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Measurement of a Multidimentional Index of Globalization and its Impact on Income Inequality

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Abstract

In this paper we present two composite indices of globalization. The first is based on the Kearney/*Foreign Policy* magazine and the second is obtained from principal component analysis. They indicate which countries have become most globalized and show how globalization has developed over time. The indices are composed of four components: economic integration, personal contact, technology and political engagement, each generated from a number of variables. A breakdown of the index into major components provides possibilities to identify sources of globalization and associate it with economic policy measures. The empirical results show that a low rank in the globalization process is due to political and personal factors with limited possibility for the developing countries to affect. The high ranked developed countries share similar patterns in distribution of various components. The indices were also used in a regression analysis to study the causal relationship between income inequality and globalization. Globalization indices explain only 7 to 11 per cent of the variations in income inequality among countries.

Acknowledgements

Tables and Figures appear at the end of the paper.

1 Introduction

Globalization is defined as the free movement of goods, services, labour and capital across borders. It is a contentious process by which the western market economies have effectively spread across the globe. Although it does not constitute a new phenomenon, it is viewed as an inexorable integration of markets, nations and technologies to a degree never witnessed before in a way that is enabling individuals, and corporations, to reach around the world further, faster, deeper and more economically than ever before. By contrast, some groups of scholars and activists view globalization as an ideological project of economic liberalization that subjects states and individuals to more intense market forces.

Globalization causes rapid changes in trade relations, financial flows, and the mobility of labour across the world and has brought the (developed) national economies closer together and made them more strongly interrelated. However, there is a large heterogeneity in the degree of the process of globalization over time and across countries and regions. This heterogeneity causes disparity in development and urges the need for research to find the sources of disparity and quantification of its magnitude and impacts.

In recent years, theoretical research on the link between globalization and world inequality has been intense. However, analysis of the link at the empirical level is scarce. The causal connections between globalization and inequality in developing nations are best understood by building on what we have learned about inequality change during the pre-globalization phase. Extensive empirical research points to two stylized facts. First, there is no structural relationship between growth and inequality. Second, income inequality levels in the pre-globalization phase were generally immobile and trendless.

There is a comprehensive body of literature on the historical perspective and descriptive nature of globalization and its impact on for instance inequality amongst nations. Despite the great importance that is placed on the globalization process of the world economy, its sources and consequences remain poorly understood. The relationship between inequality and the number of channels through which globalization affects world (in)equality have been investigated. The channels identified are: commodity price equalization, factor price convergence due to international migration, capital mobility reducing wage inequality and differentials in marginal products and rates of return of capital among countries, and dynamic convergence in per capita income growth where the growth rate is positively related to the distance to the steady state.

The objective of this study is to investigate the usefulness of the recently created database by Kearney in the development of an index of globalization. The index is based on countries' economic integration, personal contact, technology and political engagement. The main features of this study are as follows:

— using the same data reproduce the globalization index introduced by Kearney;
— an alternative globalization index is obtained using principal component analysis;

- countries are compared by their integration in the world economy. A decomposition of the indices into underlying components quantifies individual factors' contribution to the integration;

- the indices in addition to international level globalization are further used for between and within region comparisons. The indices are expected to serve as useful tools in evaluation of the impact of globalization on the welfare of nations and regions. The hope is to generate interest and research on important issues like analysis of the globalization process and evaluation of its impacts on developing economies;

- the indices are used in regression analysis to study the causal relationship between income inequality and globalization. However, globalization indices explain only 7 to 11 per cent of the variations in income inequality among countries;

- given our experience, we provide guidelines for the creation of a globalization database based on national data and a modified globalization index incorporating more relevant determinant factors.

This study is organized as follows. Following a review of the literature on the link between globalization and world inequality in Section 2, Section 3 provides a brief description of how the index of globalization has been constructed. In Section 4 the data is described and variables used in the analysis are defined, followed in Section 5 by a discussion of the results. In Section 6 the link between globalization and income inequality are discussed and guidelines on possible extensions and for future research are presented. Section 7 is the summary and conclusion.

2   A review of the literature

In reviewing the literature on globalization we identify a number of directions. The last two centuries can be classified into different periods or phases. Therein a number of approaches link globalization to convergence/divergence, and inequality/equality issues. Links have also been made to poverty and traditional and non-traditional factors causing inequality; the impact on wage inequality at a micro level is one such topic, though the implications of globalization for within- and between-country inequality and how globalization influences world inequality are all noted in the literature. Governance issues also arise, drawing upon the benefits of globalization and suggesting how to reduce negative impacts better. While the economic component is dominant, some views find globalization misinterpreted and its quantitative (economic and financial) extent exaggerated. In this section we report the main findings in each of these directions from a selection of studies.

Globalization periods and main approaches

Globalization is not a new phenomenon. The process has its roots in the second half of the eighteenth century. In O'Rourke and Williamson (2000), O'Rourke (2001), Maddison (2001) and Williamson (2002) the period 1870-2000 is classified into: the first wave of globalization 1870-1913, the de-globalization period of 1913-1950, the golden age of 1950-1973, and the second wave of globalization of 1973 onwards.

In recent years, research on the link between globalization and world inequality has been intense. Three main approaches are distinguished by Wade (2001). First, the neoclassical growth theory predicts that national economies will converge in their average productivity levels and average incomes because of increased mobility of capital. Second, the endogenous growth theory predicts that increasing returns to technological innovation in developed countries offsets diminishing returns to capital. In short the neoclassical theory predicts convergence (equality) while the endogenous theory predicts less convergence or divergence (inequality). Third, the dependency approach predicts that convergence is less likely and divergence more likely, because of differential benefits from economic integration and trade, restricted free market relations, and developing countries locked into producing certain commodities.

Globalization and convergence/divergence issues

The empirical evidence shows that during the first wave of globalization convergence in per capita income and real wages took place within the Atlantic economy due to an increase in international trade and massive international migration. The de-globalization period is characterized as widening disparity between the richest and the poorest regions, and among the Atlantic economy reverting to the convergence trend of the previous period. The golden age period was 25 years of rapid growth, relative stability and declining inequality. There was considerable convergence among Western European economies and the OECD, and a decline in the GDP gap in per capita income between the poorest and the richest regions (see Solimano, 2001). It is argued that neoclassical effects of trade and changes in the supply of input factors provide more insight. Increased trade, stimulated by falling transportation costs, and factor movements caused prices of locally scarce factors to fall and promoted factor price convergence.

Globalization-inequality-poverty links

Economic growth has often been given priority as an anti-poverty measure, but the negative link between growth and inequality has been largely ignored by policymakers. Rising inequality threatens growth and the poverty reduction targets calling for more distributionally favourable pro-growth policies. Cornia and Court (2001) in a policy brief using the WIID,[1] covering the second wave of globalization, report changes in within-country income inequality and on the link between poverty, inequality and growth. The analysis highlights five main issues. First, inequality has risen since the early-mid 1980s. Second, the traditional common factors causing inequality, such as land concentration, urban bias and inequality in education, are not responsible for worsening the situation. Third, the persistence of inequality at high levels makes poverty reduction difficult; there is a negative relationship between inequality and the poverty alleviation elasticity of growth (Cornia and Kiiski, 2001). Fourth, a high level of inequality can depress the rate of growth and have undesirable political and social impacts (see also Birdsall, 2000). Fifth, developments in Canada and Taiwan show that low inequality can be maintained at a fast growth rate.

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[1] The World Income Inequality Database (WIID) can be downloaded at: http://www.wider.unu.edu/

The non-traditional new causes of inequality identified are liberal economic policy regimes and the way in which economic reform policies have been carried out. Land reform, expanding education and active regional policy are recommended as measures to reduce inequality among areas, gender and regions. Policies offsetting the inequality impact of new causes are designed and incorporated in a revised development approach, called the 'Post-Washington Consensus' by Stiglitz (1998). These policies include measures to offset the impacts of new technologies and trade, macroeconomic stability, careful financial liberalization and regulation, equitable labour market policies, and innovative tax and transfer policies. The international community should include distribution issues in their policy advice, avoid distributive distortions, support to reduce output volatility and increase external budgetary support.

Agénor (2003) examines the extent to which globalization affects the poor in developing countries. The focus is on the channels through which trade openness and financial integration may have adverse effect on poverty.[2] Cross country regression analysis relates globalization to poverty and control for various macroeconomic and structural variables. Results suggest evidence of an inverted U-shape relationship between globalization and poverty indicating that globalization at low (higher) levels tends to increase (reduce) poverty. Globalization and trade liberalization make consumer price subsidies directed to poverty reduction inefficient by calling for their removal or reduction. Results from Tunisian food policy evaluation indicate that gradual subsidy removal would increase the relative position of non-subsidy products and affect low income groups (Dhehibi and Gil, 2003).

