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The Impact of U.S. Economic Growth on the Rest of the World: How Much Does It Matter?

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Abstract

This paper attempts to quantify the extent to which U.S. growth is an "engine" of the world economy. Results based on fixed-effects estimation using panel data suggest a significant positive impact of U.S. growth on growth in the rest of the world, especially developing countries, in recent decades. The impact is as large as one-for-one in some specifications. The results are robust to alternative specifications and to the alternative claim that world growth in recent decades has been driven predominantly by common global shocks.

- **JEL Classifications:** O4, F15
- **Key words:** Economic growth, Economic integration

I. Introduction

A common view among economists is that the United States is an engine of the world economy, in the sense that U.S. and world output are closely correlated and movements in U.S. economic growth appear to influence growth in other countries significantly. While this view seems intuitive and plausible, quantitative assessments of just how much U.S. growth matters for other countries have been relatively neglected in the literature. This paper attempts to fill this gap by providing estimates of the impact of U.S. growth on growth in a large sample of countries during the past two decades in the context of a methodology that is standard in the growth literature.

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The significant role of the United States in the world economy would suggest that U.S. growth could have a substantial impact on other countries. The impact could be transmitted through several channels, most obviously trade linkages – with higher U.S. growth contributing to a rise in U.S. import demand, which is reflected directly in an increase in the net exports of other countries. The paper estimates the direct contribution of net exports to the United States to economic growth in a number of countries, and shows that the direct contribution is substantial for several countries, especially in North America and Asia.

However, the overall impact of U.S. growth on growth in other countries could encompass a broader set of effects than just the direct impact on net exports. Additional trade effects of U.S. growth on growth in other countries could include, given the relatively advanced level of U.S. technology, an impact on investment and on innovation and technology transfers along the lines discussed in the literature on trade and growth.[1] Moreover, with U.S. foreign direct and portfolio investment playing a large and growing role in world financial flows, the effects of U.S. growth may also be transmitted through financial linkages. In addition, U.S. developments could have a significant impact on business and consumer confidence in other countries. A quantification of the overall impact of U.S. growth on growth in the rest of the world thus requires a formal econometric analysis.

The paper reports results from an estimation of the overall impact of U.S. growth on growth in other countries during the past two decades in the context of a standard growth model. The analysis focuses on countries' average growth rates during five-year sub-periods, rather than on shorter-run macroeconomic fluctuations that may be associated with business cycles. Rather than attempting to isolate each of the channels by which U.S. growth may be expected to influence growth in other countries, the paper focuses on quantifying the aggregate impact.[2] The impact is estimated in a growth regression that also controls for other generally-accepted determinants of long-run growth. The results suggest that U.S. growth is a significant determinant of growth in a large panel of industrial and

[1]See Grossman and Helpman (1989, 1990, 1991), Rivera-Batiz and Romer (1991a, 1991b), and Romer (1990) for a discussion of spillover effects from trade. For a review of the literature on the impact of trade on growth, see Vamvakidis (2002). Some recent studies, for example Harrison (1996) and Rodriguez and Rodrik (1999), question the robustness and causality of the relationship between trade and growth.

[2]It is difficult to identify all of the individual channels through which the effect is transmitted, leave alone to quantify their importance, although this is a subject for further research.

developing countries, with an effect as large as one-for-one in some specifications. The impact of U.S. growth turns out to be larger than the impact of growth in the rest of the world, suggesting that it has dominated the influence of any common global factors. The results are robust to changes in the sample, the period considered, and the inclusion of other growth determinants.

II. How Much Does U.S. Economic Growth Matter for Growth in the Rest of the World?

The large economic size of the United States and its close linkages with the world economy would suggest that U.S. growth could have a significant influence on growth in other countries. In 2000, U.S. GDP was equivalent in size to over one-fifth of world GDP on a purchasing power parity basis and nearly a third of world nominal GDP at market exchange rates.[3] The United States accounted for over one fifth of the expansion in world real GDP during the past two decades, and for nearly a quarter of the expansion during 1992 – 2000. World and U.S. growth have moved closely together in recent decades, with a correlation coefficient of over 80 percent.

