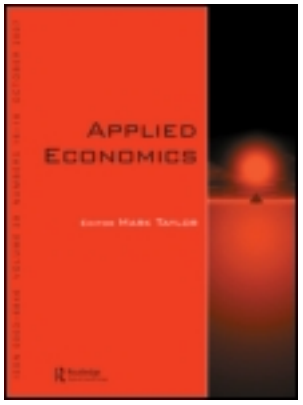

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Does globalization affect growth? Evidence from a new index of globalization

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Does globalization affect growth? Evidence from a new index of globalization

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The study develops an index of globalization covering its three main dimensions: economic integration, social integration, and political integration. Using panel data for 123 countries in 1970–2000 it is analysed empirically whether the overall index of globalization as well as sub-indexes constructed to measure the single dimensions affect economic growth. As the results show, globalization indeed promotes growth. The dimensions most robustly related with growth refer to actual economic flows and restrictions in developed countries. Although less robustly, information flows also promote growth whereas political integration has no effect.

I. Introduction

Many non-economists expect the costs associated with globalization to exceed its benefits. Fears of an erosion of social and environmental standards, high poverty rates in less developed countries and ever higher frequencies of financial crisis resulted in protests and even riots. Quite the contrary, most economists strongly believe the net effect of globalization to be positive. Apart from economic theory, this optimism is supported by a number of empirical studies as well. To measure globalization, most of these studies employed proxies like trade and capital flows or openness to these flows. Using these proxies, Beer and Boswell (2001) and Mah (2002) examined the consequences of globalization on inequality. Li and Reuveny (2003) analysed their effects on democracy. As Heinemann (2000) shows, more globalized countries have lower increases in government outlays and taxes. Vaubel (1999) found them to have lower government consumption.

The effects of globalization on growth have also been frequently analysed with these measures. Until recently, however, most studies examined them employing cross-sections only. For example, Chanda (2001) uses an index of capital account openness to show that more developing countries have suffered from globalization than not, while Rodrik (1998) as well as Alesina *et al*. (1994) found no effect of capital account openness on economic growth.[1] With respect to foreign direct investment (fdi) there is evidence of a positive growth-effect in countries which are sufficiently rich (Blomström *et al*., 1992) and a negative one in low income countries (Garrett, 2001).[2] Among others, Dollar (1992) analysed the relationship between economic performance and openness to trade, Frankel and Romer (1996) those between growth and actual trade flows. Their results

[1] Edison *et al*. (2002a) summarize the literature on capital account liberalization and economic performance.
[2] Studies examining the effects of foreign direct investment on countries' growth rates have been summarized by Durham (2000).

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show that both openness to trade and actual flows are robustly related to growth. All of these studies present, however, only cross-sectional estimates. Moreover, they do not adequately control for endogeneity. Their results might therefore reflect unobserved characteristics which do not vary over time instead of being the consequences of globalization or might reflect reverse causality.[3]

Aware of the shortcomings of the cross-section approach, some recent studies use panel data to examine the relationship between some dimensions of globalization and growth. Among them, Dollar and Kraay (2001) found that an increase in trade flows and foreign direct investment resulted in higher growth rates. Greenaway *et al*. (1999) also report a strong relationship between trade and growth. With respect to fdi, Borensztein *et al*. (1998) provide evidence of a positive growth-effect – given a minimum threshold stock of human capital. Carkovic and Levine (2002), to the contrary, do not find a robust influence of foreign direct investment on growth. A detailed analysis of the impact of several indicators of financial integration and growth is provided by Edison *et al*. (2002b). Their results show that no robust relationship exists.

While those studies provide very detailed analysis of individual sub-dimensions of globalization, none of them examines the overall consequences of globalization on economic growth. The effects reported for one dimension of globalization might therefore appear only because other important aspects of globalization are omitted from the regressions. Most dimensions of globalization are strongly related to each other, so including them separately in a regression induces collinearity problems. Excluding those dimensions which are not the primary focus of the analysis – the method preferred in the literature – can, however, severely bias the coefficients estimated. Moreover, it is not obvious that all dimensions of globalization affect economic performance in the same direction. Since the overall effects of globalization are what matters, the lack of an overall measure and an analysis of its relationship with growth is a serious omission. The only study trying to measure overall globalization is A. T. Kearney/Foreign Policy Magazine (2002). They calculated a globalization ranking using various subgroups. Their ranking is, however, only available for recent years. Moreover, important dimensions of globalization are omitted. The measure can therefore not be used in an empirical investigation.[4]

This study does not try to give specific policy advice. It contributes to the literature in examining the overall effects of several dimensions of globalization on growth empirically in a time-series cross-section context. Since many of these dimensions are highly correlated, it is impossible to include them all individually in one regression. Therefore, the study develops an index of globalization covering its most important aspects: economic integration, social integration and political integration. To measure these dimensions, 23 variables have been combined to three sub-indexes using an objective statistical method. The sub-indexes are in turn aggregated into one single index of globalization.

The remainder of the paper is structured as follows. First, it presents the methodology and rationale of the index, and the results. It proceeds by analysing empirically the relationship between this index and economic growth. The final section draws conclusions.

II. Methodology and Rationale of the Index

Throughout the study globalization is meant to describe the process of creating networks of connections among actors at multicontinental distances, mediated through a variety of flows including people, information and ideas, capital, and goods (Clark, 2000: 86). It is a process that erodes national boundaries, integrates national economies, cultures, technologies and governance, and produces complex relations of mutual interdependence (Norris, 2000: 155). Among others Keohane and Nye (2000: 4) highlight the following dimensions of globalization:

- economic globalization, characterized as long distance flows of goods, capital and services as well as information and perceptions that accompany market exchanges;
- political globalization, characterized by a diffusion of government policies; and
- social globalization, expressed as the spread of ideas, information, images and people.

To measure the degree of economic globalization, two indexes are constructed. One index measures actual flows: trade, foreign direct investment and portfolio investment (all in percentage of GDP). Income payments to foreign nationals and capital employed (in percentage of GDP) are included

[3] Dollar and Kraay (2001: 13) summarize criticisms of this approach.
[4] The A.T. Kearny/ Foreign Policy measure has also been criticized for its ad hoc procedure of determining the weights of its components and a lack of robustness to alternative weighting schemes (Lockwood, 2004).

to proxy for the extent a country employs foreign people and capital in its production processes. The second index measures restrictions on trade and capital using hidden import barriers, mean tariff rates, taxes on international trade (as a share of current revenue) and an index of capital controls. Given a certain level of trade, a country with higher revenues from trade taxes is less globalized. To proxy restrictions of the capital account most previous studies employed rather crude measures.[5] Rodrik (1998) used the proportion of years for which the capital account was free of restrictions. Alesina *et al.* (1994) coded a 0–1 dummy variable. Since openness is not a yes-or-no question – it can and does occur in differing degrees in different countries – an index constructed by Gwartney and Lawson (2002) is employed. It is based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions and includes 13 different types of capital controls. The index is constructed by subtracting the number of restriction from 13 and multiplying the result by 10.

The data on actual flows and on restrictions are aggregated into two sub-indexes and one overall index as described below. All variables, their precise definitions and data sources are listed in the appendix.

To proxy the degree of political globalization, the number of embassies in a country, the number of international organizations to which the country is a member and the number of UN peace missions a country participated in are used.[6]

The aspects of globalization that are hardest to pin down relate to the flow of information and ideas. According to Keohane and Nye (2000: 4), these constitute, however, the most pervasive form of globalism. Therefore, they necessarily have to be included in an index of globalization. These flows are measured distinguishing between three categories: data on personal contacts, data on information flows and data on cultural proximity. To proxy flows of information and personal contacts measures like international tourism, internet users, and number of radios are used, among others. The variables are shown in Table 1. Following Saich (2000: 209), cultural globalization is interpreted as the domination of American cultural products. This is because the USA is the pacesetter in much of the global social-cultural realm (Rosendorf, 2000: 111). Cultural proximity could be proxied by the number of English songs in national hit lists or movies shown in national cinemas that originated in Hollywood. However, the only proxy available is the number of McDonald's restaurants located in a country.