Modes of globalization

Globalization has different dimensions with different impacts and can be looked at from different perspectives. James (2002) analyses the causes of globalization in terms of transaction costs and focuses on information and communication technologies as well as technical change and foreign investment deriving from globalization and their application to developing problems in Africa. Bhagwati (2000) focuses on trade and foreign direct investment. Globalization is both economically and socially benign, that is it can, as a general tendency, produce beneficial consequences for a variety of social objectives. Appropriate governance is needed to manage globalization and the speed at which it must be pursued. There is disagreement about the effects of globalization on income distribution of countries. International trade theory implies that increased trade and foreign investment should make income distribution more equal in poor countries and less equal in rich countries. La Porta et al.'s (1999) examination shows that from the perspective of promoting development the performance and quality of government across countries varies in systematic ways; common law countries have better governments than French civil law or socialist law systems, Protestant countries generally have better governments than Catholic or Muslim countries. Milanovic (2002) attempts to discern the effects of trade and foreign investment on relative income shares of low and high deciles using household budget surveys. The results show that the

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2 For another comprehensive analysis of globalization, growth and poverty see Dollar and Collier (2001).

effects of openness on income distribution depend on the country's initial income level. At very low levels the rich benefit, but the situation changes as income levels rise. Seshanna and Decornez (2003) find that during the last 40 years the world economy has become wealthier, more globally integrated, but unequal and polarized in sharpening the division between rich and poor countries.

The issues of economic globalization, domestic politics and income inequality in developed countries is studied by Mahler (2001). The results from regression analysis show little evidence of a systematic relationship between any of the three main modes of economic globalization (trade, foreign direct investment and financial openness) or either of the distribution of disposable income or earnings of households. The overall conclusion is that integration into the world economy does not systematically lead to an inegalitarian distribution of income or earnings across entire economies; the modes of globalization are weakly and positively related to the fiscal redistribution in the countries studied. Empirics show that politics continues to play a critical role in determining distributive outcomes in the developed world; economic globalization is compatible with a variety of political interactions leading to a range of distributive outcomes.

Influences of globalization

In their studies of the link between globalization and inequality Lindert and Williamson (2001) and O'Rourke (2001) state that increased world inequality has been driven by between-country rather than within-country inequality. It follows that globalization will have very different implications for within-country inequality, depending on the dimension of globalization involved on the country concerned, and on the distribution of endowments. The fact that the world economy has become more globally integrated can be interpreted as that globalization has raised inequality between nations. The direction of impact on within-country inequality depends on participating country's changes in their policy to exploit it. In this view, the net impact of globalization is too small to explain the long-run rise in world inequality since 1800. The source of inequality in a globalized world with vast regions with inferior education and chaotic institutions could be poor government and non-democracy, not globalization.[3]

Based on exploring the components of inequality, the sources and degree of globalization, and the historical time path, Lindert and Williamson (2001) classified the influence of globalization on inequality in five conclusions. The conclusions are in part based on regression of normalized inequality for unskilled workers on real wage, migration impact, and trade variables. First, the widening income gaps between countries that integrated into the world economy have probably been reduced. Second, within labour-abundant countries, emigration and opening up to international trade before 1914 lowered inequality. Third, within labour-scarce countries, immigration and opening up to international trade raised inequality. Fourth, accounting for all international and intra-national effects, more globalization has reduced inequality. Fifth, complete global integration does not make inequality vanish, but inequality is lower

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[3] See also Aghion and Williamson (1998) on the link between inequality and growth focusing on the causes of wage and income inequality in developed economies.

under integration than segmentation. The source of further inequality would be poor government and non-democracy in lagging countries, rather than globalization. Williamson (1996) concludes that evidence shows that globalization had the same impact on income distribution in the late nineteenth and in the late twentieth centuries: inequality rose in rich countries and fell in poor countries.

Wage inequalities

Several studies address the wage links between globalization and inequality. The effects of globalization on skill premium, unemployment, and countries social policies are addressed by Ethier (2002). Empirical literature concludes that trade has played a minor role in the rise of skill premium rather than skill-biased technical change. Here it is assumed that outsourcing and unskilled labour are highly substitutable and that capital equipment and skilled labour are complementary. Globalization offers a possible explanation to stylized facts in the above. Miller (2001) demonstrates that globalization explains a significant increase in earnings inequality from declining relative wages of unskilled workers in the US since the late 1970s. Most of the increase in wage inequality results from changes in the structure of production, in part by outsourcing involving moving unskilled-intensive production process to low-income countries. Miller finds that halting globalization will do little to offset the rising inequality that has already occurred. Eckel (2003) in analysing the role of wage rigidities in labour market adjustment to international trade and biased technological progress shows that changes in relative wages are independent of wage rigidities, but wage inequality is affected by capital market integration. Manasse and Turrini (2001) study the effects of globalization on income inequality by looking at trade integration in the form of lower transportation costs and improved production and communication technologies benefitting the quality of products and rising consumer satisfaction. In the first case, redistribution from non-exporting to exporting firms and changing demand for skills results in income inequality. In the latter, the effect is ambiguous. Globalization, although improving welfare, is likely to raise inequality. Redistribution, rather than protection, should be the answer.

Governing globalization

A number of measures could reduce the negative impacts of the rapid globalization process. The current system is incapable of dealing with the surfacing problems. Nayyar and Court (2002) summarize the results from a major WIDER project on governing globalization, where they identify the main ways in which the governance needs of the world economy and policy can be strengthened. A new structure of governance, reforms and new institutions are proposed to better protect the interests of poorer developing countries. Addison and Rahman (2002) identify that geographical characteristics, institutional and political factors, economic policy and histories matter for an individual country's capacity to globalize. Regarding the importance of institutional capacity for globalization and openness Chirathivat and Murshed (2001) argue that domestic institutional capacities in Southeast Asia were inadequate to cope with the influx of capital to prevent the recent Asian crisis.

Critiques on globalization

Bordo et al. (1999) in their comparison of trade, finance and economic integration today and pre-1914 conclude that commercial and financial integration before the First World War was more limited but trade tensions and financial instability have not worsened in recent years; institutional innovations and their stabilizing role explain this. However, the threats are real and pressing especially for smaller, more open and lower-income countries. In a critical paper Sutcliffe and Glyn (1999) find globalization widely misinterpreted and its quantitative extent and novelty exaggerated. They criticize the research on the basis of the use of inappropriate statistical measures, conclusions drawn from limited data, failure to make historical comparisons and to see counter-globalization tendencies. Analysis based on trade, direct investment, multinational corporations' activities, and national and global production volumes suggests that globalization is neither new nor so great as is often supposed.

Recent literature on economic geography considers globalization as the catalyst for structural change (Peri, 2002). Decrease in transport costs trigger the emergence of agglomeration economies that generate increasing returns by factor relocation, concentration of production in one sector, or in one location, as a source of within country inequality. Transportation plays a dualistic role as a pro-active agent of globalization and as a beneficiary of its development. However, regional inequalities in accessibility, standardization and multi-modal transport and governance of global transportation limits globalization opportunities (Janelle and Beuthe, 1997). The growth of the information technology service sector (Zagler, 2002) and reduced manufacturing sector in the new economy also affect productivity growth, and inequality within and between countries. Pieterse (2000) argues that globalization involves a trend towards human integration, but that this is a long-term, uneven and paradoxical process. In global human integration, widening human cooperation and deepening inequality go together. Ravallion (2003) offers a non-technical commentary of the conceptual and methodological differences underlying the debate on globalization. In line with Sen (2002) the concern is continuing deprivation and rising disparity in standards of living. Ravallion suggests that before quantification of the effects one must first be clear about the concept to be measured and the choice of measurement. The conceptual differences carry considerable weight for the position one takes in the debate. Lack of distinction between inequality between and within countries, differences in underlying assumptions made in measurement, and data are among the sources of conflicting claims.

In studying the link between the type of export and inequality Calderón and Chong (2001) find that primary export countries, of which most are developing ones, are associated with an increase in inequality, while manufacturing exporters, of which most are developed, are linked with decreasing inequality. Despite increasing inequality, Mayer (2001) finds that globalization has improved access to new technologies and provides unique opportunities for poor countries to raise their incomes, however countries differ in technology upgrading and skill accumulation of their domestic labour force (see also Meyer, 1999).

Summary

Theoretical research on the link between globalization and world inequality and channels through which it affects inequality, are intense. Three main approaches are distinguished. The neoclassical growth theory predicts convergence because of increased mobility of capital. The endogenous growth theory predicts less convergence or divergence because of increasing returns to technological innovation in developed countries. The dependency approach predicts that divergence is more likely because of differentials in benefits from economic integration and trade and a locked production structure in less developed countries. Based on Luxembourg Income Study (LIS) data there is little evidence of a systematic relationship between three modes of globalization namely trade, foreign direct investment (FDI) and financial openness, and either the distribution of disposable income or earnings of households. Integration into the world economy does not lead to inegalitarian distribution of income or earnings across entire economies. Globalization has increased between-country inequality, but it does not explain the long-term rise in world income inequality. Inequality is lower under integration than segmentation. The within-country distributive outcome can not fully be linked to globalization. Rising within-country inequality can be explained by the countries' inferior education, chaotic institutions, poor governments and non-democratic domestic (re)distributive politics.

3   A composite globalization index

Creation of a comprehensive globalization database and construction of a composite and decomposable index of globalization is an important research issue.