A. The Role of the United States as a Trading Partner

The impact of U.S. growth on growth in other countries depends in part on the significance of the United States in other countries' external trade. Table 1 compares the importance of the five major trading partners in the world economy – the United States, France, Germany, Japan, and the United Kingdom – in the external trade of a sample of 147 countries. The United States has the highest average weight as well as the highest average ranking. On average, it is

Table 1. Selected Countries: Role as Trading Partners for Other Countries[1]

Countries	Average Weight	Average Ranking	Number of First Rankings
United States	14.3	3.6	49
Germany	9.4	4.1	21
Japan	8.8	4.8	17
France	8.5	5.5	22
United Kingdom	6.6	6.1	11

Source: Information Notice System (INS), IMF.
[1]Sample of 147 countries.

[3]Authors' calculations, based on IMF World Economic Outlook data.

among the four most important trading partners for other countries, and it is the most important trading partner for 49 countries.

During the past few decades, trade with the United States accounted for a substantial share of merchandise trade in a large number of countries (Table 2).[4] Trade with the United States has also been sizeable as a share of GDP in many countries, especially Canada, Mexico, several Asian and Latin American countries, Ireland, Israel, and Saudi Arabia. Growing North American trade integration has been reflected in a strongly rising share of U.S. trade in Canada. In the Asia and Pacific region, the United States is a major trading partner for most countries. In Japan, Korea, and the Philippines, greater diversification from an initial trade pattern heavily reliant on the United States was reflected in a declining U.S. trade share through the early 1980s, followed by a stable share of over 20 percent for Korea and around 30 percent for Japan and the Philippines. China's external opening since 1978 is reflected in a doubling of the share of its trade with the United States to nearly 30 percent by 1999. In Australia and New Zealand, trade diversification contributed to a modest decline in the U.S. trade share, which, however, remained relatively high at around 15 percent.

In Latin America, the share of U.S. trade has been relatively stable for most countries during the past three decades, accounting for over 20 percent of trade in Brazil and Chile in 1999. In the Middle East, U.S. trade has grown in importance, with its share increasing substantially in Egypt, Israel, and Saudi Arabia after the 1970s. Trade with the United States has been less important for European countries, generally accounting for less than 10 percent of their trade (exceptions include Ireland, Switzerland, and the United Kingdom). In South Africa, U.S. trade has accounted for over 10 percent of trade during the past few decades.

The role of the United States as a trading partner suggests that U.S. growth may have a significant impact on other countries. A simple measure that captures the direct effect of trade with the United States on a country's growth is the contribution to growth of its net exports to the United States. The growth contribution can be calculated by the change in real net exports in the current year as a percent of real GDP in the previous year.[5] On this basis, net exports to the

[4]Merchandise trade is examined because data on bilateral trade in nonfactor services are not available for as large a range of countries.

[5]That is, the contribution of a country's real net exports (NX) to its real GDP (Y) growth in any year, t, can be calculated as $\Delta NX_t/Y_{t-1}$, and the contribution of its real net exports to the United States ($NX^{U.S.}$) can be calculated as $\Delta NX_t^{U.S.}/Y_{t-1}$. Details regarding the data are provided in the Appendix.

Table 2. Selected Countries: Merchandise Trade with the United States as a Percent of Total Merchandise Trade