To construct the proxies for the empirical analysis, each variable is transformed to an index with a zero to ten scale, whereas higher values denote more globalization. When higher values of the original variable indicate higher globalization, the formula $((V_i - V_{\min})/(V_{\max} - V_{\min}) * 10)$ has been used for transformation. Conversely, when higher values indicate less globalization, the formula is $((V_{\max} - V_i)/(V_{\max} - V_{\min}) * 10)$. This is the procedure employed by Gwartney and Lawson (2001) in the construction of their economic freedom index. The weights for the sub-indexes are calculated using principal components analysis.[7] The year 2000 is used as the base year. For this year, the analysis partitions the variance of the variables used. The weights are then determined in a way that maximizes the variation of the resulting principal component. Therefore, the index captures the variation as fully as possible. As Gwartney and Lawson (2001: 7) point out, this procedure is particularly appropriate when several sub-components measure different aspects of a principal component. The same procedure was applied to the overall index.[8]

If possible, the weights determined for the base year are then used to calculate the indexes for each single year back to 1970. Where no data are available, the weights are readjusted to correct for this. Since the aim of the study is to examine longer run changes, the yearly indexes are averaged over five years.[9]

The weights for the sub-indexes are presented in Table 1. Table 2 shows the results for the 2000 indexes as well as the overall index for 1975 and the change from 1975–2000.[10] They are ranked by the overall index in 2000. According to this index, the world's most globalized country is the USA with a score of 6.48. This result is driven by high social and political integration with the rest of the world.

[5] An exception is Garrett (2001) who employs a ten scale indicator constructed by Brune (2000). He does, however, only report cross-section results.
[6] Those variables have been proposed by A. T. Kearney/Foreign Policy Magazine (2000) to proxy political engagement.
[7] A similar methodology has been suggested by Lockwood (2004), testing for the robustness of the Kearny/ Foreign Policy index of globalization.
[8] While Gwartney and Lawson (2001) is followed in using the same weights for all periods, the robustness of the results is tested with an index employing individual weights for each period.
[9] This is consistent with the analysis of Barro (1997). In some cases, data are only available in five year intervals. In these cases, data refer to the end of the five year period.
[10] Due to space restraints, the other results are not reproduced in the table. They are available from the author.

Table 1. Components of index of globalization

A.	Data on economic integration	[35%]
	(i) Actual Flows	(50%)
	Trade (in percentage of GDP)*	(23%)
	Foreign direct investment (in percentage of GDP)*	(29%)
	Portfolio investment (in percentage of GDP)*	(27%)
	Income payments to foreign nationals (in percentage of GDP)*	(22%)
	(ii) Restrictions	(50%)
	Hidden import barriers	(20%)
	Mean tariff rate	(30%)
	Taxes on international trade (in percentage of current revenue)	(24%)
	Capital account restrictions	(26%)
B.	Data on political engagement	[28%]
	Embassies in country*	(34%)
	Membership in international organizations*	(34%)
	Participation in UN Security Council missions*	(32%)
C.	Data on social globalization	[38%]
	(i) Data on personal contact	(24%)
	Outgoing telephone traffic*	(31%)
	Transfers (in percentage of GDP)*	(9%)
	International tourism*	(1%)
	Telephone average costs of call to USA	(33%)
	Foreign population (in percentage of total population)	(26%)
	(ii) Data on information flows	(39%)
	Telephone mainlines (per 1000 people)	(18%)
	Internet hosts (per capita)*	(15%)
	Internet users (as a share of population)*	(18%)
	Cable television (per 1000 people)	(16%)
	Daily newspapers (per 1000 people)	(16%)
	Radios (per 1000 people)	(17%)
	(iii) Data on cultural proximity	(37%)
	Number of McDonald's restaurants (per capita)	(100%)

Notes: The number in parentheses indicates the weight used to derive the indexes. Weights may not sum to 100 because of rounding. All indexes range between 0 (not globalized) and 10 (globalized).
* These variables have been used in the A.T. Kearney/Foreign Policy Index as well.

To the contrary, the USA is ranked only 25th with respect to economic integration. According to the index, France has the highest political integration with the rest of the world, followed by the USA, Sweden and Canada. Other countries ranking high on the overall index include countries like Sweden and Luxembourg. While Hong Kong and Singapore are ranked second and third, respectively, in terms of actual economic flows (not reported in the table), overall, they are ranked much lower. This is mainly due to their low political integration with the rest of the world. According to the political integration index, Hong Kong is the country with the lowest score. The table also shows, that overall the world's least globalized country is Rwanda, with an index of 0.92. This country has been destroyed by civil war and bad institutions. Its GDP per capita growth rate has been highly volatile over recent years, ranging between −4% in 1997 and +3% in 2000. It is politically isolated with only 16 in-country-embassies in 2000 and membership in 32 international inter-governmental organizations. Its sum of exports and imports amounts to 32% of its GDP, foreign direct investment inflows have been less than 1% of GDP in the same year. Capital transactions are controlled heavily (IMF, 1998).

The country least integrated in economic terms is Togo, with fdi inflows amounting to 4% of GDP in 1999 and a heavily restricted capital account. Nepal has the lowest social globalization score. It had 21 in-country embassies in 2000 and was member in 30 inter-governmental organizations. Per 1000 capita, 12 daily newspapers have been published and, on average, each citizen talked 1.1 minutes with people in another country per phone in 2000. The results also show that globalization increased since the 1970s, and particularly so for the more globalized countries.

The next section analyses the influence of globalization on economic growth.

Table 2. Ratings of globalization

		Economic integration	Social integration	Political integration	Summary rating		
		2000	2000	2000	1975	2000	Δ1975–2000
1.	United States	4.92	6.90	7.88	4.56	6.48	1.92
2.	Canada	5.17	6.56	7.61	5.49	6.37	0.88
3.	Sweden	5.62	5.63	7.85	5.18	6.24	1.06
4.	Denmark	5.63	4.76	7.26	5.28	5.75	0.47
5.	Finland	5.67	5.00	6.79	4.32	5.73	1.41
6.	Luxembourg	8.84	5.37	2.21	5.45	5.71	0.26
7.	United Kingdom	6.01	4.21	7.04	5.04	5.62	0.58
8.	Switzerland	5.96	5.16	5.63	4.86	5.57	0.71
9.	France	5.19	3.47	8.58	4.24	5.48	1.24
10.	Belgium	6.18	3.44	7.33	6.30	5.47	−0.83
11.	Norway	5.31	4.68	6.62	4.37	5.43	1.06
12.	Netherlands	6.46	4.21	5.52	5.31	5.36	0.05
13.	Germany	5.38	3.94	6.99	4.26	5.28	1.02
14.	Austria	5.39	4.00	6.75	4.44	5.25	0.81
15.	Ireland	6.75	3.74	4.92	3.59	5.12	1.53
16.	Australia	4.60	6.05	4.37	3.58	5.08	1.50
17.	Singapore	6.90	5.35	2.11	3.56	5.00	1.44
18.	New Zealand	5.30	5.79	3.35	3.31	4.95	1.64
19.	United Arab Emirates	8.15	3.36	2.54	3.41	4.81	1.40
20.	Hong Kong	7.31	5.92	0.00	4.20	4.78	0.58
21.	Japan	4.16	4.93	4.84	3.92	4.64	0.72
22.	Italy	5.11	2.22	7.05	4.14	4.56	0.42
23.	Portugal	5.61	2.51	4.88	2.23	4.25	2.02
24.	Spain	5.01	2.22	5.31	2.85	4.05	1.20
25.	Iceland	4.87	4.53	2.05	3.49	3.97	0.48
26.	Argentina	4.17	1.98	5.96	2.35	3.84	1.49
27.	Czech Republic	4.86	2.32	4.48	n.a.	3.80	n.a.
28.	Poland	3.65	2.08	6.30	2.77	3.79	1.02
29.	Israel	4.73	3.77	2.51	3.10	3.76	0.66
30.	Russian Federation/USSR	3.29	1.41	7.50	1.07	3.74	2.67
31.	Greece	4.76	2.36	4.30	3.01	3.73	0.72
32.	Uruguay	4.43	2.66	3.99	3.55	3.65	0.10
33.	Kuwait	4.31	3.60	2.72	2.72	3.61	0.89
34.	Malta	4.68	4.19	1.34	2.93	3.57	0.64
35.	Malaysia	4.69	2.02	4.16	2.50	3.54	1.04
36.	Hungary	4.26	2.41	4.16	2.77	3.54	0.77
37.	Egypt	3.41	1.32	6.67	1.59	3.52	1.93
38.	Bahrain	5.50	2.79	1.77	2.62	3.46	0.84
39.	Estonia	5.81	2.68	1.44	n.a.	3.43	n.a.
40.	Korea, Republic	3.86	2.72	3.65	2.71	3.37	0.66
41.	Chile	4.45	1.84	3.66	2.44	3.25	0.81
42.	Turkey	4.04	1.65	4.22	1.85	3.19	1.34
43.	Venezuela	4.10	1.73	3.99	2.86	3.18	0.32
44.	Brazil	3.50	1.54	4.95	1.51	3.17	1.66
45.	Cyprus	3.32	3.79	2.04	2.03	3.15	1.12
46.	Jordan	3.93	1.00	5.07	1.59	3.15	1.56
47.	Panama	4.90	2.09	2.31	3.81	3.13	−0.68
48.	Slovak Republic	4.48	2.04	2.80	n.a.	3.10	n.a.
49.	Costa Rica	4.74	2.06	2.39	2.34	3.09	0.75
50.	Indonesia	3.85	0.96	4.98	1.69	3.08	1.39
51.	Slovenia	4.31	2.84	1.79	n.a.	3.07	n.a.
52.	China	3.23	1.17	5.36	0.90	3.04	2.14
53.	Romania	3.73	1.62	4.08	3.34	3.04	−0.30
54.	South Africa	4.21	1.56	3.55	1.96	3.03	1.07
55.	Latvia	4.94	2.25	1.54	n.a.	2.99	n.a.
56.	Mexico	4.03	1.47	3.44	2.19	2.91	0.72
57.	Trinidad and Tobago	4.57	1.94	1.92	1.92	2.86	0.94