3.1 The Kearney index

Kearney (2002, 2003) is the first attempt to construct a database and to compute a composite globalization index. The index is a simple combination of forces driving the integration of ideas, people, and economies worldwide. It is composed of four major components: economic integration, personal contact, technology, and political engagement, each generated from a number of determinant variables. The total number of variables used in the computation of the globalization index is 13.[4]

The index quantifies economic integration by combining data on four key variables namely trade, foreign direct investment, portfolio capital flows, and income payments and receipts. It gauges technological connection by accounting for internet users, internet hosts, and secure servers. The index assesses political engagement by taking stock of the number of international organizations and UN Security Council missions in which each country participates and the number of foreign embassies that each country hosts. Personal contact is charted by looking at international travel and tourism,

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[4]   The total number of variables is 36 including year of observation, country, and country codes. The remaining variables reflect the direction of trade, FDI, travel, portfolio investment, and international calls.

12

international telephone traffic, and across-borders money transfers. The globalization index (GINDEX) is based on normalization of individual variables and subsequent aggregation using an ad hoc weighting system as follows:

$$GINDEX_{it} = \sum_{j=1}^{J} \omega_j \left(\sum_{m=1}^{M} \omega_m \left(\frac{X_{jmit} - X_{jmt}^{\min}}{X_{jmt}^{\max} - X_{jmt}^{\min}} \right) \right) \tag{1}$$

where i and t indicate country and time periods, m and j are within and between major component variables, ω_m are the weights attached to each contributing X-variable within a component, ω_j are weights attached to each component, min and max are minimum and maximum values of respective variables across countries in a given year. The index is similar to a commonly used Human Development Index (HDI). The HDI is based on educational attainment, life expectancy and real GDP per capita.[5]

3.2 The principal component index

In calculation of the Kearney (2002, 2003) globalization index, the component's weights are chosen on an ad hoc basis. We consider this index a basic or benchmark index. In the basic index each of the 13 determinants of the index are given equal weight (w=1). In the alternative case, a number of variables were given double weights (w=2). Ideally the weights should differ by countries and over time.

An alternative approach could be to use principal component (PC) or factor analysis to compute an index of globalization. In this paper we adopt the principal component approach. PC analysis is a multivariate technique for examining relationships among several quantitative variables. It was originated by Pearson (1901) and further developed by Hotelling (1933). PC analysis has been used in many areas such as the computation of an environmental index (Kang, 2002). Recently, Agénor (2003) used trade and financial openness to compute a simple globalization index based on PC analysis.

Given a dataset with p numeric variables, at most p principal components can be computed; each is a linear combination of the original variables with coefficients equal to the eigenvectors of the correlation of the covariance matrix. The eigenvectors are taken with unit length. The principal components are sorted by descending order of the eigenvalues, which are equal to the variance of the components. The first (last) component has the largest (smallest) variance of any unit length linear combination of the determinant variables. This method gives a least square solution to the following model:

$$Y_{it} = X_{1it}\beta_1 + X_{2it}\beta_2 + ... + X_{Jit}\beta_J + e_{it} \tag{2}$$

where X is the matrix of J (j = 1, 2, …, J) factor scores, β_j is the factor pattern and e residuals. Here we minimize the sum of all the squared residuals, distances from the point to the first principal axis. In the least squares case the vertical distance to the fitted line is minimized.

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[5] For a review of the HDI, its components, criticisms on the index, alternative indices and suggestions for some improvements, see Noorbakhsh (1998).

The two globalization indices indicate which countries have become most globalized and quantifies the state of inequality in globalization among countries and regions. It shows how globalization has developed for different countries and regions over time. A breakdown of the index into major components provides possibilities to identify sources of globalization. It is valuable to associate this information with economic policy measures to bring about desirable changes in national and international policies. The indices as shown later can also be used to study the causal relationship between globalization, inequality, growth and a number of other (macroeconomic) variables frequently found in the literature like poverty, openness, wages, and liberalization.

4   The data

The database created by Kearney/Foreign Policy magazine (2002, 2003)[6] is unique and the first of this kind to serve as a basis for computation of a globalization index. This data is a small balanced panel covering 62 countries observed for the period 1995-2001, and was originally collected from national sources and international organizations and financial institutions such as the World Bank, International Monetary Fund (IMF) and the International Telecommunication Union (ITU). Several variables were normalized by the source prior to their receipt. Kearney fills gaps in the data from other sources like the Economist Intelligence Unit (EIU) and Netcraft.com (for example, all data on Taiwan is obtained from the EIU).

The data variables on economic integration, personal contacts, technology, political engagement and supplemental data are expected to proxy the channels through which globalization affects world inequality. As indicated earlier these channels are identified by commodity price equalization, factor price convergence and dynamic convergence in per capita income growth towards the steady state.

The data on economic integration consists of four variables: trade, foreign direct investment, portfolio capital flows, and income payments and receipts. The data originates from the IMF and International Financial Statistics (IFS) database. All four variables are given as a share of GDP. The trade variable includes total trade and is measured as the sum of goods (imported and exported) and services (credits and debits). FDI is measured as an aggregate of in- and outflows of FDI. Portfolio flows is measured as the sum of portfolio inflows and outflows. The last variable, income payments and receipts, includes the compensation of non-resident employees and income earned and paid on assets held abroad.

The second component on personal contact consists of three variables: international telephone traffic, international travel and tourism, and transfer payments and receipts. The telephone traffic variable is defined as per capita sum of incoming and outgoing calls. It is obtained from the ITU and the World Telecommunication Indicators database. The travel and tourism variable is defined as the sum of travellers in and out from a country as a share of its population. It originates from the World Development Indicators and the

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6   The data sources are available at web sites: www.foreignpolicy.com and www.atkearney.com.

World Tourism Organization. The receipts of transfers and payments are obtained from the IMF and is measured as the sum of in- and out-transfer payments as a share of GDP.

The technology component builds on three variables: internet users, internet hosts and secure internet servers. This component is very much internet specific and not reflecting technology in a broad meaning. The first two variables are obtained from the ITU and World Telecommunication Indicators database, while data on secure internet servers are obtained from Netcraft.com surveys. The internet user variable is measured as a share of population, while internet hosts and secured servers are measured per capita.

The last component, political engagement, is based on three variables including the number of embassies in the country, number of memberships in international organizations, and number of UN Security Council missions undertaken during a calendar year. These are obtained from the Europe World Yearbook, Central Intelligence Agency and various UN sources. Similar to the technology component, the political component is to be considered a poor proxy of political perspectives of globalization.

The supplementary data on population and GDP are taken from the World Development Indicators and the US Census Bureau, International database. A summary statistics of the variables is given in Table 1.

From Table 1 we observe large variations among variables underlying the calculation of the index and its components. The distribution of the index components is not uniform. This is particularly evident in the case of the technology component a with large dispersion and with the sample mean significantly higher than the median. In the case of the political component the mean and median values overlap. The range of principal-component-based index differs from those of Kearney-based weighted and unweighted indices.

Correlation coefficients among various index components are presented in Table 2. As expected, the various components are positively and mostly significantly correlated among themselves. The economic integration component is negatively correlated over time, while technology is positively correlated with time. The remaining personal and political components as well as the two weighted and unweighted globalization indices are not correlated with time. Application of different weights does not change the rank of the countries much. The overall index is much dominated by political and economic integration.[7]

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7 Personal and technology variables are very likely to cause the economic component. Alternative combinations of the factors into economic and non-economic components should be possible. Investigation of the nature of their causality relationship is outside the scope of this study.

5   Variations in the globalization index

5.1 Country heterogeneity in globalization

Using the formula in equations (1) and (2), the two globalization indices are computed for each of the 62 countries and for six years of observation. Following Kearney's approach a number of economic, personal and technology factors are given higher weights than others (see Table 1). The countries are ranked by the heterogeneously weighted index in descending order. For matters of sensitivity analysis the Kearney index as a benchmark model is computed with equal weights as well. In order to conserve space we have reported the mean of the three indices by country together with the mean Gini and most recent years of Gini coefficient in Table 3A.

The results show that Iran, Peru, Ukraine, Colombia and Uganda are ranked as the least globalized countries compared to Ireland, Singapore, Switzerland, Sweden and Canada, which rank as the five most globalized countries. Croatia, Egypt and Nigeria are among the average globalized countries. Iran's low rank is due to the consequences of the long period of engagement in war with Iraq and the ongoing economic embargo, resulting in a low economic, personal and technology components contributions to the overall index. Internal and external conflicts seem to effectively reduce countries' globalization process. Taiwan is ranked as the 55th globalized country despite its high economic development. The low rank is due to political and personal factors with limited possibilities for the country to control. The high ranked countries share similar patterns in the various components distribution. Minor deviations are the low economic factor in the case of Canada and low political factor in the case of Singapore. Several exceptions can be found, such as the Russian Federation. Russia is allocated a very high political factor which is crucial for its rank (30) and France ranked as 14 has also the highest political factor. The same is true in the case of China which despite its participation in Security Council missions and a high number of embassies around the world ranked only 42. The weighted index values decomposed by underlying components and by country are reported in Figure 1.

