percent confidence intervals.

Figure B.2: Interaction Coefficients with 10-Year Growth Spells

(a) FDI × Private Credit



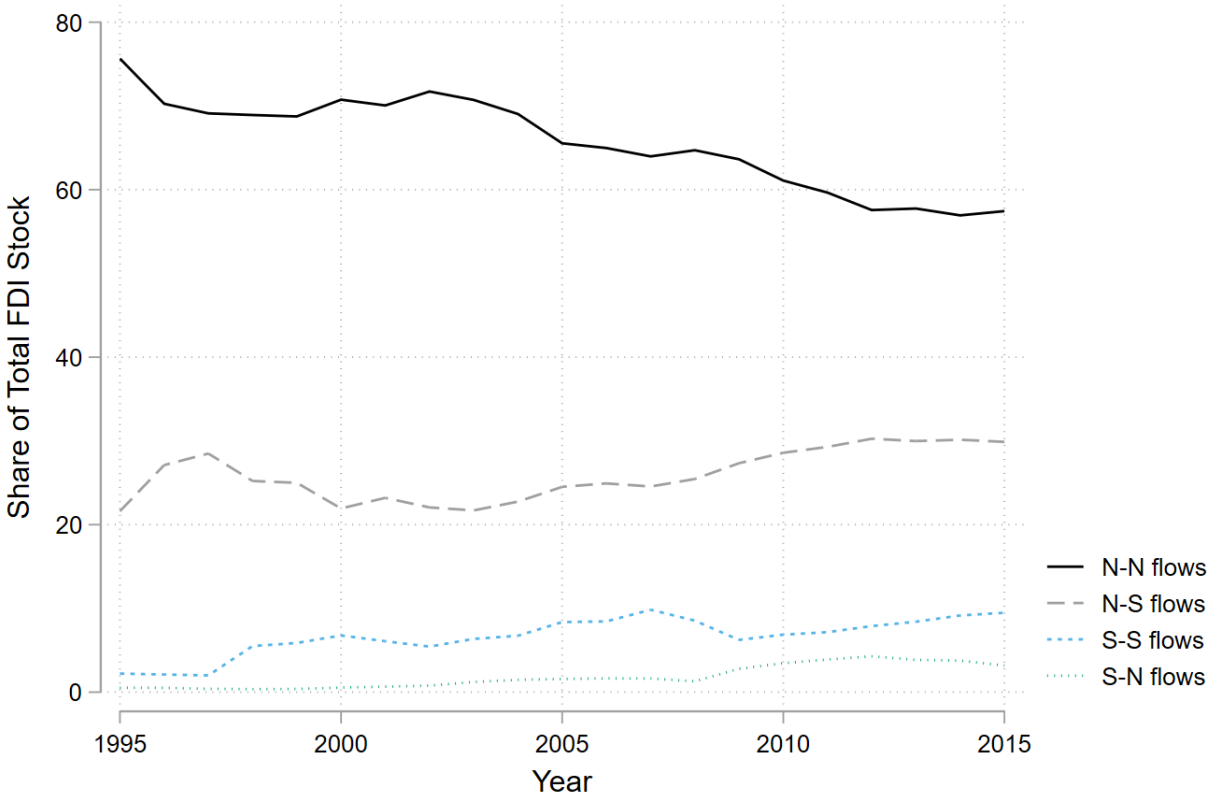
(b) FDI × Schooling



Notes: Panel (a) plots the coefficients on FDI × Private Credit in cross-sectional regressions using averages over 10-year periods. Panel (b) does the same for the coefficients on FDI × Schooling. Both private credit and schooling are demeaned. The results shown here correspond to the constant sample of emerging and developing countries starting in 1970. The points denote the cross-sectional point estimates for rolling regressions and the bands display 95-percent confidence intervals.

C Additional Material for IV Estimations

Figure C.1: Bilateral FDI Shares



Notes: This figure shows the share of annual bilataral FDI by North-North FDI, North-South FDI, South-South FDI, and South-North FDI. Authors' calculations, compiled from IMF CDIS data.