	1960	1970	1980	1990	1999
World	n.a.	13.3	12.2	13.0	15.5
Canada	63	69	61	70	78
Japan	46	32	21	29	28
New Zealand	13	16	13	14	15
Australia	13	19	16	17	14
Austria	5	3	2	2	4
Denmark	8	7	4	5	5
Finland	5	5	3	5	6
France	9	7	6	6	8
Germany	n.a.	n.a.	6	6	8
Greece	4	3	5	6	5
Ireland	7	10	7	10	16
Italy	15	10	6	6	8
Netherlands	13	9	7	7	9
Portugal	4	4	9	5	4
Spain	22	16	9	6	5
Sweden	9	7	5	8	8
Switzerland	11	10	10	8	11
United Kingdom	12	12	11	11	14
South Africa	12	10	13	9	12
China	n.a.	n.a.	14	22	28
Hong Kong SAR	17	27	18	10	7
India	23	20	12	13	15
Indonesia	20	20	21	11	14
Korea	67	38	23	26	21
Malaysia	n.a.	12	17	16	21
Philippines	50	40	29	30	30
Singapore	3	9	12	16	16
Thailand	16	14	14	15	19
Turkey	33	27	7	10	9
Egypt	16	6	22	18	17
Israel	23	27	20	24	32
Saudi Arabia	7	5	15	22	23
Argentina	19	17	18	17	17
Brazil	n.a.	30	19	26	26
Chile	42	23	19	21	22
Mexico	68	82	80	67	67

Sources: IMF Direction of Trade Statistics; and WEO.

United States contributed on average 1/4 percentage point annually to real GDP growth in the selected countries during the period 1971 – 99 (Table 3). The growth contribution was significantly larger in countries with close trading links

Table 3. Selected Countries: Contribution to Real GDP Growth of Total Net Exports and of Net Exports to the United States, 1971–99 1/

	1971–80		1981–90		1991–99	
	Total	U.S. Trade	Total	U.S. Trade	Total	U.S. Trade
Canada	-0.2	-0.1	0.0	0.1	0.2	0.4
Japan	0.2	0.2	0.0	0.1	0.2	0.1
New Zealand	n.a.	n.a.	1.2	0.2	2.3	0.4
Australia	0.2	0.0	-0.1	-0.1	0.0	-0.1
Austria	-0.3	0.0	0.2	0.0	0.0	0.0
Denmark	0.1	0.0	0.7	0.1	-0.1	0.0
Finland	-0.2	0.0	0.0	0.0	1.5	0.1
France	0.0	0.0	0.0	0.0	0.3	0.1
Germany	n.a.	n.a.	0.4	0.1	-0.1	0.1
Greece	n.a.	n.a.	-1.0	0.0	-1.0	0.0
Ireland	-0.4	-0.2	1.4	-0.1	3.8	0.9
Italy	0.1	0.0	0.2	0.1	0.2	0.1
Netherlands	0.4	-0.1	0.4	0.0	0.4	-0.2
Portugal	0.7	0.0	-1.1	0.0	-1.5	0.0
Spain	0.0	0.0	-0.3	0.0	0.0	0.0
Sweden	0.2	0.0	0.2	0.1	1.0	0.2
Switzerland	0.0	0.0	-0.3	0.1	-0.3	0.0
United Kingdom	0.1	0.0	-0.4	0.0	-0.2	0.0
South Africa	0.3	0.1	-0.1	-0.1	-0.2	0.0
China	0.5	0.1	0.5	0.1	1.0	0.3
Hong Kong SAR	0.4	0.9	0.7	0.5	-0.7	-0.7
India	n.a.	n.a.	0.1	0.1	-0.2	0.2
Indonesia	2.8	1.1	-1.8	-0.4	0.7	0.3
Korea	n.a.	n.a.	0.2	0.3	1.7	0.3
Malaysia	0.9	0.3	0.7	0.2	1.4	1.5
Philippines	-0.2	0.1	-0.7	0.3	-0.2	0.1
Singapore	n.a.	n.a.	0.5	1.3	1.5	0.0
Thailand	n.a.	n.a.	n.a.	n.a.	1.6	0.7
Turkey	n.a.	n.a.	-0.2	-0.1	-0.2	0.1
Egypt	-1.7	-0.6	-0.4	0.0	-1.2	-0.2
Israel	n.a.	n.a.	-0.4	0.2	-1.2	0.0
Saudi Arabia	2.3	0.3	0.5	0.8	1.0	-0.4
Argentina	-0.2	-0.1	0.7	0.2	-0.6	-0.2
Brazil	n.a.	n.a.	0.0	0.0	-0.1	-0.1
Chile	-1.2	-0.3	1.3	0.4	-0.6	-0.2
	-0.6	1.2	0.5	1.0	0.0	2.5

Source: Calculations based on IMF Direction of Trade Statistics and World Economic Outlook.
1/ Merchandise trade. Data refer to averages during the periods shown.

with the United States (e.g., Canada) as well as in several emerging Asian countries (e.g., China, Malaysia, Thailand). In Latin America, where the United

States is traditionally more important as a source of imports than as a destination for exports, net imports from the United States were reflected in a negative net contribution to growth. In Europe, the growth contribution was small, reflecting the relatively low share of the United States in European countries trade.