Unlike the Kearney-based indices the principal-component-based index is positively correlated (0.29) over time. It is highly correlated with weighted technological (0.73) and personal (0.72) components and with the other two Kearney unweighted (0.88) and weighted (0.88) indices. For details see Table 2 and Figure 2.[8]

The rank of countries by degree of globalization changes somewhat based on the method of principal component analysis (Table 3A). Among the 10 most globalized countries Canada 5 (6) and the Netherlands 6 (5) swap positions. The same applies to Norway 7 (8) and the US 8 (7). The number after the countries indicates their positions based on the Kearney weighted index, while the number in parenthesis indicates positions based on the PC index. The transition of the least globalized countries is

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[8] For the principal component analysis we identified three eigenvalues exceeding one; 4.5862, 2.6419 and 1.3622. The proportion of the total variance explained by these principal components are: 0.3528, 0.2032 and 0.1048. The cumulative proportion of total variance explained is 0.6608. In order to conserve space the results from principal component analysis for each component are not reported here separately. Those can be obtained from the author upon request.

somewhat higher than that of the most globalized ones. Ideally one should report the transition steps over time for the selected index in a form of transition matrix. Later we will discuss changes in the indices over time. Here the focus is on comparing mean ranks of different indices.

5.2 Regional heterogeneity in globalization

The mean globalization by regions is presented in Table 3B. The ranking of regions differs depending on whether identical or different weighting system is applied. As a result of attaching a higher weight to the technology factor, sub-Saharan Africa, with relative low technology component, switches its position with East Asia to a lower rank. Based on equal weights, the South Asian region is identified as the least globalized region. The low level of globalization is very much determined by the absence of the technology factor. This picture is shared with the sub-Saharan African region.

The ranking based on the principal component analysis is similar to that of the Kearney-based weighted index. An exception is the swap position between the Middle East and North Africa (-0.569) and Latin American (-0.438) regions.

The Latin America and Middle East and North Africa regions are allocated a medium average level of globalization. However, they differ by index components. For instance, Latin America is advantageous in economic integration, while the Middle East and North Africa enjoy better personal contacts and higher technology transfers. In terms of political engagements they share, however, a very close position.

The East Asian region shows a high economic integration and technology transfer, but globalization is found to be limited by relatively low personal contacts and political engagements. The East European region is showing progress in all four factors, but yet have low technology transfer. They have not been able to attract foreign investors or benefits from the relocation of plants and production in response to their low wages despite a relatively highly educated labour force.

The West European and South East Asian regions take the positions of the highest globalized economic and geographic regions. The economic integration component for the South East Asian region is higher, while the remaining three (in particular technology and political) components are higher in West European. The South East Asian countries differ by the degree of globalization; the index for Singapore is four times that of Thailand caused mainly by the economic integration component. A similar large dispersion is found among countries in the West European region,[9] where Ireland receives a score that is 10 times higher than that of the lowest ranked Greece. Surprisingly Japan is placed next lowest. Its score is determined by the low levels of economic integration and personal components.

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[9] In order to reduce the number of regions to a manageable level given the small sample size, Australia, Japan, USA, and Canada are included as part of the West European region.

5.3 The development of globalization over time

Based on individual country and time-varying index observations we have computed the mean index and its components for each year of observation from 1995 to 2000. These are reported in Table 3C and Figure 3. Ideally this should be weighted by the countries' share of aggregate GDP (or population) to provide a more accurate picture of the temporal changes in the global globalization process and the changes from the selected index be shown in a transition matrix. Despite the weighting limitation and the short period of observation it yet provides a partial picture of the development and distribution of the globalization index. In terms of total GDP produced, size of population and total trade, the included countries provide a satisfactory coverage of globalization. Major economies and countries are included in the relatively small sample.

The unweighted economic integration component increased during 1995 to 1997 from 0.73 to 0.86. It declined sharply to 0.60 in 1998 and remained below this level until 2000. The PC index continuously increased over time, and is to be preferred as it is not restricted by assumption of the same weights or different weights chosen arbitrarily; personal contact picks up in 1999. It varies in the interval 0.50 and 0.61 with no systematic trend. The technology component continuously increased from 0.27 to 0.44. The political component is constant over time and as expected does not change over a short period.

The unweighted aggregated four components increased between 1995 and 1997. They declined in 1998 and remained at the low level. The time pattern of the index is largely influenced by economic integration. Similar patterns are found when economic integration, personal contact and technology transfer sub-components are given different weights.

The average annual changes in the index components and composite indices reported in Table 3D confirm the discussion about temporal development of the variables. However, the mean percentage annual changes calculated for each country and over time are much higher than the percentage changes calculated based on annual means. In the latter case the variations among countries are neglected. The neglected between country variation is quite high as a share of the total variation. The presence of extreme observations[10] increases the percentage changes and the discrepancy between the two measures. Due to the increasing patterns of the principal component index over time, its per cent changes over time are all positive. The highest rates are found in 1995/96 and 1997/98.

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[10] Outlier or extreme observations include some transition countries (Czech Republic), countries engaged in war (Iran) or countries with unstable economies (Turkey).

6 The link between globalization and income inequality

Income inequality from a country perspective may depend on a number of internal and external factors. Globalization is one main external factor.

6.1 Specification of the relationship

The link between globalization, income inequality and growth has for years been the focus of much researcher attention.[11] However, with the exception of a partial view in studies like Mahler (2001) and Agénor (2003) who looked at the relationship between inequality and the main modes of globalization (trade, FDI and financial openness), the lack of a globalization index has not allowed statistical estimation and testing of the relationship. In this section we aim to address this by the means of simple regression analysis. The model is written as:

$$GINI_i = \beta_0 + \beta_1 GINDEX_i + \sum_{j=1}^{J} \gamma_j REGION_{ji} + u_i \qquad (3)$$

where *GINI* and *GINDEX* refer to the Gini coefficient and globalization index, *REGION* is a *J* vector of regional dummies, *u* an error term and the subscript *i* refers to a country. Since the two datasets, Kearney and WIID, do not overlap we were forced as a second best alternative to use a cross sectional approach in establishing the relationship. The Kearney database covers the period 1995-2000, while the WIID covers the period before 1998. The former is a balanced panel data of 62 countries, while in the latter 146 countries are observed non-consecutively on an irregular basis. With the exception of a number of industrialized countries the WIID sample countries are observed with long interruption in the individual country time series.

The Gini coefficient is a standard measure of income inequality. It is given as a means of multiple observations for a given country in a given year. The multiplicity of observations is due to the different definitions of income, area coverage and units of measurement. It is defined here in two different ways. First, the most recent observation (often 1996 to 1998) is used in the cross sectional regression analysis. A number of countries (16) are observed prior to 1995. The second definition is used to avoid non-overlapping inequality and WIID datasets and averaging out possible measurement errors. Here instead of the last year of observation we use the mean Gini by country for all years a country is observed as part of the WIID database. The degree of over- and underestimation of income inequality due to trends in individual countries' inequality over the period is against the use of this approach.[12]

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[11] This study is limited to the relationship between inequality and globalization. However, the model can be extended to incorporate the simultaneous inequality-growth-globalization relationship.

[12] A third possible measure could be a population-weighted measure of inequality. In such a case all variations among countries are eliminated. There is no use of such adjustment in cross sectional analysis. The adjustment of Gini is based on the country's share of total population of all countries observed in a given year. Non-consecutive observation of countries with extremely large populations makes the aggregate population fluctuate largely making the population adjustment not accurate or probably less meaningful.

The globalization index is defined in three different ways: the unweighted and weighted Kearney-based indices and the PC index. In the unweighted case all 13 underlying factors are given identical weights ($w=1$). The assumptions of equal weights are very strong and have major implications for the index, its interpretation and the ranking of countries. In order to avoid the assumption of equal weights, a number of factors on an ad hoc basis are given double weights ($w=2$). Here we follow Kearney's approach. The factors include foreign direct investment, portfolio investment, international telephone traffic and internet users. The principal component index is based on the first principal component of the same 13 factors. It varies across countries and over time.

Since we use cross sectional regression analysis, it has not been possible to identify unobservable country specific effects. However, in addition to the globalization index we have added a number of dummy variables representing unobservable regional effects.[13] These capture regional heterogeneity in income inequality. If income inequality differs systematically among the regions or is affected differently as a consequence of globalization, the dummies will pick up such effects. We observe similar patterns regardless of the type of globalization index and whether any weights are used or not. Correlation among the inequality and globalization indices are reported in Table 4.

6.2 The empirical relationship

The estimation results from a regression of the Gini coefficient on the globalization index, when Gini is defined as the most recent year of observation, are reported in Table 5A. Results based on an alternative definition where Gini is defined as mean income inequality over time are reported in Table 5B. The Gini data are taken from the WIID database. Regression results from the three Gini measures on principal component measure of globalization are presented in Table 5C.

For sensitivity analysis, a number of alternative specifications of the simple relationship (equation 3) are estimated. In the basic model in Table 5A (Model A1) variations in income inequality are explained by an aggregate unweighted globalization index. The coefficient is negative and statistically highly significant; it indicates a negative relationship between the level of globalization and income inequality. However, due to the cross-sectional nature of the sample it does not show how globalization as a process affects inequality among countries. The same relationship applies when globalization is differently weighted (Model A9). The inclusion of the squared globalization indices in Models A1 and A9 were insignificant indicating absence of Kuznets U-shaped relationship between inequality and globalization, based on the current sample. F-test values indicate that an aggregate globalization index is a relevant explanatory variable. However, globalization explains only 11 per cent of the variations in income inequality among the 60 countries.[14] This is in the line with Lindert and Williamson (2001) who

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[13] The countries are grouped into the following eight regions: Middle East and North Africa, East Asia, South East Asia, South Asia, Latin America, sub-Saharan Africa, East Europe and former Soviet republics and West Europe. The latter with minor exceptions is equivalent to the OECD. See also note 9.