(continued)

Table 2. Continued

		Economic integration	Social integration	Political integration	Summary rating		
		2000	2000	2000	1975	2000	Δ1975–2000
58.	Bulgaria	4.04	1.25	3.43	2.72	2.83	0.11
59.	Kenya	3.33	0.81	4.81	1.70	2.80	1.10
60.	Jamaica	4.21	2.11	1.88	2.10	2.78	0.68
61.	Zambia	4.62	1.19	2.63	2.15	2.78	0.63
62.	India	2.26	1.01	5.86	1.85	2.78	0.93
63.	Lithuania	4.66	1.79	1.74	n.a.	2.78	n.a.
64.	Bolivia	4.32	1.10	2.88	2.04	2.72	0.68
65.	Peru	4.22	1.11	2.87	2.00	2.68	0.68
66.	Nicaragua	4.66	1.18	2.17	2.21	2.67	0.46
67.	Thailand	3.40	1.21	3.61	1.62	2.64	1.02
68.	El Salvador	4.39	1.57	1.84	1.84	2.63	0.79
69.	Tunisia	2.48	1.09	4.91	1.97	2.63	0.66
70.	Colombia	3.61	1.39	3.03	1.71	2.62	0.91
71.	Senegal	3.00	1.02	4.23	1.57	2.60	1.03
72.	Bangladesh	2.56	1.03	4.76	1.08	2.59	1.51
73.	Ghana	2.78	1.40	3.94	1.57	2.58	1.01
74.	Fiji	3.93	1.73	1.95	1.89	2.56	0.67
75.	Ukraine	3.77	0.74	3.46	n.a.	2.55	n.a.
76.	Nigeria	2.72	0.16	5.51	1.84	2.53	0.69
77.	Algeria	2.81	1.21	3.93	1.81	2.52	0.71
78.	Guatemala	3.89	1.45	2.06	1.85	2.47	0.62
79.	Philippines	3.60	1.16	2.82	1.41	2.47	1.06
80.	Ecuador	3.65	1.19	2.60	1.81	2.44	0.63
81.	Pakistan	1.58	1.12	5.30	1.54	2.43	0.89
82.	Morocco	2.48	1.14	4.09	1.92	2.42	0.50
83.	Mauritius	3.89	1.70	1.46	1.77	2.40	0.63
84.	Oman	4.29	0.78	2.15	2.58	2.38	−0.20
85.	Uganda	4.14	0.89	1.91	1.24	2.31	1.07
86.	Honduras	3.85	1.20	1.84	1.65	2.30	0.65
87.	Croatia	2.89	1.99	1.86	n.a.	2.27	n.a.
88.	Botswana	4.36	1.13	1.10	2.68	2.25	−0.43
89.	Zimbabwe	3.14	1.14	2.52	0.70	2.22	1.52
90.	Dominican Republic	3.04	1.51	1.95	1.58	2.17	0.59
91.	Sri Lanka	3.10	1.10	2.16	1.08	2.09	1.01
92.	Iran	2.42	1.01	3.11	2.44	2.08	−0.36
93.	Cameroon	2.50	0.99	3.00	1.47	2.07	0.60
94.	Cote d'Ivoire	2.37	0.95	3.08	1.06	2.03	0.97
95.	Namibia	2.99	1.22	1.77	0.21	1.99	1.78
96.	Tanzania	2.09	0.97	3.18	1.99	1.97	−0.02
97.	Syrian Arab Republic	3.01	0.26	2.96	1.82	1.96	0.14
98.	Albania	3.00	1.17	1.71	0.85	1.96	1.11
99.	Paraguay	3.45	0.63	1.83	1.76	1.94	0.18
100.	Guyana	3.53	0.72	1.51	1.87	1.92	0.05
101.	Bahamas	1.13	3.31	0.83	0.95	1.87	0.92
102.	Saudi Arabia	0.86	1.72	3.27	2.08	1.84	−0.24
103.	Barbados	2.24	1.84	1.17	2.39	1.80	−0.59
104.	Gabon	2.62	0.31	2.70	1.80	1.77	−0.03
105.	Congo, Republic	3.27	0.09	1.98	1.12	1.72	0.60
106.	Mali	2.00	0.51	2.96	1.26	1.70	0.44
107.	Congo, Dem. Republic	2.24	0.21	3.04	1.13	1.70	0.57
108.	Nepal	2.61	0.03	2.78	0.98	1.69	0.71
109.	Malawi	2.61	0.88	1.48	1.76	1.65	−0.11
110.	Chad	2.28	0.69	1.78	1.04	1.55	0.51
111.	Belize	1.53	1.80	1.18	0.81	1.54	0.73
112.	Niger	1.86	0.70	2.13	1.18	1.50	0.32
113.	Papua New Guinea	2.78	0.20	1.18	1.29	1.37	0.08
114.	Togo	0.98	0.87	2.49	1.47	1.35	−0.12

(continued)

Table 2. Continued

		Economic integration	Social integration	Political integration	Summary rating		
		2000	2000	2000	1975	2000	Δ1975–2000
115.	Central African Republic	2.02	0.37	1.75	1.38	1.33	−0.05
116.	Madagascar	1.56	0.76	1.64	1.21	1.28	0.07
117.	Burundi	2.00	0.58	1.25	0.93	1.26	0.33
118.	Benin	0.59	0.81	2.54	0.61	1.21	0.60
119.	Sierra Leone	2.10	0.13	1.54	1.41	1.21	−0.20
120.	Myanmar	2.22	0.03	1.03	0.90	1.07	0.17
121.	Guinea-Bissau	0.99	0.26	2.00	0.73	0.99	0.26
122.	Haiti	0.34	1.07	1.53	0.72	0.94	0.22
123.	Rwanda	1.33	0.33	1.20	0.81	0.92	0.11

Notes: All indexes range from 0 (not globalized) to 10 (globalized). The countries are ranked according to their overall index score in 2000.

Table 3. Per capita GDP growth and globalization (1970–2000, 123 countries)

	1970–1975	1976–1980	1981–1985	1986–1990	1991–1995	1996–2000
Countries with low globalization	2.62	2.08	0.35	0.68	0.14	1.16
Number of countries	68	71	80	83	64	40
Countries with high globalization	2.99	3.02	0.79	2.64	1.24	2.04
Number of countries	38	38	36	36	59	82
H_0: mean(low) − mean(high) = 0 (P > |t|)	0.58	0.17	0.51	0.001	0.11	0.05

Notes: Indicates GDP per capita growth rates in percentage in countries with an overall globalization index smaller and greater than the index-mean of 2.45, respectively.