The direct impact on countries' growth of trade with the United States rose during the 1990s compared with previous decades. During 1997 – 98, when several emerging market countries experienced economic crises, trade with the United States appears to have been an important factor supporting growth in many countries.[6] In several Asian countries, for example, the crisis led to sharp adjustments in the external sector that were characterized by substantial exchange rate depreciation and significant increases in current account balances, reflected in large increases in net exports, including net exports to the United States.

The direct impact of net exports to the United States on growth, while it is useful for establishing orders of magnitude, captures only part of the overall impact of U.S. growth on growth in other countries The effects of trade with the United States on countries' growth could include, in addition, such factors as technology spillovers and effects on sectors not directly involved in bilateral trade.[7] Furthermore, the effects of U.S. growth are likely to extend beyond just the trade effect, including through such channels as financial linkages, particularly with U.S. foreign direct and portfolio investment flows often being significant in other countries' capital flows, and an influence on consumer and business sentiment in other countries. A fuller analysis of the impact of U.S. growth thus requires a formal econometric estimation, which is taken up below.

B. Methodology

The impact of U.S. growth on growth in the rest of the world can be quantified by estimating a fixed-effects panel regression, which allows an analysis of a cross-section of countries over time. The fixed-effects estimator allows the constant term to differ across cross-section units and it captures the time series dimension of the U.S. growth effect after controlling for other growth determinants. Also,

[6]For short time periods, however, net exports may reflect more of a cyclical element than the true, underlying effect of U.S. growth over longer periods of time.

[7]In addition, the positive effects of U.S. growth clearly could extend beyond just the countries that have trade surpluses with the United States.

unlike in the case of a cross-country regression using long period average data, the use of a longer time period in a fixed effects estimation provides additional information. In addition, with a fixed-effects panel approach it is possible to control for other explanatory variables in the growth regression and to test the robustness of the estimated U.S. growth impact to changes in model specification. A possible disadvantage of using panel data is the presence of too much short-term volatility in the time series for each country, but this problem can be avoided by using multi-year averages, focusing on long-run effects instead of business cycle fluctuations.[8]

Recent criticism of the growth regression framework suggests that the estimates are very sensitive to the variables included in the regression and that the results may be driven by outliers (see for example Temple, 2000). Although there is still debate over how best to address these problems, the paper follows the suggestions in the literature to consider alternative specifications and to test of the robustness of the results by estimating the growth regression for alternative country samples and time periods.

While a fixed-effects panel approach is preferable for analyzing long-run growth, several studies that focus instead on estimating the impact of foreign output fluctuations on the domestic business cycle have used alternative methodologies. Ahmed and Loungani (1999 and 2001) used a vector error-correction model to estimate the impact of foreign output shocks on domestic output for several groups of emerging market economies in Asia and Latin America, based on annual data for the period 1973 – 1996. They found the impact of a foreign output shock on domestic output to be roughly one-for-one, after controlling for other external and domestic shocks. Agenor, McDermott, and Prasad (1999) estimated cross correlations using seasonally adjusted and detrended quarterly data to determine the stylized facts of business cycles in developing countries and found that output fluctuations in industrial countries were transmitted at, or near, lag zero to most developing countries.