[14] The income inequality variable for South Africa and Morocco is missing. These two countries are excluded from the regression analysis.

found the net impact of globalization too small to explain the long-term rise in world inequality.

A decomposition of the composite globalization index into its four (*m*) sub-components results in the following model formulation:

$$GINI_i = \beta_0 + \sum_{m=1}^{M} \beta_m GINDEX_{mi} + \sum_{j=1}^{J} \gamma_j REGION_{ji} + u_i. \qquad (4)$$

The results (Models A2 to A5) show that economic integration and political engagement do not individually explain any of the variations in income inequality.[15] However, simultaneous inclusion of the four components (Model A6) indicates that personal contacts and technology transfers reduce inequality, while economic integration increases inequality. Political engagement is found to have no significant effect. Personal contact is the single component contributing most to the explanation of inequality variations. Economic integration and personal contacts are correlated (Table 4) causing difficulties in separating the two effects.

To control for regional heterogeneity we added a number of regional dummies. Accounting for regional heterogeneity (Model A7) captures most variations in inequality among the countries. The explanatory power of the model increases from 0.11 to 0.64. Similar results are obtained when the globalization index is weighted (Model A10), but the coefficient of determination increases to 0.69. However, the globalization index turns out to be insignificant. Inferior education, chaotic institutions, poor government and non-democracy could be the main sources of inequality, rather than globalization (Lindert and Williamson, 2001). It should be noted that there is a risk that regional (effects) inequality and globalization are correlated biasing the effects of globalization on income inequality.

A further decomposition of the globalization index by its components (Model A8) shows that personal contact is a main contributing factor to the negative relationship. In a cross sectional case it is difficult to separate the effects of globalization from regional specific effects not necessarily associated with the inequality impacts of the globalization process. A possible solution to the confounded effects could be the use of panel data to better be able to separate time and regional invariant and time and regional variant effects from each other.

Regression results corresponding to Models A1 to A8, based on alternative definitions of inequality, where mean Gini over time is used, are reported in Table 5B and labelled as Models B1 to B8. The signs of coefficients are not changed. However, their significance and sizes in a number of cases are changed. The regional variables play an even more important role in the explanation of variation in inequality.

Regression results on the link between income inequality defined in two different ways and globalization computed using principal component method are presented in Table 5C. As in the previous cases the results indicate a negative relationship between globalization and income inequality. The squared globalization index is positive

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[15] Agénor (2003) found a significant inverted U-shape relationship between globalization and poverty. The index of globalization was based on trade and financial integration. The index is similar to our economic integration component.

(Models C2 and C5) indicating a U-shaped or declining negative relationship. The fit of the model is somewhat lower compared to the two Kearney indices. Here we cannot show differences in the direction of the impacts from a decomposition of the index into its four underlying components as the index is obtained from a simultaneous analysis of all 13 factors. Adding regional dummies to the relation produces similar results in terms of signs, significance and the size of effects. Again the globalization index turns out to be insignificant when regional dummies are added.

Our results are in line with Mahler (2001) who using LIS data found little evidence of a systematic relationship between the three main modes of economic globalization namely trade, outbound investment and financial openness and either the distribution of disposable personal income or earnings of households. The overall conclusion is that economic integration does not systematically lead to increased income inequality across entire economies. The relationship between globalization and fiscal redistribution must be established and modelled to make such an inference. Economic policy at country level continues to play an important role in redistributive outcomes. As noted by Lindert and Williamson (2001), increased world income inequality has been driven by between-nations inequality rather than within-country inequality.

6.3 Guidelines to possible extensions

It is to be noted that the results presented here are to be considered as primary and tentative. The results provide some initial support to the hypothesis of the existence of a (negative) relationship between inequality and globalization but several essential improvements are still necessary to confirm this finding.

The index should take an axiomatic approach that sets out its desirable properties and provide a family of indexes that fulfil such properties. The first improvement should be the globalization index itself and identification of the key dimensions; in its current form it is just a partial index. The index should fully quantify globalization, in addition to economic integration, personal contact, political engagement and technology transfer, it should incorporate several other relevant components. These could include some measure of cost-benefit ratio (analysis) of both micro and macro aspects of globalization effects, impacts on standards of living, environmental aspects, wage inequality, skill biased technological change, foreign trade volume and its direction, democracy and conflict, financial markets, access to information and information flow and the directions of movement of skilled labour between countries.

A specification, though based on a complete and representative index, still suffers from a number of problems like the direction of causality, simultaneity and bias due to omitted variables. Testing for poolability of the data and application of switching and non-linear regressions would be desirable to group countries into different classes of globalization levels. Industrialized countries dominate the current sample, with different relationships between development, redistribution and inequality. The switching regression is important to account for differences in responsiveness by level of development, as there is indication that globalization enriches rich countries, at the expense of poor countries. Additional tests will have to focus in particular on: tackling the simultaneity problem and to control for growth issues as well as other components left out of the globalization index. Non-linearity would also shed more light on the

Kuznets inverted U-hypothesis about the inequality-growth relationship conditional on globalization or the inequality-globalization relationship.

The sample of countries should be expanded to include more developing and transition countries and ideally panel data static and dynamic estimation approaches could be used. This would enable researchers to control for unobservable country specific effects and to model the temporal patterns of key variables like inequality, growth and globalization, country-specific rate of (skill-biased) rate of technological change. Access to panel data would also enable identification of globalization effects by performance comparison of countries over time, before and after globalization and by the use of matching techniques. This would provide valuable information on globalization, its consequences and redistributive policies to counteract the negative impacts.

Quantification of globalization is a new field and quite scarce. There is need to account for several dimensions and identify new ones as well as to test for their relevance in computation of an index of globalization. Measurement issues play an important role in empirical research, and a new index would differ from the ones presented above in a number of ways. First, it would incorporate more components and be modelled non-parametrically as well as parametrically where the weights are estimated rather than chosen on an ad hoc basis. Second, it would compute disaggregated principal component analysis and allow for time variation. Third, the index should be designed in such a way that it can further be used for international, regional, and within-region comparisons and in the evaluation of the impact of globalization on the welfare of nations and sub-groups of a population within countries and regions. Fourth, one should perform sensitivity analysis of the composite index by examining functional forms and assessment and consistency of weights. These are important issues in the understanding of how globalization functions and as a guide to policy formulation and evaluation.

An identification of major determinants of globalization, quantification of their effects on the ranking of countries are key issues based on which policy options could be provided. Since rich countries benefit most from the fruits of globalization, developing countries need advantageous and non-protectionistic policies to effectively compete. Analysis will help in identifying ways for a fair treatment of products, services and people that enables poor countries to benefit from globalization to a greater extent.

This new database could serve as a source for researchers conducting empirical research on globalization and its relation with other macro variables such as inequality in wages, income or health, poverty and economic growth. The modified composite globalization index will differ from the one above by incorporating more components like financial markets, institutions, environment, democracy and conflict and be modelled non-parametrically as well as parametrically where the weights are estimated rather than chosen on an ad hoc basis. This will improve analysis of the determinants of globalization by paying more attention to measurement problems, data issues and data sources.

7 Summary and conclusions

This study addresses the globalization index introduced by Kearney that quantifies the level and development of the globalization process to rank countries. The index is composed of four main components: economic integration, personal contact, technology, and political engagements, each developing differently over time.

The results show that internal and external conflicts seem to effectively reduce countries' globalization prospects. The low rank of countries is often associated with political and personal factors that several developing countries are unable to address. The high ranked countries share similar patterns in various component distributions. The mean globalization by region shows that technology factors play an important role in the ranking of regions. This breakdown of the index into major components provides possibilities to identify sources of globalization and associate it with economic policy measures to bring about desirable changes in national and international policies.

In a regression analysis we investigate the relationship between inequality and globalization. Results show that the globalization index explains only 7-11 per cent of the variations in income inequality among the countries. By decomposing the aggregate globalization index into four sub-components, results show that personal contacts and technology transfers reduce inequality, while economic integration increases inequality. Political engagement is found to have no significant effects on income inequality. When controlling for regional heterogeneity, we find that the regional variable plays an important role in the explanation of a variation in inequality.

Although the current version of the index quantifies the level of globalization it has certain limitations and the results should be interpreted with caution; it is to be considered as a simple and partial measure. We have addressed a number of extensions to overcome several of the shortcomings, which concern an axiomatic approach to set out the desirable properties of the index, identification and incorporation of more dimensions or components and the use of non-parametric and a parametric estimation of the index to avoid the choice of weights attached to each index component on an ad hoc basis. The use of panel data will certainly shed light on the temporal patterns of globalization and its regional variability. These are important issues in understanding how globalization functions and how to use the generated information in policy formulation and development evaluations.

In view of this, it must be noted that the simpler approach adopted here was mainly due to problems of data availability and difficulties in the interpretation of the results of a more complex specification. Globalization is considered a possible source and deriving force of inequality differences across countries and over time. Identification and quantification of its effects will have value to policy-makers' resource allocation. This research not only measures but also empirically links globalization to inequality. It is in an early stage of development but has identified several directions along which future advances can be made.