Table C.1: First Stage for Baseline IV Estimations

	(1) 1990-2009	(2) 1992-2011	(3) 1994-2013	(4) 1996-2015	(5) 1998-2017
IV	1.196***	1.261**	1.136*	1.190*	1.025
	(0.444)	(0.540)	(0.616)	(0.694)	(0.680)
GDP_{t-1}	-0.414	-0.366	-0.383	-0.380	-0.194
	(0.309)	(0.353)	(0.418)	(0.498)	(0.519)
Pr. Cr.	0.483	0.204	0.601	-0.615	-1.285
	(1.261)	(1.320)	(1.514)	(1.627)	(1.750)
School	0.547	0.638	0.335	0.482	0.002
	(0.697)	(0.768)	(1.041)	(1.116)	(1.260)
Infl.	0.373*	0.283	0.701	0.345	0.241
	(0.198)	(0.292)	(0.431)	(0.575)	(0.613)
Trade	2.734***	2.673***	2.926***	3.160***	3.788***
	(0.581)	(0.688)	(0.827)	(0.953)	(1.046)
Govt. Cons.	-0.379	-0.600	-0.938	-0.667	-0.557
	(0.857)	(0.906)	(1.077)	(1.192)	(1.340)
Instit.	0.057	0.007	0.124	0.039	0.024
	(0.334)	(0.336)	(0.348)	(0.376)	(0.390)
SSA	0.051	0.324	0.785	1.080	1.169
	(0.709)	(0.735)	(0.856)	(0.988)	(1.046)
B. M. P.	0.684	-1.733	-1.651	-2.467	-6.981
	(10.436)	(12.102)	(13.437)	(14.351)	(15.078)
Constant	-8.433	-5.636	-7.344	-6.708	-6.514
	(7.798)	(8.800)	(9.802)	(10.313)	(10.731)
N. Obs	72	72	72	72	72
R2	0.540	0.490	0.436	0.394	0.401
CD F-test	7.286	6.558	4.554	3.909	2.805
Underid-test	4.934	4.810	3.581	2.989	2.358
P. val.	0.026	0.029	0.058	0.084	0.125

Notes: This table reports the first stage results for the IV regressions of Table 4. The dependent variable is net FDI flows and the IV is built using bilateral flows from all countries to emerging or developing countries. The 20-year time span is indicated in each column heading. All other variables are as in Table A.3. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1. The bottom rows show the Cragg-Donald F-statistic for the first stage results, the underidentification test, and its associated p-value.

Table C.2: Reduced Form for Baseline IV Estimations

	(1)	(2)	(3)	(4)	(5)
	1990-2009	1992-2011	1994-2013	1996-2015	1998-2017
IV	0.715**	0.822***	0.933***	1.051***	0.957***
	(0.287)	(0.299)	(0.300)	(0.308)	(0.281)
GDP_{t-1}	-1.356***	-1.331***	-1.482***	-1.518***	-1.570***
	(0.275)	(0.256)	(0.243)	(0.268)	(0.247)
Pr. Cr.	2.564**	2.644**	2.451**	1.855	1.843*
	(1.025)	(1.144)	(1.135)	(1.115)	(1.086)
School	1.624***	1.934***	2.311***	2.522***	2.727***
	(0.546)	(0.545)	(0.562)	(0.712)	(0.721)
Infl.	0.074	0.171	0.432	0.353	0.230
	(0.164)	(0.188)	(0.262)	(0.357)	(0.349)
Trade	-0.978**	-1.107**	-1.140***	-1.071**	-1.000**
	(0.443)	(0.452)	(0.428)	(0.467)	(0.482)
Govt. Cons.	0.105	-0.454	-0.769*	-0.907	-0.888
	(0.487)	(0.475)	(0.460)	(0.550)	(0.541)
Instit.	0.621***	0.540**	0.501**	0.371**	0.298*
	(0.217)	(0.206)	(0.189)	(0.165)	(0.158)
SSA	-1.419***	-1.065**	-0.619	-0.543	-0.675
	(0.462)	(0.437)	(0.393)	(0.463)	(0.504)
B. M. P.	14.622	13.230*	13.073*	8.529	8.666
	(9.846)	(7.827)	(7.088)	(8.141)	(9.143)
Constant	-1.322	1.297	2.520	6.934	7.396
	(7.164)	(5.946)	(5.815)	(5.951)	(6.269)
N. Obs	72	72	72	72	72
R2	0.520	0.533	0.565	0.530	0.561