C. Estimation

The empirical framework is a growth regression with a specification that is

[8]For a more detailed discussion on the growth empirics and the use of cross country and panel data see Barro and Sala-i-Martin (1995).

standard in the literature:[9]

$$\textit{(Real GDP per capita growth)}_i = c_i + \beta X_i + u, \quad \textit{for country } i = 1,\ldots, n \quad (1)$$

The constant term is different for each country. The dependent variable is the average per capita real GDP growth rate; $\mathbf{c_i}$ is the matrix of constant terms for each country i; β is the matrix of parameters to be estimated and **u** is the error term. $\mathbf{X_i}$ is the matrix of independent variables that includes the standard variables in growth regressions:

- Demographic developments (population growth);
- Investment in physical capital (gross domestic investment as a percent of GDP);
- Human capital (secondary school enrollment);
- Macroeconomic policies (inflation, government consumption);
- Trade openness (the share of external trade in GDP);[10] and
- Convergence (the logarithm of per capita real GDP in the initial year of the period under consideration).[11]

In addition, $\mathbf{X_i}$ includes:

- U.S. real per capita GDP growth; and
- Non-U.S. real per capita GDP growth, to distinguish the impact of U.S. growth from that of common global influences.[12]

All industrial and developing countries with available data are included in the regressions.[13] The time period is 1980 – 98. Each observation is a five-year

[9]See, for example, Barro and Sala-i-Martin (1995) and Levine and Renelt (1992).

[10]The trade share is one of the most broadly used measures of openness in the literature and among the most robust (see Levine and Renelt, 1992).

[11]In addition to their traditional roles, initial per capita GDP and openness may capture some of the effects on growth of international spillovers and technology transfers (albeit not explicitly those from the United States).

[12]The results are robust if world- (rather than non-U.S.) real per capita GDP growth is used, as reported in an earlier draft of the paper. However, it is more appropriate to use non-U.S. growth since U.S. growth is already included separately in the regression.

[13]All data are from the World Bank's World Development Indicators.

average, except the initial GDP per capita, which takes the value of the first year of each five-year period, and the last observation, which is a three-year average.[14] The model could instead be estimated using annual data instead of five-year averages, but the estimates in such a case would capture short-term business cycle fluctuations, while the focus of the paper is on longer-run effects. Since the regressions are on growth rates, it is not necessary to test for unit roots and co-integration relationships in the data. The use of a fixed rather than a random-effects model is justified by a Hausman test, which rejects the hypothesis that the individual effects are uncorrelated with the other regressors for most specifications.

The results suggest a positive and statistically significant impact of U.S. growth on growth in other countries, particularly developing countries. The regression results reported in Table 4 cover all countries in the sample. The first regression includes U.S. per capita real GDP growth in addition to the standard growth determinants, while the second regression also includes non-U.S. world per capita real GDP growth.[15] A 1 percent increase in U.S. growth is correlated with an average 1.0 percent increase in growth in other countries. The estimate for non-U.S. world growth in the second regression is positive (0.4 percent), although much smaller than the U.S. coefficient and not statistically significant. To test whether growth in countries that trade more with the United States is more highly correlated with U.S. growth, the third regression includes an interaction term of U.S. per capita real GDP growth with the share of exports to the United States in total exports. The interaction term is indeed positive and statistically significant at the 10 percent level (it is significant at the 5 percent level if the t-statistics are corrected for heteroskedasticity).

The estimated impact of U.S. growth remains statistically significant even when non-U.S. world growth is included in the regressions, which suggests that the influence of U.S. growth on growth in other countries is distinct from the influence of any common global shocks on growth across countries. Furthermore, the estimated impact of U.S. growth is considerably larger than the estimated impact of growth in the rest of the world, which suggests that the U.S. effect dominates any impact from common global shocks.[16]

[14]The results are robust to the exclusion of the last observation.

[15]The t-statistics are derived in the conventional way, although adjusted t-statistics based on Moulton's (1990) methodology are discussed in the Appendix.