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Table 1. Summary statistics, globalization data, 1995-2000, NT=62x6=372 observations

Variable	Mean	Median	Std Dev	Minimum	Maximum
A. Economic integration					
Trade	0.7774	0.6750	0.5053	0.1570	3.4750
Foreign direct investment (w=2)	0.0426	0.0285	0.0501	0.0000	0.3307
Portfolio investment (w=2)	0.0575	0.0229	0.1498	0.0000	1.6693
Income payments and receipts	0.0899	0.0604	0.0986	0.0055	0.7821
B. Personal contacts					
International telephone traffic (w=2)	97.4325	44.2450	128.9096	0.9000	707.4600
International travel and tourism (w=1)	0.8056	0.3480	1.0561	0.0030	6.3610
Transfer payments and receipts (w=1)	0.0335	0.0266	0.0298	0.0000	0.1504
C. Technology					
Internet users (w=2)	0.0639	0.0178	0.1011	0.0000	0.5944
Internet hosts (w=1)	0.0126	0.0016	0.0272	0.0000	0.2950
Secure internet servers (w=1)	0.0111	0.0010	0.0294	0.0000	0.2830
D. Political engagements					
Embassies in country (w=1)	71.6129	68.5000	34.1968	13.0000	172.0000
Membership in intl org. (w=1)	48.8065	47.8000	10.3816	6.0000	77.0000
Particip. in UN SC missions (w=1)	0.2512	0.2220	0.2051	0.0000	0.7780
1. Unweighted Kearney index components					
Economic integration	0.6770	0.5330	0.5850	0.0560	3.6580
Personal contacts	0.5570	0.4800	0.4270	0.0140	2.3470
Technology	0.3690	0.0880	0.5450	0.0000	2.6050
Political engagements	1.3770	1.3610	0.5400	0.0060	2.7010
Unweighted globalization index	2.9800	2.4370	1.4200	1.0690	7.9780
2. Weighted Kearney index components					
Economic integration	1.0070	0.7710	0.9130	0.0600	5.6580
Personal contacts	0.7240	0.5760	0.6160	0.0240	3.2780
Technology	0.5370	0.1480	0.7620	0.0000	3.2090
Weighted globalization index	3.6460	2.8250	2.0350	1.1680	11.0550
3. Principal Component (PC) Analysis					
First PC index	0.0000	-0.4310	1.0000	-1.0290	5.2500
Second PC index	0.0000	0.0950	1.0000	-4.2790	4.5530
Third PC index	0.0000	0.0430	1.0000	-6.8100	3.7200

Source: Author's calculations.

Table 2. Pearson correlation coefficients, N = 372

	year	econom	economw	person	personw	techno	technow	politi	gindex	gindexw	princomp
year	1.0000										
economic	-0.1380	1.0000									
	0.0076										
economic_w	-0.1653	0.9886	1.0000								
	0.0014	0.0001									
personal	0.0399	0.5871	0.5589	1.0000							
	0.4423	0.0001	0.0001								
personal_w	0.0351	0.6584	0.6352	0.9756	1.0000						
	0.4992	0.0001	0.0001	0.0001							
technology	0.1150	0.2906	0.3151	0.3446	0.4524	1.0000					
	0.0265	0.0001	0.0001	0.0001	0.0001						
technology_w	0.1444	0.2991	0.3223	0.3578	0.4632	0.9927	1.0000				
	0.0053	0.0001	0.0001	0.0001	0.0001	0.0001					
political	0.0046	0.0312	0.0893	0.0243	0.0836	0.3952	0.3817	1.0000			
	0.9282	0.5475	0.0854	0.6403	0.1073	0.0001	0.0001				
gindex	0.0010	0.7119	0.7303	0.6840	0.7700	0.7576	0.7572	0.5523	1.0000		
	0.9832	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001			
gindex_w	-0.0082	0.7630	0.7852	0.6863	0.7832	0.7550	0.7607	0.4738	0.9909	1.0000	
	0.8746	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		
princomp	0.2946	0.6395	0.6420	0.6327	0.7227	0.7127	0.7283	0.3947	0.8774	0.8842	1.0000
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	

Source: Author's calculations.

Note: …_w indicates weighted index component. Principal component index (princomp) is based on the first principal component. p-values are given under the coefficients.

Table 3A Globalization index by country, ranked by weighted index (gindexw)

Rank	country	econom	econow	person	persow	techno	technw	politi	gindex	gindexw	pccomp	pcrank	gini	mgini
1	Ireland	2.477	3.615	1.899	2.738	0.560	0.779	1.510	6.446	8.643	2.697	1	36.96	36.80
2	Singapore	2.729	3.947	1.551	2.530	0.920	1.365	0.734	5.935	8.575	2.152	2	38.11	42.49
3	Switzerland	1.545	2.432	1.746	2.677	0.999	1.339	1.689	5.979	8.137	2.022	3	33.10	33.20
4	Sweden	1.444	2.394	0.900	1.310	1.346	2.059	2.178	5.868	7.941	1.706	4	33.66	38.14
5	Canada	0.872	1.348	0.825	1.361	1.467	2.027	2.434	5.598	7.170	1.428	6	30.05	30.83
6	Netherlands	1.892	3.098	0.927	1.323	0.807	1.127	1.577	5.202	7.125	1.477	5	32.20	32.10
7	Norway	0.874	1.410	0.836	1.205	1.699	2.581	1.685	5.094	6.881	1.260	8	39.42	30.74
8	US	0.436	0.750	0.275	0.486	2.400	2.973	2.531	5.641	6.739	1.362	7	40.42	38.65
9	Finland	0.790	1.253	0.731	0.991	1.752	2.524	1.818	5.091	6.586	1.231	9	31.50	29.33
10	Denmark	1.242	1.825	1.000	1.421	0.903	1.359	1.925	5.069	6.529	1.199	10	35.52	34.04
11	Austria	0.890	1.372	1.272	1.733	0.761	1.126	2.081	5.005	6.313	1.104	11	26.50	25.91
12	UK	1.265	1.924	0.545	0.875	0.736	1.050	2.181	4.727	6.030	0.983	12	37.27	30.87
13	New Zealand	0.603	0.907	0.699	1.133	1.311	1.729	1.144	3.757	4.913	0.652	13	30.33	45.61
14	France	0.683	1.131	0.479	0.708	0.302	0.473	2.564	4.028	4.875	0.574	15	32.70	38.14
15	Portugal	0.883	1.435	1.008	1.203	0.335	0.598	1.404	3.630	4.641	0.170	19	35.60	36.26
16	Germany	0.712	1.162	0.472	0.716	0.513	0.793	1.960	3.657	4.631	0.449	16	31.78	31.67
17	Australia	0.535	0.883	0.354	0.535	1.309	1.712	1.396	3.594	4.526	0.427	17	44.60	37.68
18	Czech Rep.	0.833	1.189	1.281	1.400	0.225	0.347	1.410	3.749	4.346	0.591	14	23.90	23.22
19	Italy	0.649	1.048	0.544	0.694	0.210	0.333	2.096	3.499	4.171	0.073	23	31.21	35.68
20	Spain	0.635	1.051	0.676	0.825	0.297	0.444	1.530	3.139	3.850	0.104	22	23.70	30.93
21	Malaysia	1.159	1.500	0.642	0.751	0.145	0.261	1.244	3.190	3.756	0.153	21	48.50	47.71
22	Panama	1.943	2.607	0.322	0.415	0.039	0.061	0.642	2.947	3.725	0.196	18	52.03	49.22
23	Hungary	0.898	1.320	0.690	0.794	0.165	0.253	1.283	3.036	3.650	0.154	20	25.30	24.61
24	Israel	0.547	0.757	0.999	1.306	0.536	0.739	0.764	2.847	3.566	-0.101	24	38.20	32.70
25	Poland	0.412	0.639	0.565	0.632	0.124	0.214	1.891	2.991	3.376	-0.103	25	32.70	26.60
26	Argentina	0.473	0.829	0.091	0.124	0.056	0.090	1.981	2.600	3.024	-0.286	28	46.66	51.79
27	Japan	0.284	0.419	0.073	0.119	0.549	0.906	1.496	2.403	2.940	-0.266	27	24.90	35.53
28	Greece	0.223	0.310	0.861	1.075	0.154	0.256	1.278	2.515	2.919	-0.331	29	32.70	41.56
29	Chile	0.784	1.326	0.197	0.251	0.106	0.178	1.124	2.211	2.879	-0.266	26	55.51	50.93
30	Russian Fed	0.322	0.461	0.090	0.115	0.032	0.056	2.168	2.613	2.801	-0.444	34	39.57	34.14
31	Saudi Arab-	0.518	0.737	0.959	1.065	0.009	0.018	0.979	2.464	2.799	-0.682	52	.	.
32	Nigeria	0.617	0.819	0.305	0.307	0.001	0.001	1.653	2.576	2.781	-0.410	32	50.30	43.20
33	Egypt	0.242	0.321	0.496	0.511	0.005	0.010	1.904	2.647	2.747	-0.582	43	28.90	33.72
34	Croatia	0.547	0.788	0.873	1.164	0.111	0.180	0.594	2.125	2.727	-0.421	33	30.06	25.68
35	Korea Rep.	0.478	0.730	0.258	0.313	0.322	0.597	1.058	2.116	2.698	-0.469	35	31.60	34.18
36	Botswana	0.811	0.930	1.153	1.224	0.017	0.029	0.477	2.458	2.659	-0.524	38	52.30	53.90
37	Slovenia	0.510	0.634	0.490	0.717	0.514	0.767	0.500	2.014	2.618	-0.359	30	29.69	25.66
38	Slovak Rep.	0.631	0.820	0.412	0.512	0.209	0.370	0.875	2.127	2.576	-0.376	31	23.70	21.99
39	Tunisia	0.441	0.554	0.507	0.556	0.005	0.010	1.288	2.241	2.407	-0.519	37	40.41	44.92
40	Mexico	0.550	0.835	0.235	0.314	0.041	0.068	1.122	1.947	2.340	-0.508	36	51.97	51.08
41	Pakistan	0.186	0.247	0.378	0.385	0.001	0.001	1.674	2.238	2.307	-0.675	51	31.20	34.26
42	China	0.393	0.647	0.043	0.047	0.009	0.017	1.577	2.022	2.289	-0.617	44	40.30	29.35
43	Senegal	0.350	0.456	0.535	0.555	0.003	0.006	1.263	2.151	2.279	-0.685	53	41.30	49.96
44	Venezuela	0.467	0.713	0.102	0.133	0.038	0.067	1.312	1.919	2.226	-0.528	39	47.24	42.90
45	SouthAfrica	0.507	0.844	0.123	0.155	0.145	0.230	0.985	1.759	2.215	-0.635	47	59.00	54.89
46	India	0.166	0.286	0.215	0.216	0.004	0.008	1.697	2.082	2.208	-0.667	49	35.45	34.55
47	Indonesia	0.451	0.619	0.069	0.072	0.006	0.012	1.492	2.018	2.195	-0.572	42	35.27	36.36
48	Kenya	0.196	0.209	0.495	0.500	0.003	0.005	1.459	2.153	2.173	-0.774	58	51.00	60.69
49	Philippine	0.802	1.086	0.161	0.185	0.013	0.025	0.876	1.852	2.172	-0.564	40	47.90	46.94
50	Romania	0.345	0.503	0.303	0.339	0.044	0.079	1.207	1.899	2.128	-0.624	45	36.37	26.38
51	Thailand	0.647	0.898	0.133	0.149	0.021	0.036	1.034	1.835	2.117	-0.569	41	41.75	45.03
52	Bangladesh	0.076	0.092	0.414	0.414	0.000	0.000	1.609	2.099	2.116	-0.769	57	38.80	37.68
53	Brazil	0.258	0.467	0.045	0.056	0.059	0.091	1.464	1.825	2.078	-0.629	46	58.84	54.99
54	Turkey	0.260	0.345	0.278	0.318	0.036	0.062	1.301	1.875	2.026	-0.667	50	45.62	49.21
55	Taiwan	0.530	0.740	0.372	0.502	0.427	0.725	0.010	1.339	1.977	-0.647	48	31.70	33.04
56	Sri Lanka	0.406	0.528	0.597	0.612	0.006	0.011	0.721	1.730	1.872	-0.851	59	34.40	40.40
57	Morocco	0.234	0.249	0.599	0.634	0.003	0.005	0.953	1.789	1.841	-0.863	60	.	.
58	Uganda	0.221	0.354	0.824	0.824	0.001	0.002	0.619	1.664	1.799	-0.992	62	39.20	37.19
59	Colombia	0.347	0.590	0.133	0.163	0.031	0.056	0.962	1.472	1.770	-0.732	54	57.10	51.79
60	Ukraine	0.349	0.444	0.240	0.273	0.010	0.017	1.033	1.632	1.766	-0.750	55	32.94	28.43
61	Peru	0.342	0.547	0.159	0.182	0.021	0.039	0.899	1.422	1.668	-0.754	56	49.00	49.46
62	Iran	0.085	0.087	0.049	0.057	0.002	0.005	1.055	1.191	1.203	-0.953	61	42.90	45.59