III. Empirical Estimates

Table 3 gives first evidence on the relationship between growth and globalization. The countries are separated into two sub-samples according to their overall index score. The mean of 2.45 of the index is used to draw the line between more and less globalized countries. As can be seen, more globalized countries grew faster in each five-year-period. A *t*-test shows that the hypothesis of equal means can be rejected between 1986–1990 and 1996–2000. To analyse this relationship in greater detail, pooled time-series cross-section regressions are conducted. The dependent variable is the growth rate of per capita GDP. The data are averages over five years and cover the time period 1970–2000. They extend to 123 countries. Since some of the data are not available for all countries or years, the panel data are unbalanced and the number of observations depends on the choice of explanatory variables. To account for time-invariant unobservable heterogeneity potentially correlated with the regressors, a fixed effects specification is used. A dummy for each of the five-year-periods is also included. All standard errors are estimated robustly. All variables, their precise definitions and data sources are listed in the appendix.

The first column of Table 4 includes variables typically employed in growth regressions (e.g. Barro, 1997). The initial level of GDP per capita at each of the five-year periods is included to measure the conditional rate of convergence to the steady state growth rate. Secondary school enrolment and the log of life expectancy are employed as indicators of human capital. Since higher population growth should directly lead to lower per capita economic growth, the log of the fertility rate is also included. Higher domestic investment as a share of GDP should lead to higher growth rates whereas the effect of higher government consumption is not obvious a priori. On the one hand, a large government sector may induce inefficiencies and crowd out the private sector. On the other, the provision of an efficient infrastructure and a proper legal framework may promote growth (Hansson, 2000). To account for the quality of the legal system and the enforceability of property rights, a rule of law index constructed by Gwartney and Lawson (2002) is included in the regression. Obviously, better institutions should promote growth. Finally, the change in a country's

Table 4. Per capita GDP growth and globalization (1970–2000)

	1	2	3	4	5	6
Overall index of globalization		1.09	0.84	0.95	0.07	
		(3.49°)	(2.29*)	(2.96°)	(2.29*)	
Index of economic integration						0.04
						(2.53*)
Index of social integration						0.02
						(1.06)
Index of political integration						0.01
						(0.64)
Log (per capita GDP),	−5.74	−5.93	−7.34	−5.88	1.30	1.22
beginning of period	(−6.86°)	(−7.30°)	(−5.39°)	(−7.33°)	(3.70°)	(3.30°)
Secondary school enrolment	0.03	0.03	0.004	0.03	−0.003	−0.002
	(3.11°)	(2.53*)	(0.40)	(2.33*)	(−1.32)	(−0.99)
Log (life expectancy)	1.86	0.60	3.27	−0.04	−0.37	−0.33
	(0.84)	(0.26)	(0.88)	(−0.02)	(−1.54)	(−1.44)
Log (fertility rate)	−1.38	−1.49	−1.04	−1.25	−0.28	−0.28
	(−1.38)	(−1.48)	(−0.86)	(−1.20)	(−2.36*)	(−2.55*)
Investment (in percentage of GDP)	0.18	0.17	0.18	0.17	0.01	0.01
	(5.92°)	(5.82°)	(3.54°)	(5.71°)	(2.85°)	(2.73°)
Government consumption (in percentage of GDP)	−0.093	−0.10	−0.12	−0.12	−0.01	−0.01
	(−1.98*)	(−2.20*)	(−2.03*)	(−2.64°)	(−1.11)	(−1.06)
Rule-of-law index	0.19	0.17	0.06	0.13	0.02	0.02
	(2.01*)	(1.83**)	(0.52)	(1.32)	(2.24*)	(2.10*)
Inflation rate	−0.001	−0.001	−0.002	−0.001	−0.0001	−0.0001
	(−3.84°)	(−3.98°)	(−3.70°)	(−3.86°)	(−2.46*)	(−2.68°)
Growth rate of terms of trade	4.41	3.55	4.71	3.45	0.18	0.18
	(1.93**)	(1.58)	(1.32)	(1.55)	(1.17)	(1.23)
Liquid liabilities			−0.22			
			(−0.23)			
Stock market capitalization			0.30			
			(0.67)			
Political rights				−0.12		
				(−0.45)		
Civil liberties				0.17		
				(0.57)		
Democracy				−0.04		
				(−0.45)		
Estimation method	OLS	OLS	OLS	OLS	GMM	GMM
Number of countries	106	106	76	105	102	102
Number of observations	435	434	260	426	325	325
R^2 (within)	0.42	0.44	0.45	0.43		
Hausman test (Prob > Chi^2)	0.00	0.00	0.00	0.00		
(Prob > F)	0.00	0.00	0.00	0.01	0.00	0.02
Sargan test (p-level)					0.45	0.26
Arellano-bond test (p-level)					0.82	0.73

Notes: In the OLS regressions, the dependent variable is the average GDP per capita growth rate. When estimated with GMM, the natural logarithm of per capita GDP at the end of each five-year period is employed.
A dummy for each time period is included; the OLS regressions also include a dummy for each country.
The Hausman test tests whether the difference between random and fixed effects estimates is not systematic; the F-test tests whether it is valid to exclude the time dummies.
Robust (White) t-statistics are shown in parentheses:
° significant at the 1% level, * significant at the 5% level, ** significant at the 10% level.

terms of trade and its rate of inflation are included. Both have been shown to have a significant effect on growth in previous studies.

Most results do qualitatively correspond to those of Barro (1997). Higher initial GDP is significantly associated with lower growth rates. Higher government consumption over GDP also leads to lower growth. The same is true for low investment and high inflation. Growth rates are higher with better institutions and higher school enrolment. Whereas the coefficients of those variables are significant at the 5% level at least, the coefficient of a change in a country's terms of trade is only marginally significant, with a positive sign.

Life expectancy and fertility rates do not significantly influence economic growth.

Column 2 includes the overall index of globalization. As can be seen, its coefficient is positive and significant at the 1% level. The coefficient of the index shows that a one point increase would expand GDP per capita growth by 1.09 percentage points. For example, if Latvia was as integrated with the world as Spain, all else equal it could raise its growth rate from currently 5.94 to 7.1%. This could be achieved, for example, by increasing inflows of foreign direct investment from 7 to 27% of GDP, exports plus imports (in percentage of GDP) from 107 to 140% and portfolio investment (in percentage of GDP) from 5 to 30%. The same difference is between Italy and the United Kingdom while increasing the globalization index of Zimbabwe to those of the USA would increase the Zimbabwean growth rate by 4.64 percentage points. The rule of law index is only significant at the 10% level while changes in the terms of trade are now completely insignificant. The regression includes 106 countries with an average of 4.1 observations. It explains 44% of the within-groups variation.

King and Levine (1993) argue that the quality of a country's financial markets can influence economic growth. In column 3, variables to account for this quality are included. Liquid liabilities are a typical measure of the financial depth and thus of the overall size of the financial sector, stock market capitalization (relative to GDP) is an indicator of the size of the stock market. However, confirming the results of Chanda (2001), these variables are completely insignificant. Due to missing data, the number of observations is reduced dramatically. This results in generally lower *t*-statistics. School enrolment and the rule of law no longer influence growth significantly. The globalization index, however, is significant at the 5% level.

In recent years, the impact of political and institutional variables on economic growth has been highlighted.[11] Sala-i-Martin (1997), e.g., reports a positive influence of civil liberties and political rights on growth. Another variable frequently included in growth regressions is an index of democracy (e.g. Fernandez *et al*., 2001, Sala-i-Martin 1997). Column 4 tests for these impacts. It includes the political rights and civil liberties index constructed by Gastil (2002) and the Polity-IV-indicator of democracy. However, none of these variables has a significant influence on economic growth.[12] Again, the globalization index keeps its significance.

With some of the variables there is an obvious endogeneity problem: previous research has shown that, e.g., fertility is influenced by measures of wealth (Barro and Lee, 1994). If fertility declines with growth, it is endogenous. The same is true for government consumption and investment. Endogeneity might even be a problem for the index of globalization. In the framework of the Arellano-Bond estimation discussed below, the right-hand side variables can be instrumented and the validity of the exogeneity assumption can be tested.[13] The Arellano-Bond estimator consists in first-differencing the estimating equation and using lags of the dependent variable from at least two periods earlier as well as lags of the right-hand side variables as instruments. Since there are more instruments than right-hand side variables, the equations are over-identified and instruments must be weighted in an appropriate way.

Following Dollar and Kray (2001), the natural logarithm of per capita GDP at the end of a five-year period on its lag and other variables is now regressed, as opposed to regressing the growth rate on these variables. However, the formulation of the model in differences means that the regression shows how changes in globalization affect growth.