[16]This result is driven by the impact of U.S. growth on developing countries. Easterly (2002) argues that (continued)

Table 4. Industrial and Developing Countries: Fixed Effects Panel Regressions, 1980–98

Independent Variables	(1)	(2)	(3)
ln (initial GDP per capita)	-10.08 (-10.47)	-10.03 (-10.44)	-9.35 (-8.25)
Population growth	0.18 (0.53)	0.16 (0.50)	0.03 (0.09)
Investment/GDP	0.14 (4.00)	0.015 (4.07)	0.16 (3.41)
Inflation rate	-0.002 (-4.83)	-0.002 (-4.93)	-0.001 (-4.58)
Secondary school enrollment	0.06 (3.48)	0.07 (3.59)	0.06 (2.81)
Government consumption/GDP	-0.05 (-0.94)	-0.05 (-0.85)	-0.02 (-0.41)
Trade/GDP	-0.01 (-0.58)	-0.00 (-0.35)	-0.01 (-0.81)
Growth of U.S. GDP per capita	1.03 (6.32)	0.97 (5.81)	0.95 (4.68)
Growth of non-U.S. world GDP per capita		0.36 (1.52)	
Growth of U.S. GDP per capita weighted by exports to US over total exports			0.72 (1.77)
R-squared	0.41	0.41	0.57
Number of countries	147	147	144

Note: Dependent variable: GDP per capita growth. t-statistics in parentheses.

The impact of the other variables on growth is as expected and consistent with the general conclusions in the literature. The coefficient for the trade share is not statistically significant, but once the investment share is excluded from the regressions it becomes statistically significant (and is positive) for most of the specifications. This result is consistent with the conclusion of previous studies that the impact of openness on growth occurs in part through investment (for example, Levine and Renelt, 1992).

The regressions in Table 5 include only developing countries.[17] The results are

the failure of developing-country growth to increase on a sustained basis in recent decades, despite improvements in the generally-accepted determinants of growth, may owe to worldwide factors such as higher world real interest rates and slower industrial-country growth. This paper does not contradict Easterly's point, which is on a somewhat different question, but it does point to U.S. growth as a significant factor in explaining developing countries' growth performance.

[17]Developing countries are defined here as countries whose per capita GDP during the first half of the 1960s was less than $3,200 in 1995 prices.

Table 5. Developing Countries: Fixed Effects Panel Regressions: 1980–98

Independent Variables	(1)	(2)
ln (initial GDP per capita)	-12.61	-12.58
	(-10.51)	(-10.47)
Population growth	0.33	0.32
	(0.84)	(0.81)
Investment/GDP	0.19	0.20
	(4.67)	(4.70)
Inflation rate	-0.001	-0.001
	(-4.08)	(-4.10)
Secondary school enrollment	0.08	0.08
	(2.69)	(2.70)
Government consumption/GDP	-0.05	-0.05
	(-0.87)	(-0.84)
Trade/GDP	0.00	0.00
	(0.12)	(0.20)
Growth of U.S. GDP per capita	1.07	1.04
	(5.39)	(5.09)
Growth of non-U.S. world GDP per capita		0.18
		(0.61)
R-squared	0.48	0.48
Number of countries	113	113

Note: Dependent variable: GDP per capita growth. t-statistics in parentheses.

similar to those for the full sample. The estimates indicate that a 1 percent increase in U.S. growth is correlated with an average 1 percent increase in developing country growth. The estimate for non-U.S. world growth is again considerably smaller than that for U.S. growth, and is not statistically significant.

The regressions in Table 6 include only industrial countries.[18] The impact of U.S. growth on industrial countries is weaker than that on developing countries, with smaller estimated coefficients and lower levels of significance. A 1 percent increase in U.S. growth is correlated with an average 0.3–0.4 percent increase in industrial countries' growth. The coefficient for non-U.S. world growth is now larger and more significant than that for U.S. growth, and close to 1. U.S. growth is statistically significant only in the first specification, and even then only at the 10 percent level, although it becomes significant in both specifications once the standard errors are corrected for serial correlation (as recommended by Moulton (1990) and discussed in the Appendix).

[18]Naturally the sample of industrial countries does not include the United States.