Source: Author's calculations.

Note: w at the end of a variable indicates weighted index component. The principal component index (pccomp) is based on the first principal component. Gini and mgini are the last period and mean period Gini coefficients.

Table 3B Globalization index by region, ranked by descending order of weighted globalization index

Region	Econo.	Econo. weighted	Person.	Person. weighted	Techn.	Techn. weighted	Political	GIndex	GIndex weighted	Principal Comp.
West Europe	0.947	1.488	0.806	1.156	0.921	1.309	1.824	4.497	5.778	0.916
South East Asia	1.158	1.610	0.511	0.737	0.221	0.340	1.076	2.966	3.763	0.120
East Europe	0.539	0.755	0.549	0.661	0.159	0.253	1.218	2.465	2.887	-0.259
Middle E&N Africa	0.374	0.494	0.640	0.732	0.099	0.141	1.198	2.311	2.564	-0.569
Latin America	0.645	0.989	0.161	0.205	0.049	0.081	1.188	2.043	2.464	-0.438
East Asia	0.467	0.706	0.225	0.287	0.253	0.446	0.881	1.826	2.321	-0.578
sub-Saharan Africa	0.450	0.602	0.572	0.594	0.028	0.045	1.076	2.127	2.318	-0.670
South Asia	0.184	0.248	0.331	0.337	0.003	0.005	1.351	1.868	1.941	-0.783

Table 3C Globalization index over time

Year	Econo.	Econo. weighted	Person.	Person. weighted	Techn.	Techn. weighted	Political	GIndex	GIndex weighted	Principal Comp.
1995	0.726	1.120	0.522	0.682	0.266	0.364	1.380	2.893	3.546	-0.340
1996	0.760	1.156	0.576	0.745	0.316	0.450	1.374	3.026	3.725	-0.280
1997	0.861	1.313	0.522	0.677	0.349	0.492	1.359	3.091	3.841	-0.157
1998	0.595	0.865	0.543	0.715	0.404	0.585	1.388	2.929	3.553	0.021
1999	0.545	0.762	0.612	0.790	0.441	0.662	1.380	2.978	3.595	0.235
2000	0.577	0.828	0.566	0.736	0.438	0.669	1.381	2.961	3.614	0.521

Table 3D Percentage change in globalization index over time

Year	Econo.	Econo. weighted	Person.	Person. weighted	Techn.	Techn. weighted	Political	GIndex	GIndex weighted	Principal Comp.
1995/1996	10.07	11.51	18.80	15.70	74.23	74.20	-0.02	5.43	6.15	45.08
1996/1997	16.93	19.52	-8.05	-8.05	32.25	27.12	-0.33	2.53	3.77	18.90
1997/1998	-28.19	-30.18	3.27	3.99	56.89	59.28	2.20	-5.23	-7.17	28.85
1998/1999	-9.41	-13.53	16.96	14.81	52.85	55.74	0.67	1.82	0.80	19.48
1999/2000	9.06	13.07	-6.79	-6.52	29.65	30.95	0.63	-0.55	0.41	19.54

Table 4. Pearson correlation coefficients, N=60-62

	gini	mgini	econom	person	techno	politi	gindex	gindexw	princomp
gini	1.0000								
mgini	0.8411	1.0000							
	0.0001								
economic	-0.0654	-0.0825	1.0000						
	0.6193	0.5306							
personal	-0.3736	-0.2981	0.6482	1.0000					
	0.0033	0.0207	0.0001						
technology	-0.2249	-0.2731	0.3658	0.3506	1.0000				
	0.0385	0.0347	0.0035	0.0052					
political	-0.2249	-0.2082	0.0392	0.0243	0.4074	1.0000			
	0.0840	0.1103	0.7620	0.8510	0.0010				
gindex	-0.3261	-0.3053	0.7294	0.6909	0.7826	0.5622	1.0000		
	0.0110	0.0177	0.0001	0.0001	0.0001	0.0001			
gindexw	-0.3141	-0.2982	0.7741	0.6989	0.7866	0.4876	0.9921	1.0000	
	0.0145	0.0206	0.0001	0.0001	0.0001	0.0001	0.0001		
princomp	-0.3024	-0.2924	0.8031	0.6894	0.7652	0.4525	0.9786	0.9899	1.0000
	0.0189	0.0234	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	

Source: Authors calculations.

Note: p-values are given under the coefficients. Gindexw indicates weighted globalization index. The principal component index (princomp) is based on the first principal component. Gini and mgini are the last period and mean period Gini coefficients.