Column 5 presents results from the Arellano-Bond one-step GMM estimator, which uses the identity matrix as a weighting matrix.[14] Applying this estimator leads to a dramatic loss of observations, since information from two periods is discarded by differencing and instrumenting. In some cases, this results in lower *t*-statistics. With one exception, the results are nevertheless similar to those obtained with OLS: GDP per capita at the beginning of the period is now significantly positive. This confirms the results of Dollar and Kraay (2001).[15] The index of globalization is significant at the 5% level, again with a positive sign. Compared with the previous results,

[11] Carmignani (2001) provides an overview.
[12] In comparing these results to those of cross-section studies, note that the fixed country effects employed here do not give much room for institutional variables to affect growth.
[13] Moreover, the GMM estimator of Arellano and Bond (1991) is consistent, whereas the within groups estimator is inconsistent in the presence of a lagged dependent variable in a short panel (Nickell, 1981).
[14] The two-step GMM estimator weighs the instruments asymptotically efficiently using the one-step estimates. However, in small samples like this, standard errors tend to be under-estimated by the two-step estimator (Arellano and Bond, 1991: 291).
[15] Note that initial GDP is not significant when per capita GDP growth is employed as dependent variable instead, while most of the other results remain. Particularly, the choice of dependent variable has no impact on the influence of the index of globalization.

the magnitude of the coefficient is similar. The estimate shows that a one point increase in the index of globalization increases GDP growth by 7 percentage points. The average yearly growth rate thus equals about 1.4 percentage points, slightly higher than the previous result of 1.09.

On the basis of the Arellano-Bond estimator, a Sargan test on the validity of the instruments can be conducted. This amounts to a test for the exogeneity of the covariates. As can be seen from column 3, the Sargan test accepts the over-identifying restrictions. Hence, strict exogeneity is not rejected. The Arellano-Bond test of second order autocorrelation, which must not be present in the data in order for the estimator to be consistent, also accepts the specification.

While the overall effect of globalization on growth was found to be positive, it is interesting to examine the effects of the single components. It is not obvious that economic, cultural and political dimensions of globalization will necessarily go along with or reinforce each other (Brown *et al*., 2000: 280). As column 6 shows, only economic integration seems to be correlated with growth rates. Neither social nor political integration seem to have any influence on economic growth. One potential problem with this specification results from correlation between the three sub-indexes.[16] This probably results in lower *t*-statistics. Therefore, the three dimensions of globalization are analysed individually as well. In an effort to provide more detailed information, I replicate the analysis with the sub-indexes instead of the overall index of globalization. Table 5 starts with economic integration. There are various reasons why economic integration should promote growth. Trade makes it possible to exploit comparative advantages. Countries gain from specialization. Foreign investment might serve to close 'idea gaps' between developing and developed countries (Romer, 1993). It often comes along with management educated in industrial countries. This management may try to press for reforms, in order to improve the business environment and enhance profits (Boockmann and Dreher, 2003). Since there might be spillover effects, foreign investment could increase the productivity of the whole economy (Rappaport, 2000). Workers from other countries probably produce similar effects. Openness to international trade should promote growth since it encourages gains from trade and fosters innovation and efficient production. The effects of capital controls on growth are less obvious a priori. With open capital accounts, countries in need of capital can borrow abroad to finance investment, which promotes growth (Obstfeld, 1998: 2). Moreover, government interventions probably result in inefficiencies and underinvestment. They could also promote corruption.[17] On the other hand, however, such controls can ensure that domestic savings are channelled towards domestic investment (Chanda, 2001: 5). In some cases, capital controls increase the flexibility of monetary and fiscal policy. This could increase domestic growth rates.

Column 1 shows the results for the economic integration subindex (estimated by OLS). As can be seen, higher economic integration is significantly associated with higher growth. However, while actual flows promote growth rates (column 2), restrictions on trade and capital do not have any influence (column 3).

The insignificant coefficient of restrictions could reflect an average of the benefits from liberalization in countries with highly developed financial markets and institutions and the costs associated with a higher frequency of financial crisis in less developed countries. According to the World Bank (2002a: 10), integration with global capital markets can lead to disastrous results without sound domestic financial systems. Garrett (2001) suggests that capital account openness promotes growth only in more developed countries. I therefore employ interactions of the restrictions-subindex with dummies for low, middle and high levels of GDP and the log of these countries' per capita GDP at the beginning of a five-year period. The results are reported in column 4. It turns out that freedom from restrictions significantly promotes growth only in high income countries. In low and middle income countries, the coefficients of the interactions are insignificant.[18] The insignificant coefficient does, however, not necessarily mean that liberalization does have no influence on growth in these countries. Even in the absence of a direct effect, lower tariffs probably lead to more trade, and liberalization of the capital account promotes foreign investment. Therefore, the absence of restrictions could increase growth rates indirectly.

[16] The correlation between economic integration and social globalization is 0.51, those between economic integration and political engagement 0.11 and those between social globalization and political engagement 0.47. However, if fixed effects are taken into account correlations are substantially lower (0.22, 0.05 and 0.1, respectively).
[17] It has been shown by Dreher and Siemers (2003) that capital account restrictions and corruption re-enforce each other.
[18] To analyse this relationship in more detail, the index was also interacted with the measures of financial markets' quality introduced above and with the rule of law index. All resulting coefficients are, however, completely insignificant. This is consistent with Rodrik (1998).

Table 5. Per capita GDP growth and economic integration (1970–2000)

	1	2	3	4	5	6	7a	7b
Index of economic integration	0.42				0.04			
	(2.40*)				(2.37*)			
Index of actual economic flows		0.96				0.07		
		(3.92°)				(2.53*)		
Index of restrictions			0.004					
			(0.03)					
Restrictions * Log (per capita GDP), (low income countries)				−0.03			−0.001	0.001
				(−1.20)			(−0.35)	(0.21)
Restrictions * Log (per capita GDP), (middle income countries)				0.01			0.001	0.001
				(0.41)			(0.62)	(0.64)
Restrictions * Log (per capita GDP), (high income countries)				0.09			0.004	0.01
				(3.91°)			(1.72**)	(3.56°)
Log (per capita GDP), beginning of period	−5.75	−5.62	−5.81	−6.32	1.34	1.38	0.86	0.69
	(−6.94°)	(−6.81°)	(−6.73°)	(−7.27°)	(3.85°)	(4.15°)	(3.20°)	(6.29°)
Secondary school enrolment	0.03	0.03	0.03	0.02	−0.003	−0.003	−0.001	0.0004
	(3.36°)	(3.03°)	(2.82°)	(2.27*)	(−1.11)	(−1.26)	(−0.44)	(0.42)
Log (life expectancy)	0.94	0.77	1.97	2.09	−0.34	−0.38	−0.16	−0.11
	(0.43)	(0.28)	(0.88)	(2.27*)	(−1.35)	(−1.51)	(−1.15)	(−0.88)
Log (fertility rate)	−1.26	−1.88	−1.08	−2.19	−0.29	−0.34	−0.18	−0.22
	(−1.27)	(−1.93**)	(−1.08)	(−2.09*)	(−2.33*)	(−2.59°)	(−2.25*)	(−2.59°)
Investment (in percentage of GDP)	0.16	0.17	0.18	0.20	0.01	0.01	0.01	0.01
	(5.36°)	(5.88°)	(5.79°)	(6.36°)	(2.45*)	(2.75°)	(3.73°)	(4.35°)
Government consumption (in percentage of GDP)	−0.11	−0.10	−0.10	−0.11	−0.01	−0.01	−0.001	−0.01
	(−2.24*)	(−2.18*)	(−2.08*)	(−2.44*)	(−1.08)	(−1.02)	(−1.21)	(−1.54)
Rule-of-law index	0.20	0.20	0.24	0.18	0.02	0.02	0.02	0.01
	(2.02*)	(2.14*)	(2.35*)	(1.82**)	(2.34*)	(2.27*)	(2.30*)	(2.54*)
Inflation rate	−0.001	−0.001	−0.001	−0.001	−0.0001	−0.0001	−0.0001	−0.0001
	(−3.75°)	(−3.71°)	(−3.81°)	(−3.66°)	(−2.42*)	(−2.32*)	(−3.62°)	(−3.99°)
Growth rate of terms of trade	4.23	2.69	4.41	3.54	0.21	0.12	0.14	0.08
	(1.83**)	(1.19)	(1.88**)	(1.58)	(1.33)	(0.71)	(1.07)	(0.63)
Estimation method	OLS	OLS	OLS	OLS	GMM	GMM	GMM	GMM
Number of countries	106	106	105	105	102	102	100	100
Number of observations	435	435	463	423	326	326	314	314
R^2 (within)	0.43	0.46	0.37	0.46				
Hausman test (Prob > Chi^2)	0.00	0.00	0.00	0.00				
(Prob > F)	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Sargan test (p-level)					0.29	0.35	0.03	0.28
Arellano-Bond test (p-level)					0.85	0.96	0.22	0.16

Notes: In the OLS regressions, the dependent variable is the average GDP per capita growth rate. When estimated with GMM, the natural logarithm of per capita GDP at the end of each five-year period is employed.
Column 7b treats the interaction terms as predetermined, while all variables are treated as exogenous in the other columns. A dummy for each time period is included; the OLS regressions also include a dummy for each country. The Hausman test tests whether the difference between random and fixed effects estimates is not systematic; the F-test tests whether it is valid to exclude the time-dummies.
Robust (White) t-statistics are shown in parentheses:
° significant at the 1% level, * significant at the 5% level, ** significant at the 10% level.