Notes: This table reports the reduced form regressions for the IV regressions of Table 4. The dependent variable is the average annual growth rate of GDP per capita and the IV is built using bilateral flows from all countries to emerging or developing countries. The 20-year time span is indicated in each column heading. All other variables are as in Table A.3. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Table C.3: OLS vs. IV Overidentified Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1990-2009		1992-2011		1994-2013		1996-2015		1998-2017	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
FDI	0.150*	0.432	0.187**	0.431*	0.154**	0.563*	0.161**	0.624*	0.107	0.541
	(0.088)	(0.307)	(0.080)	(0.253)	(0.070)	(0.321)	(0.072)	(0.368)	(0.066)	(0.351)
GDP_{t-1}	-1.175***	-1.133***	-1.168***	-1.129***	-1.295***	-1.217***	-1.286***	-1.219***	-1.349***	-1.370***
	(0.262)	(0.268)	(0.248)	(0.255)	(0.251)	(0.334)	(0.283)	(0.391)	(0.282)	(0.353)
Pr. Cr.	2.813**	2.474**	2.895**	2.694***	2.627**	2.217*	2.227*	2.337**	2.317*	2.698**
	(1.071)	(0.974)	(1.168)	(1.014)	(1.173)	(1.136)	(1.185)	(1.185)	(1.179)	(1.189)
School	1.436**	1.348**	1.760***	1.633***	2.272***	2.128***	2.426***	2.215***	2.690***	2.709***
	(0.585)	(0.617)	(0.560)	(0.595)	(0.563)	(0.684)	(0.655)	(0.720)	(0.681)	(0.658)
Infl.	0.041	-0.079	0.148	0.063	0.292	0.025	0.166	0.091	0.077	0.039
	(0.170)	(0.183)	(0.185)	(0.187)	(0.261)	(0.309)	(0.341)	(0.377)	(0.343)	(0.374)
Trade	-1.181**	-2.082**	-1.374**	-2.148**	-1.289**	-2.670**	-1.222**	-2.917**	-1.009*	-2.861*
	(0.567)	(1.038)	(0.537)	(0.893)	(0.501)	(1.141)	(0.536)	(1.391)	(0.570)	(1.541)
Govt. Cons,	0.279	0.312	-0.218	-0.137	-0.363	-0.140	-0.582	-0.413	-0.628	-0.491
	(0.549)	(0.591)	(0.534)	(0.558)	(0.519)	(0.587)	(0.553)	(0.670)	(0.535)	(0.663)
Instit.	0.700***	0.629***	0.628***	0.580***	0.603***	0.478**	0.489***	0.391	0.407**	0.338
	(0.194)	(0.218)	(0.174)	(0.193)	(0.160)	(0.241)	(0.155)	(0.257)	(0.164)	(0.262)
SSA	-1.502***	-1.469***	-1.185***	-1.233***	-0.842**	-1.100**	-0.856*	-1.267**	-0.926*	-1.367**
	(0.433)	(0.435)	(0.412)	(0.408)	(0.379)	(0.479)	(0.444)	(0.581)	(0.510)	(0.612)
B. M. P.	13.703	14.025*	13.949*	14.164**	15.231**	14.739*	12.286	11.272	13.048	14.169
	(9.531)	(8.023)	(7.397)	(6.914)	(7.152)	(8.724)	(9.057)	(11.202)	(10.120)	(11.467)
Const.	-1.560	1.763	0.022	2.619	-0.463	5.057	2.790	9.255	2.421	8.225
	(7.027)	(6.911)	(5.518)	(6.290)	(5.213)	(8.583)	(5.851)	(9.926)	(6.280)	(10.182)
N. Obs	72	72	72	72	72	72	72	72	72	72
R2	0.505	0.431	0.526	0.463	0.531	0.286	0.489	0.080	0.502	0.093
CD F-test		2.063		2.198		2.192		1.873		1.546
Underid-test		5.896		7.216		5.963		4.953		4.435
P-val		0.052		0.236		0.103		0.084		0.109
Sarg-Hans		1.421		1.407		2.655		2.534		4.059
P-val		0.233		0.027		0.051		0.111		0.044

Notes: The dependent variable is the average annual GDP per capita growth rate. The columns alternate between OLS and IV regression results. There are two instruments for FDI: one is built from bilateral flows from advanced countries to emerging or developing countries, and the second is build from bilateral flows from emerging or developing economies to emerging or developing economies (see Table A.2). The 20-year time span is indicated in each column heading. All variables are as in Table A.3. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1. The bottom rows show the Cragg-Donald F-statistic for the first stage results, the underidentification test, the Sargan-Hansen test, and their associated p-values.