Table 6. Industrial Countries: Fixed Effects Panel Regressions: 1980-98

Independent Variables	(1)	(2)
ln (initial GDP per capita)	-2.87	-2.75
	(-1.97)	(-2.00)
Population growth	-1.22	-1.14
	(-2.07)	(-2.06)
Investment/GDP	-0.04	-0.05
	(-0.68)	(-0.84)
Inflation rate	-0.007	-0.007
	(-3.56)	(-4.13)
Secondary school enrollment	0.01	0.02
	(0.63)	(0.97)
Government consumption/GDP	-0.17	-0.16
	(-1.27)	(-1.27)
Trade/GDP	-0.01	0.00
	(-0.44)	(0.18)
Growth of U.S. GDP per capita	0.41	0.26
	(1.70)	(1.12)
Growth of non-U.S. world GDP per capita		0.96
		(3.16)
R-squared	0.32	0.41
Number of countries	34	112

Note: Dependent variable: GDP per capita growth. t-statistics in parentheses.

A natural question about the close correlation between U.S. and rest-of-the-world growth is the direction of causality. Results from Granger-causality tests must be interpreted cautiously, however, since the use of five-year averages restricts the sample size, which comprises only eight observations when the sample period is extended to 1960 – 98. On this basis, for the full sample of countries, the hypothesis that U.S. growth does not Granger cause growth in the rest of the world was rejected at the 15 percent level, but the reverse could not be rejected.

D. Extensions

The results reported in Tables 4 – 6 are robust to alternative empirical specifications. The estimates of the impact of U.S. growth on domestic growth remain robust and relatively stable to the inclusion or exclusion of other independent variables, except in the case of the industrial countries. The R^2 is smaller than in cross-country regressions, as the previous literature has found for

panel growth regressions (see Barro and Sala-i-Martin (1995)).

The results are robust to the use of alternative time periods and samples of countries.[19] Estimates for the alternative period 1960 – 98 show that the impact of U.S. growth was positive and significant: a 1 percentage point increase in U.S. growth was correlated with a 0.4 – 0.7 percentage point increase in domestic growth.[20] Estimating the 1960 – 98 regression separately for developing countries and industrial countries results in similar estimates in terms of significance, but with the estimated coefficient for U.S. growth closer to 0.5, compared with 1 for the period 1980 – 98. In terms of alternative samples of countries, when Latin American countries are excluded – in order to assess the extent to which the earlier results were driven by the large impact of the U.S. economy on these economies given their relatively close integration with the United States – the conclusions are similar to those presented in Table 4: U.S. growth has a positive impact on growth in other economies, an impact as large as one-for-one in some specifications. The same holds true when Asian countries are excluded in order to assess how much the earlier results were driven by the large U.S. share in the exports of some of these economies.

An additional question of interest is how the impact of U.S. growth on other countries compares with the impact of growth in the European Union and Japan. Table 7 reports these results from fixed-effects panel estimations for the period 1980 – 98. The estimates suggest that EU growth has a significant impact on growth in other countries, albeit a smaller one than U.S. growth. A 1 percent increase in EU growth is correlated with a 0.7 percentage point increase in domestic growth. Growth in Japan does not seem to have a positive impact on growth of other countries, as its coefficient is not statistically significant.

III. Conclusion

The significant estimated impact of U.S. growth on the rest of the world fills a

[19]Details are available from the authors on request.

[20]These coefficients are somewhat smaller than those estimated for the period 1980 – 98, suggesting that the impact of U.S. growth on other countries may have increased in significance during the last two decades. (However, because of data limitations, the results for 1960-98 are based on a smaller set of countries than for 1980-98.) The same conclusion is reached when we test for a structural break during the last two decades in the regression for the period 1960 – 98, by interacting a dummy variable equal to one in 1980 – 98 with U.S. growth.