Columns 5 to 7 report results estimated with the Arellano-Bond estimator. Confirming the OLS results, the overall sub-index, the index of actual flows and the interaction of high income and restrictions significantly influence growth. However, the Sargan test rejects the instruments when the interactions are included. They are therefore treated as predetermined. Column 7b shows the results. The coefficient of the high income and restrictions interaction term is highly significant. Both the Sargan test and the Arellano-Bond test of second-order autocorrelation now clearly accept the specification.

Table 6 reports the results for the political dimension. This aspect of globalization has never been studied in the context of growth. However, political integration might influence growth rates. Economic globalization leads to the inability of national governments to control their citizens (Allison, 2000: 83). On the one hand, high political integration could serve governments as counterweight to

Table 6. Per capita GDP growth and political integration (1970–2000)

	1	2
Index of political integration	0.003	0.01
	(0.02)	(0.65)
Log (per capita GDP),	−5.75	1.40
beginning of period	(−6.85°)	(3.88°)
Secondary school enrolment	0.03	−0.004
	(3.10°)	(−1.40)
Log (life expectancy)	1.86	−0.38
	(0.84)	(−1.40)
Log (fertility rate)	−1.37	−0.28
	(−1.39)	(−2.23*)
Investment (in percentage of GDP)	0.18	0.01
	(5.93°)	(2.83°)
Government consumption	−0.09	−0.01
(in percentage of GDP)	(−1.98*)	(−1.09)
Rule-of-law index	0.19	0.02
	(2.00**)	(2.40*)
Inflation rate	−0.001	−0.0001
	(−3.83°)	(−2.23*)
Growth rate of terms of trade	4.41	0.23
	(1.92**)	(1.37)
Estimation method	OLS	GMM
Number of countries	106	102
Number of observations	435	326
R^2 (within)	0.42	
Hausman test (Prob > Chi^2)	0.00	
(Prob > F)	0.00	0.01
Sargan test (p-level)		0.33
Arellano-Bond test (p-level)		0.87

Notes: In the OLS regressions, the dependent variable is the average GDP per capita growth rate. When estimated with GMM, the natural logarithm of per capita GDP at the end of each five-year period is employed.
A dummy for each time period is included; the OLS regressions also include a dummy for each country. The Hausman test tests whether the difference between random and fixed effects estimates is not systematic; the F-test tests whether it is valid to exclude the time-dummies.
Robust (White) t-statistics are shown in parentheses:
° significant at the 1% level, * significant at the 5% level, ** significant at the 10% level.

globalized markets. They could co-operate to promote more redistribution than would otherwise be possible. This would probably reduce economic growth. A good example is pre-industrial-revolution-Europe. Low political integration and resulting competition between governments strongly promoted economic and technical innovations (Rosenberg and Birdzell, 1986: 137, Jones, 1981: 138). On the other hand, high integration could lead to reforms in political or economic processes and thus promote growth. Examples could be monopoly regulation in the European Union or free trade zones like NAFTA and MERCOSUR. As columns 1 and 2 show, however, political integration is completely irrelevant for economic growth.

Finally, Table 7 reports results for social integration. As Boockmann and Dreher (2003) point out, means of information and communication may prove important since they relay information about economic success in other countries. Exposure to such information may provoke discussions which result in the acceptance of new concepts (Brown *et al.* 2000: 279). Successful technologies are then adopted which promotes growth. As Mayer-Schöenberger and Hurley (2000: 147) put it, global communication networks promote international trade and economic integration, as they lower cross-border transaction costs. Marketing information can thus be accessed by customers worldwide which implicates a decline in the importance of geographic proximity. Given a certain level of information about economic policies in other countries, cultural proximity could reduce resistance against those ideas. For example, structural reforms conducted by many industrial countries in the 1980s spread only slowly to developing nations. Only with increased proximity, developing countries reformed their economies as well. It could also be, that simply adopting Western technology would not lead to higher growth rates without adopting the social and cultural environment in which it is embedded (Saich, 2000: 211).

Since data on cultural proximity are available for only two periods, the table includes only results on personal contact and information flows as well as the overall sub-index. As can be seen in column 1, social integration significantly promotes growth. The index of personal contact is only marginally significant. Information flows are significant at the 1% level (columns 2 and 3, respectively).

When estimated with GMM (and thus in differences), all three indexes do not seem to influence growth (columns 4 to 6). The former results may thus emerge due to reversed causality. The study therefore tried to estimate all regressions with the globalization variables lagged one five-year-period (not reported in the table). It turns out that only information flows have a significant influence on economic growth. This result is confirmed, when information flows are treated as predetermined in the GMM regression (column 6b).[19] Only this specification is accepted by the Sargan test and the Arellano-Bond test, while the overidentifying restrictions are rejected when the index is treated as exogenous.

[19] When treated as predetermined, the overall social integration index is also significant at the 1% level.

Table 7. Per capita GDP growth and social integration (1970–2000)

	1	2	3	4	5	6a	6b
Index of social integration	0.83			0.03			
	(3.69°)			(1.19)			
Index of personal contact		0.29			0.01		
		(1.86**)			(0.64)		
Index of information flows			1.25			0.03	0.12
			(3.70°)			(0.75)	(3.15°)
Log (per capita GDP),	−6.13	−6.45	−6.31	1.23	1.15	1.16	0.75
beginning of period	(−7.64°)	(−7.64°)	(−7.77°)	(3.33°)	(3.16°)	(3.08°)	(4.67°)
Secondary school enrolment	0.02	0.02	0.02	−0.002	−0.002	−0.002	−0.001
	(2.08*)	(1.74**)	(2.11*)	(−1.20)	(−0.93)	(−1.07)	(−0.90)
Log (life expectancy)	1.35	2.23	1.22	−0.27	−0.18	−0.31	−0.28
	(0.60)	(1.03)	(0.55)	(−1.66**)	(−0.79)	(−1.45)	(−2.16*)
Log (fertility rate)	−2.49	−0.88	−3.24	−0.28	−0.23	−0.27	−0.30
	(−2.27*)	(−0.89)	(−2.74°)	(−2.55*)	(−1.86**)	(−2.60°)	(−3.50°)
Investment (in percentage of GDP)	0.17	0.16	0.18	0.01	0.01	0.01	0.01
	(6.07°)	(5.13°)	(6.15°)	(3.10°)	(2.75°)	(3.24°)	(4.44°)
Government consumption	−0.09	−0.83	−0.10	−0.01	−0.01	−0.01	−0.01
(in percentage of GDP)	(−1.93**)	(−1.70**)	(−2.17*)	(−1.06)	(−0.82)	(−1.11)	(−1.31)
Rule-of-law index	0.16	0.17	0.15	0.02	0.02	0.02	0.01
	(1.65**)	(1.71**)	(1.50)	(2.18*)	(2.37*)	(2.15*)	(1.73**)
Inflation rate	−0.001	−0.01	−0.001	−0.0001	−0.0001	−0.0001	−0.0001
	(−4.10°)	(−2.43*)	(−3.81°)	(−2.53*)	(−2.18*)	(−2.71°)	(−3.85°)
Growth rate of terms of trade	3.60	2.16	3.99	0.24	0.12	0.21	0.13
	(1.64)	(0.94)	(1.78**)	(1.36)	(0.74)	(1.44)	(1.09)
Estimation method	OLS	OLS	OLS	GMM	GMM	GMM	GMM
Number of countries	106	105	106	102	99	102	102
Number of observations	434	403	435	325	294	326	326
R^2 (within)	0.44	0.45	0.44				
Hausman test (Prob > Chi^2)	0.00	0.00	0.00				
(Prob > F)	0.04	0.02	0.03	0.02	0.01	0.02	0.03
Sargan test (p-level)				0.23	0.17	0.07	0.12
Arellano-Bond test (p-level)				0.67	0.57	0.53	0.13