Table C.4: LIML Regressions

	(1)	(2)	(3)	(4)	(5)
	1990-2009	1992-2011	1994-2013	1996-2015	1998-2017
FDI	0.610	0.546	0.891	0.980	1.391
	(0.503)	(0.409)	(0.554)	(0.619)	(1.235)
GDP_{t-1}	-1.107***	-1.110***	-1.154***	-1.168***	-1.412**
	(0.277)	(0.255)	(0.364)	(0.432)	(0.670)
Pr. Cr.	2.261*	2.598**	1.888	2.420	3.445
	(1.202)	(0.990)	(1.387)	(1.471)	(2.414)
School	1.293*	1.573**	2.011**	2.052*	2.746*
	(0.727)	(0.690)	(0.912)	(1.036)	(1.543)
Infl.	-0.154	0.023	-0.189	0.033	-0.035
	(0.276)	(0.243)	(0.516)	(0.596)	(0.895)
Trade	-2.651	-2.514*	-3.778*	-4.217*	-6.490
	(1.676)	(1.370)	(1.971)	(2.375)	(5.385)
Govt. Cons.	0.333	-0.099	0.040	-0.283	-0.223
	(0.634)	(0.609)	(0.857)	(0.970)	(1.506)
Instit.	0.584**	0.557**	0.378	0.316	0.204
	(0.255)	(0.218)	(0.325)	(0.342)	(0.522)
SSA	-1.448**	-1.256**	-1.308	-1.583	-2.232
	(0.578)	(0.536)	(0.811)	(1.039)	(1.854)
B. M. P.	14.227	14.266	14.344	10.494	16.367
	(12.451)	(12.582)	(17.964)	(22.152)	(35.247)
Constant	3.861	3.847	9.491	14.216	19.600
	(10.763)	(9.936)	(14.698)	(17.443)	(28.917)
N. Obs	72	72	72	72	72
R2	0.307	0.388	-0.266	-0.788	-3.082

Notes: The dependent variable is the average annual GDP per capita growth rate. Each column shows estimation results corresponding to limited information maximum likelihood estimates (LIML). Each column correspond to the associated OLS and IV columns shown in Table 4. The 20-year time span is indicated in each column heading. All variables are as in Table A.3. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

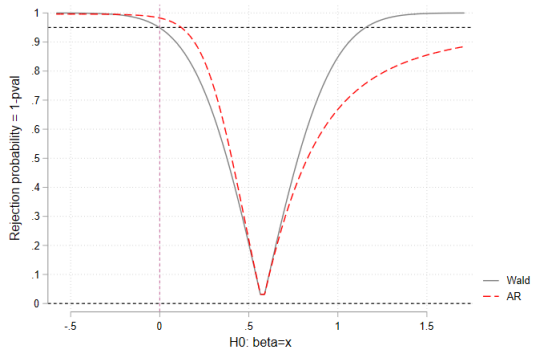
Table C.5: First Stage and Reduced form Panel Regressions

	(1)	(2)	(3)	(4)
	First Stage		Reduced Form	
IV	0.471**	0.202**	0.143*	-0.007
	(0.183)	(0.082)	(0.086)	(0.039)
GDP_{t-1}	0.059	1.319	-0.911***	-7.571***
	(0.287)	(1.535)	(0.265)	(1.254)
Pr. Cr.	0.093	-1.190	1.434	0.506
	(0.843)	(2.088)	(1.141)	(0.818)
School	0.834	2.381	2.844***	-0.777
	(0.752)	(3.684)	(0.584)	(1.498)
Infl.	-0.241	0.091	-0.071	0.057
	(0.152)	(0.155)	(0.114)	(0.055)
Trade	1.910***	-1.262	-0.395	0.165
	(0.556)	(0.796)	(0.408)	(0.369)
Govt. Cons.	-0.146	1.077	0.078	0.494
	(0.663)	(0.815)	(0.458)	(0.287)
B. M. P.	-12.660	-5.269	-2.951	1.346
	(8.746)	(4.838)	(10.698)	(3.429)
Constant	2.759	-4.053	10.273	61.643***
	(6.773)	(13.788)	(7.203)	(11.572)
N. Obs	709	705	709	705
R2	0.234	0.578	0.260	0.907
Year FE	Yes	Yes	Yes	Yes
Country FE	No	Yes	No	Yes
CD F-Test	19.14	4.37		
Underid test	18.87	4.41		
P value	0.00	0.04		