Table 7. Industrial and Developing Countries: Fixed Effects Panel Regressions: 1980–98

Independent Variables	Impact of Growth in EU	Impact of Growth in Japan
ln (initial GDP per capita)	-10.64 (-10.01)	-9.73 (-9.41)
Population growth	-0.06 (-0.17)	-0.08 (-0.23)
Investment/GDP	0.15 (3.87)	0.12 (3.28)
Inflation rate	-0.002 (-5.17)	-0.002 (-5.21)
Secondary school enrollment	0.10 (4.32)	0.09 (4.15)
Government consumption/GDP	-0.04 (-0.70)	-0.07 (-1.15)
Trade/GDP	-0.00 (-0.03)	0.00 (0.02)
Growth of EU GDP per capita	0.65 (3.07)	
Growth of Japan GDP per capita		-0.10 (-0.79)
R-squared	0.39	0.33
Number of countries	133	147

Note: Dependent variable: GDP per capita growth. t-statistics in parentheses.

gap in the literature on the effects of the U.S. economy on other countries, and lends substance to the common view of the United States as an engine of the world economy. For the period 1980 – 98, the fixed-effects panel regression results for the full sample of industrial and developing countries indicate that the coefficient of U.S. growth is close to one. The coefficient of U.S. growth remains significant when non-U.S. world growth is included in the regression, and it is larger than that of non-U.S. growth. This suggests that the influence of U.S. growth is distinct from that of any common global shocks that may affect growth across different countries and, moreover, that it dominates the influence of any such global shocks.

In future research that aims to better understand how U.S. growth affects the rest of the world, it would be useful to examine the specific channels through which the impact of U.S. growth is transmitted to other countries. The trading partner effect of the United States seems to encompass several effects beyond the direct impact of net exports to the United States and the framework used in this paper could be extended to analyze the effects of factors such as capital account linkages, co-movements in consumer and business sentiment, and the significant

role of U.S. markets in international finance. Such an analysis may also be useful for analyzing the impact of particular economic changes in the United States on growth in other countries.

Appendix: Technical Note and Data Description

Technical note

In the paper, the units (countries) in the regression share some common characteristics, namely U.S. growth in each of the sub-periods in the sample, as well as non-U.S. growth.

Moulton (1990) pointed out that when units in a regression share a characteristic, they may share other characteristics too. In that case the regression disturbances may be correlated. Even if the correlation is small, so long as it is positive the standard errors could be seriously biased downward, resulting in a spurious statistical significance. Based on Moulton's methodology, the larger the correlation of the disturbances within each group (within each five-year sub-period of the sample) and the larger the group size, the more biased the estimated standard errors will be. The true covariance matrix should be multiplied by the term $[1 + (m - 1)\rho]$, where m is the number of observations in each group (in our case, the number of countries in each sub-period) and ρ is the correlation of the disturbances within each group.

Adjusting the estimated standard errors for U.S. and non-U.S. world growth according to Moulton's methodology actually improves the results reported above. The reason is that the average correlation of disturbances within each five-year period, although close to zero, is slightly negative, implying that if anything the standard errors are inflated and the t-statistics should be adjusted upward. The average correlation of the disturbances for the sample of all countries (140 countries) turns out to be 0.005. The estimated covariance matrix should be multiplied by 0.3, and the estimated standard errors by 0.55. This means that the adjusted t-statistics for U.S. growth and non-U.S. world growth will be higher by a factor of 1.8 on average. This adjustment increases the significance of the U.S. growth estimates in all samples considered. The estimates become statistically significant even for the industrial countries sample.

Data description

Data used in the regressions were taken from the World Development Indicators (World Bank, 2000). The following variables were used for the construction of the final variables included in the regressions:

GDP at market prices in constant 1995 U.S. dollars;
Total population;
Gross domestic investment as percent of GDP;
Secondary school enrollment ratio (percent of gross);
CPI annual inflation rate;
General government consumption as a percent of GDP;
Exports plus imports as a percent of GDP.

For the trade calculations in Tables 2 – 3, data on bilateral trade in goods in current prices were taken from the IMF Direction of Trade Statistics. Data on aggregate exports and imports in current and constant prices, and on GDP in constant prices, were taken from the World Economic Outlook database. Bilateral trade data in constant prices were calculated by assuming that the share of the United States in a country's real exports and imports was equal to the share in nominal exports and imports. For China, aggregate exports and imports in constant prices were not available on a national accounts basis. The growth rates from the balance of payments data were applied to the 1990 current price data (the base year in the national accounts) to construct a series for real exports and imports.

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