Notes: In the OLS regressions, the dependent variable is the average GDP per capita growth rate. When estimated with GMM, the natural logarithm of per capita GDP at the end of each five-year period is employed.
Column 6b treats information flows as predetermined, while all variables are treated as exogenous in the other columns.
A dummy for each time period is included; the OLS regressions also include a dummy for each country. The Hausman test tests whether the difference between random and fixed effects estimates is not systematic; the F-test tests whether it is valid to exclude the time-dummies.
Robust (White) t-statistics are shown in parentheses:
° significant at the 1% level, * significant at the 5% level, ** significant at the 10% level.

Summing up, in addition to the overall index of globalization, several dimensions have a significant (positive) influence on growth: actual economic flows, capital and trade restrictions in developed countries, and flows of information. The following paragraph examines the robustness of these findings.

IV. Robustness Analysis

The study tests for the robustness of the overall index, actual economic flows, capital and trade restrictions in developed countries, and flows of information. First, it checks for the influence of outliers using an algorithm that is robust to them. The robust regression technique weighs observations in an iterative process. Starting with OLS, estimates are obtained through weighted least squares where observations with relatively large residuals get smaller weight. This results in estimates not being overly influenced by any specific observation.

Second, all regressions are replicated (estimated with OLS and GMM) omitting – one at a time – the following sub-groups: East Asian countries, Latin American countries, Sub-Saharan-African countries, OECD countries and, finally, India and China. Third, further variables which could influence the relationship between the indexes and growth are included: black market premium, overall budget balance, political instability, the theil index

Table 8. Robustness analysis

	Overall index		Actual economic flows		Restrictions* Log (per capita GDP), (high income countries)		Information flows	
	OLS	GMM	OLS	GMM	OLS	GMM	OLS	GMM
Robust regression	5		5		5		insig.	
Without East Asian countries	1	10	1	10	1	1	1	10
Without Latin American countries	5	insig.	1	5	1	1	1	10
Without Sub-Saharan Africa	10	1	1	5	5	5	1	5
Without OECD countries	5	1	1	10	–	–	insig.	insig.
Without China and India	1	5	1	5	1	1	1	10
Black market premium	1	10	1	1	1	1	1	insig.
Overall budget balance	5	insig.	1	5	1	5	1	insig.
Political instability	5	insig.	1	5	1	5	1	insig.
Theil index	5	10	1	10	1	1	1	insig.
Banking quality	5[c]	5	1	1	insig.	insig.	insig.	insig.
Institutional variables	1[c]	insig.	1	5	1	1	1	5
Re-weighted indexes[a]	1	10	1	10	1	5	1	5
Re-weighted indexes[b]	1	10	1	5	1	1	insig.	insig.

Notes: In the OLS regressions, the dependent variable is the average GDP per capita growth rate. When estimated with GMM, the natural logarithm of per capita GDP at the end of each five-year period is employed.
Numbers indicate the significance level of the respective index. All regressions include the covariates of Table 4, column 1.
[a] No category has been omitted, even if no data for the index has been available in a certain period. Instead, data from the next period available has been used.
[b] Weights for each period have been determined by Principal Components Analysis (instead of using the same weights for all periods).
[c] This corresponds to the results of Table 4.

of inequality[20] as well as the variables of banking quality and institutional variables introduced above.

As an obvious shortcoming of the procedure used to derive the globalization indexes, changes in the index over time might to some extent reflect missing data instead of real changes in globalization. To examine this shortcoming, fourth, an alternative procedure has been used as well. In those years where no data for some categories exist, the latest data available have been employed for constructing the indexes. Changes in the index over time therefore only reflect changes in the underlying data.[21]

Fifth, instead of weighing the components of the index equally in all periods, principal components analysis is applied to each individual sub-period. As it turns out, the resulting rankings are almost identical to those reported in Table 2. Correlation between the indexes is 0.996 for the 1991–1995 period, 0.983 (1986–1990), 0.986 (1981–1985), 0.988 (1976–1980), and 0.939 (1971–1975). Nevertheless the robustness of the results is tested using the re-weighted index.

To measure political instability, an index employing the following variables is constructed: assassinations, strikes, guerrilla warfare, crisis, riots and revolutions. Since those variables are highly collinear, they cannot all be included separately in one regression. Therefore an overall indicator is constructed, again using principal components analysis.[22]

Table 8 shows the results of the stability analysis. It turns out that the overall index of globalization is not completely robust to the inclusion of further variables in the GMM regressions. In most cases, however, the coefficients do not become insignificant because of the inclusion of the variables but to the drastically reduced number of observations. For example, including the variables of banking quality reduces the number of observations to 183

[20] The Gini coefficient was also tried but this leaves one with too few observations for a meaningful regression.
[21] However, note that this way of filling the gaps affects the time specific dummies also.
[22] The weights obtained are 0.08 (assassination), 0.1 (strikes), 0.25 (guerrilla warfare), 0.15 (crisis), 0.16 (riots) and 0.27 (revolutions).

(when estimated with GMM). The coefficients remain insignificant when the sample is restricted to those countries where the additional variables are available even if the variables are not included in the regression. Using different weights for the index does, however, not affect the results. The table also shows that the result is not driven by outlying observations.

Actual economic flows are highly robust to the inclusion of further variables, the exclusion of countries, the estimation method, and the construction of the index. Its coefficient is significant at least at the 10% level in all regressions. The influence of restrictions in developed countries is similarly robust. Only the reduction in the number of observations when the banking quality variables are included destroys its significant influence on growth. If the banking quality variables are included, only 194 observations remain. OECD countries are not excluded since this would leave one with an insufficient number of high income countries.

As can be seen in the table, information flows are less robustly related to economic growth. They lose their significance, when any of the additional variables except those accounting for institutional quality are included. Excluding OECD countries and employing individual weights for each period also destroys the coefficients' significance.

V. Conclusion

It has been shown that, contrary to the beliefs of its critics, globalization indeed promotes growth. The overall index of globalization developed in this study is highly significant in most specifications and has been shown to be quite robust to the inclusion of potentially relevant covariates in the regression as well as different estimation methods. These effects are economically relevant. As an example, it has been shown that Latvia could increase its economic growth rate from 5.94 to 7.1 if it would be as integrated with the rest of the world as Spain is. This example shows the limitations of the globalization process in reducing poverty as well. For Latvia to become as globalized as Spain would require enormous efforts. Such effort is nearly impossible to achieve in the short run but will take many years. As another example, the country with one of the biggest (positive) changes in globalization from 1975 to 2000 has been China. Its index increased by 2.14 points. According to the regression results from Table 4 this would mean that China's growth rate in 2000 is 2.33 percentage points higher as in 1975 due to increased integration with the rest of the world.

In summary, globalization is good for growth. On average, countries that globalized more, experienced higher growth rates. This is especially true for actual economic integration and – in developed countries – the absence of restrictions on trade and capital. There is also evidence, that cross-border information flows promote growth. The accusation that poverty prevails because of globalization is therefore not valid. To the contrary, those countries with the lowest growth rates are those who did not globalize. Countries like Rwanda or Zimbabwe, e.g., insulated themselves from the world economy. They have poor institutions which repress growth and promote poverty. Nevertheless, all else equal it will not be enough for poor countries simply to globalize their economies to spur growth rates and reduce poverty.

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Appendix A: Definitions

Trade (in percentage of GDP): Sum of exports and imports of goods and services measured as a share of gross domestic product.

Foreign Direct Investment (in percentage of GDP): Sum of the absolute values of inflows and outflows of foreign direct investment recorded in the balance of payments.

Portfolio investment (in percentage of GDP): Sum of absolute values of portfolio investment assets and portfolio investment liabilities.