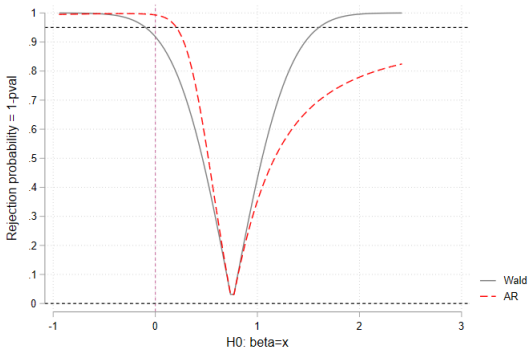
Notes: The dependent variable is FDI flows in columns (1) and (2). The IV included here is built from bilateral flows from all countries to emerging or developing countries (see Table A.2). The bottom rows show the Cragg-Donald F-statistic for the first stage results, the underidentification test, and its associated p-value for the first stage results. The dependent variable is the average annual GDP per capita growth rate in columns (3) and (4). Fixed effects in all columns are indicated. All variables are as in Table A.3. Robust standard errors are in parentheses. Significance levels are denoted as: *** p<0.01, ** p<0.05, * p<0.1.

Figure C.2: Weak IV Confidence Intervals

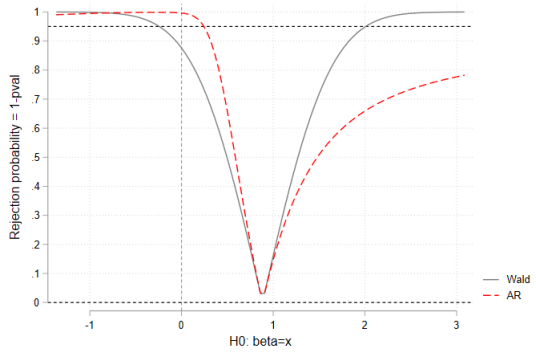
(a) 1991-2010



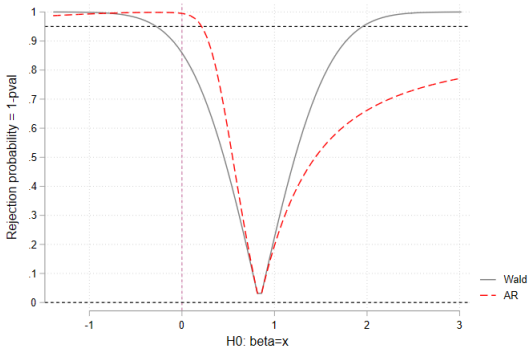
(b) 1993-2012



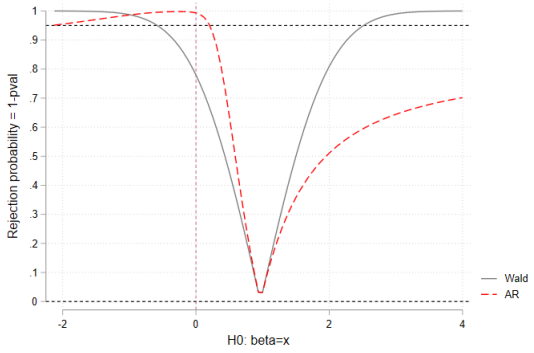
(c) 1995-2014



(d) 1997-2016



(e) 1999-2018



Notes: This figure plots the un-adjusted IV and weak-instrument robust confidence intervals. This is based on the first stage regression of net FDI inflows regressed on our FDI instrument and control variables (in Table 4, in this case, showing 20-year spans that are not reported there). Each sub-figure shows a range of dates which corresponds to the range over which 20-year averages were constructed prior to running a cross-sectional regression. The y-axis shows the rejection probability. The x-axis corresponds to confidence intervals where the solid and dashed lines cross the horizontal line at y=0.95, showing the un-adjusted and weak-instrument robust confidence intervals, respectively.