Income (in percentage of GDP): Income payments refer to employee compensation paid to nonresident workers and investment income.

Hidden Import Barriers: barriers other than published tariffs and quotas.

Mean Tariff Rate: The formula used to calculate the 0-to-10 rating for each country was: $(V_{\max} - V_i)/(V_{\max} - V_{\min})$ multiplied by 10. v_i represents the country's mean tariff rate. The values for $V_{\min}$ and $V_{\max}$ were set at 0% and 50%, respectively. This formula will allocate a rating of 10 to countries that do not impose tariffs. As the mean tariff rate increases, countries are assigned lower ratings. The rating will decline toward zero as the mean tariff rate approaches 50%.

Taxes on International Trade (in percentage of current revenue): Include import duties, export duties, profits of export or import monopolies, exchange profits and exchange taxes.

Capital Account Restrictions: The index is based on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions and includes 13 different types of capital controls. It is constructed by subtracting the number of restriction from 13 and multiplying the result by 10.

Embassies in Country: Absolute number.

Membership in International Organizations: Absolute number.

Participation in UN Security Council missions: Absolute number of missions a country participated.

Outgoing telephone traffic: Measured in minutes per 1000 population.

Transfers (in percentage of GDP): Measures inflows and outflows of goods, services, income, or financial items without a quid pro quo.

International tourism (as a share of population): Sum of arrivals and departures.

Telephone average costs of call to USA: Cost of a three-minute peak rate call from the country to the USA.

Foreign Population (in percentage of total population): Foreign (or foreign-born) population is the number of foreign or foreign-born residents in a country.

Telephone mainlines (per 1000 people): Telephone mainlines are telephone lines connecting a customer's equipment to the public switched telephone network.

Internet hosts (per capita).

Internet users (as a share of population): Internet users are people with access to the worldwide network.

Cable television (per 1000 people): Cable television subscribers are households that subscribe to a

multichannel television service delivered by a fixed line connection.

Daily newspapers (per 1000 people): Daily newspapers refer to those published at least four times a week.

Radios (per 1000 people): Radios refer to radio receivers in use for broadcasts to the general public.

Number of McDonald's restaurants (per capita).

GDP per capita growth: Annual percentage growth rate of GDP per capita based on constant local currency.

Log (per capita GDP): GDP per capita is gross domestic product divided by midyear population. Data are for the end of each five–year period.

Secondary school enrolment: Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level.

Log (life expectancy): Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Log (fertility rate): Represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with prevailing age-specific fertility rates.

Investment (in percent of GDP): Gross domestic investment.

Government consumption (in percentage of GDP): All government current expenditures for purchases of goods and services (including compensation of employees).

Rule-of-Law Index: Measures the quality of the legal system and property rights.

Inflation rate: Measured by the consumer price index. The Laspeyres formula is generally used.

Growth rate of terms of trade: Base year is 1995.

Liquid liabilities: Liquid liabilities to GDP equals currency plus demand and interest-bearing liabilities of banks and other financial intermediaries divided by GDP.

Stock Market capitalization: Equals the value of listed shares divided by GDP.

Political rights: rates political rights with 1 representing the most free and 7 the least free.

Civil liberties: rates civil liberties with 1 representing the most free and 7 the least free.

Democracy: 0–10 (0 = low; 10 = high) democracy score. Measures the general openness of political institutions.

Black market premium: (Parallel exchange rate/official exchange rate–1) $*$ 100.

Overall budget balance (in percentage of GDP): Includes grants.

Political instability: Index constructed with principal components analysis. The weights obtained for the components are 0.08 (assassination), 0.1 (strikes), 0.25 (guerrilla warfare), 0.15 (crisis), 0.16 (riots) and 0.27 (revolutions).

Theil index: The Theil inequality index is a weighted geometric average of income relatives.

Appendix B: Descriptive Statistics and Data Sources

Variable	Data source		Mean	Std. dev.
Trade index	World Bank (2002a)	overall	1.91	1.44
		between		1.36
		within		0.48
Foreign direct investment index	World Bank (2002a)	overall	1.24	1.54
		between		1.31
		within		0.93
Portfolio investment index	IMF (2002)	overall	1.48	1.82
		between		1.32
		within		1.17
Income index	World Bank (2002a)	overall	0.88	1.43
		between		1.22
		within		0.98
Hidden import barriers index	Gwartney and Lawson (2002)	overall	6.47	1.82
		between		1.82
		within		0.44
Mean tariff rate index	Gwartney and Lawson (2002)	overall	6.32	2.66
		between		2.15
		within		1.49
Taxes on international trade index	World Bank (2002a)	overall	7.42	2.39
		between		2.29
		within		0.91
Capital account restrictions index	Gwartney and Lawson (2002)	overall	3.10	3.32
		between		2.70
		within		1.92
Embassies in country index	Europa World yearbook (various years)	overall	3.51	2.47
		between		2.18
		within		1.18
Membership in international organizations index	Union of International Associations (various years)	overall	4.41	1.92
		between		1.63
		within		1.01
Participation in UN Security Council missions index	Department of Peacekeeping Operations, UN	overall	1.49	2.33
		between		2.07
		within		1.09
Outgoing telephone traffic index	World Bank (2002a)	overall	0.68	1.38
		between		1.22
		within		0.40
Transfers index	World Bank (2002a)	overall	1.95	2.09
		between		1.89
		within		1.11
International tourism index	World Bank (2002a)	overall	1.62	2.11
		between		1.95
		within		0.58
Telephone average costs of call to USA index	World Bank (2002a)	overall	7.92	1.84
		between		1.84
		within		0.00
Internet hosts index	International Telecommunications Union	overall	0.96	1.77
		between		1.75
		within		0.31
Internet users index	World Bank (2002a)	overall	0.32	1.14
		between		0.60
		within		0.98
Cable television index	World Bank (2002a)	overall	1.37	2.40
		between		1.93
		within		0.84
Daily newspapers index	World Bank (2002a)	overall	1.68	2.06
		between		1.98
		within		0.41
Radios index	World Bank (2002a)	overall	1.72	1.58
		between		1.50
		within		0.50

(continued)

Appendix B: Continued

Variable	Data source		Mean	Std. dev.
McDonald's index	McDonald's Corporation	overall	1.09	1.89
		between		1.85
		within		0.41
GDP per capita growth rate	World Bank (2002a)	overall	1.52	3.30
		between		1.96
		within		2.67
Log (per capita GDP)	World Bank (2002a)	overall	7.79	1.58
		between		1.56
		within		0.21
Secondary school enrolment	World Bank (2002a)	overall	56.55	32.93
		between		31.09
		within		11.20
Log (life expectancy)	World Bank (2002a)	overall	4.14	0.19
		between		0.18
		within		0.05
Log (fertility rate)	World Bank (2002a)	overall	1.22	0.55
		between		0.52
		within		0.18
Investment (in percentage of GDP)	Global Development Network Growth Database	overall	22.48	7.21
		between		5.69
		within		4.38
Government consumption (in percentage of GDP)	World Bank (2002a)	overall	15.46	5.92
		between		5.26
		within		2.81
Rule-of-law index	Gwartney and Lawson (2002)	overall	5.47	1.96
		between		1.60
		within		1.06
Inflation rate	World Bank (2002a)	overall	54.86	368.39
		between		180.43
		within		325.48
Growth rate of terms of trade	World Bank (2002a)	overall	0.0034	0.0589
		between		0.0277
		within		0.0539
Liquid liabilities	Beck *et al.* (1999)	overall	0.46	0.31
		between		0.31
		within		0.13
Stock market capitalization	Beck *et al.* (1999)	overall	0.33	0.45
		between		0.36
		within		0.24
Political rights	Gastil (2000)	overall	3.75	2.18
		between		1.90
		within		1.06
Civil liberties	Gastil (2000)	overall	3.80	1.88
		between		1.69
		within		0.83
Democracy	Marshall and Jaggers (2000)	overall	4.68	4.23
		between		3.77
		within		1.93
Black market premium	Global Development Network Growth Database	overall	143.68	2109.66
		between		4615.41
		within		411.32
Overall budget balance	World Bank (2002a)	overall	−3.33	5.25
		between		4.11
		within		3.55
Political instability	Global Development Network Growth Database	overall	0.23	0.37
		between		0.27
		within		0.25
Theil index	University of Texas Inequality Project	overall	0.05	0.05
		between		0.05
		within		0.03