Table 5A Least squares parameter estimates of the link between most recent years of Gini coefficient and Kearney globalization index

Explanatory variables	Unweighted globalization index								Weighted globaliz. index	
	Model A1	Model A2	Model A3	Model A4	Model A5	Model A6	Model A7	Model A8	Model A9	Model A10
Intercept	45.8642 a	37.5410 a	34.2443 a	34.8352 a	38.4699 a	33.1074 a	34.1586 a	32.4836 a	45.2898 a	39.4501 a
Log globalization index	-7.4923 a						-	-0.6478 .	-	-	-
Log global. index weighted							-	-	-	-6.9937 a	-3.4690 .
Log economic integration		-1.2966 .					5.6459 a	-	2.2652 .	-	-
Log personal contact			-4.2817 a				-4.9815 a	-	-3.4258 a	-	-
Log technology				-1.4236 a			-1.5797 a	-	0.9266 .	-	-
Log political engagement					-0.6328 .		-0.5762 .	-	0.2540 .	-	-
Middle East & North Africa							-	4.6848 .	9.2010 b	-	3.4092 .
East Asia							-	0.7517 .	-0.0385 .	-	-5.8351 .
South East Asia							-	8.7789 a	8.3152 b	-	7.5161 b
South Asia							-	2.7820 .	7.7295 c	-	0.8502 .
Latin America							-	18.5843 a	17.3636 a	-	13.2485 a
sub-Saharan Africa							-	15.1725 a	20.7833 a	-	12.7544 a
East Europe							-	-3.1218 .	-1.1671 .	-	-9.1353 a
West Europe (reference)							-	-	-	-	-
R-square adjusted	0.1119	-0.0068	0.1804	0.1026	-0.0145	0.2650	0.6381	0.6823	0.0952	0.6870
F-value	8.4300 a	0.6000 .	13.9800 a	7.6300 a	0.1500 .	6.2300 a	14.000 a	12.3200 a	7.2000 a	17.1900 a
RMSE	8.6873	9.2495	8.3457	8.8074	9.2851	7.9709	5.5458	5.2403	8.7734	5.1599
Number of observations	60	60	60	59	60	59	59	59	60	60

Source: Authors calculations.
Notes: Significant at less than 1%(a), 1-5%(b), 5-10%(c), and greater than 10%(.) level of significance. The square of weighted and unweighted globalization indices in Models A1 and A9 are insignificant indicating absence of U-shaped relationship between inequality and globalization. RMSE is root mean square error.

Table 5B Least squares parameter estimates of the periods mean Gini coefficient and Kearney unweighted globalization index

Explanatory variables	Model B1	Model B2	Model B3	Model B4	Model B5	Model B6	Model B7	Model B8
Intercept	45.3279 a	37.0677 a	35.1122 a	34.6584 a	38.4625 a	33.5454 a	40.4570 a	34.4025 a
Log globalization index	-6.9450 a					-	-3.9352 .	-
Log economic integration		-2.0444 .				3.1425 .	-	-1.6489 .
Log personal contact			-3.3687 a			-3.1366 b	-	-1.2446 .
Log technology				-1.5000 a		-1.5194 b	-	0.8357 .
Log political engagement					-0.6325 .	-0.4916 .	-	-0.5138 .
Middle East & North Africa						-	3.0800 .	6.3293 c
East Asia						-	-5.9775 .	-4.5869 .
South East Asia						-	7.0789 b	10.1603 a
South Asia						-	0.4034 .	4.7272 .
Latin America						-	12.5126 a	15.0133 a
sub-Saharan Africa						-	12.5341 a	17.5498 a
East Europe						-	-10.7333 a	-8.2671 a
West Europe (reference)						-	-	-
R-square adjusted	0.0918	0.0082	0.1023	0.1128	-0.0146	0.1427	0.7129	0.7118
F-value	6.9600 a	1.4900 .	7.7200 a	8.3700 a	0.1500 .	3.4100 b	19.3200 a	14.0200 a
RMSE	8.8877	9.2877	8.8363	8.8593	9.3939	8.7086	4.9966	5.0492
Number of observations	60	60	60	59	60	59	59	59

Source: Author's calculations.

Notes: Significant at less than 1%(a), 1-5%(b), 5-10%(c), and greater than 10%(.) level of significance. The square of the unweighted globalization index in Model B1 is insignificant indicating absence of U-shaped relationship between inequality and globalization. RMSE is root mean square error.

Table 5C Least squares parameter estimates of the link between the Gini and principal component globalization indices

Explanatory variables	Dep. variable is Last year Gini			Dep. variable is period mean Gini		
	Model C1	Model C2	Model C3	Model C4	Model C5	Model C6
Intercept	38.4299 a	36.6807 a	32.9729 a	38.4209 a	36.4696 a	35.8406 a
Principal component globalization index	-3.1456 b	-5.6839 a	0.2568 .	-3.0770 b	-5.9084 a	-1.2632 .
Squared principal comp. global. Index	-	2.3479 c	-	-	2.6190 c	-
Middle East & North Africa	-	-	5.4308 .	-	-	3.7066 .
East Asia	-	-	1.7087 .	-	-	-4.3802 .
South East Asia	-	-	9.3033 a	-	-	8.0168 a
South Asia	-	-	3.7795 .	-	-	1.6664 .
Latin America	-	-	19.4381 a	-	-	13.8757 a
sub-Saharan Africa	-	-	16.0495 a	-	-	13.2845 a
East Europe	-	-	-2.4331 .	-	-	-9.8667 a
West Europe (reference)	-	-	-	-	-	-
R-square adjusted	0.0758	0.1030	0.6380	0.0697	0.1063	0.7053
F-value	5.8400 b	5.3900 b	14.0000 a	5.4200 b	4.5100 b	18.6500 a
RMSE	8.8622	8.7305	5.5466	8.9951	8.9951	5.0630
Number of observations	60	60	60	60	60	60

Source: Authors calculations.

Note: Significant at less than 1%(a), 1-5%(b), 5-10%(c), and greater than 10%(.) level of significance.

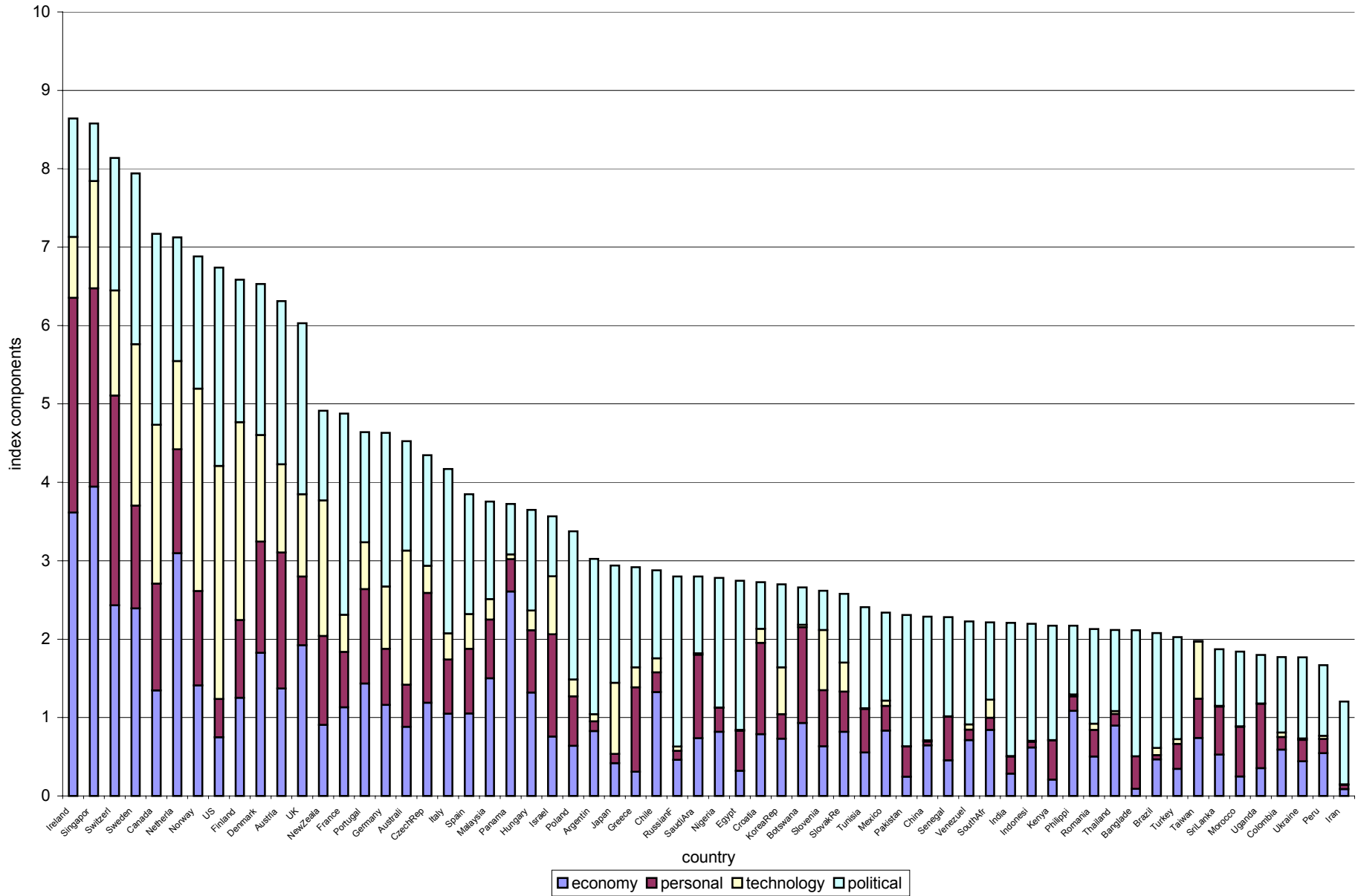Figure 1. Decomposition of weighted globalization index by country
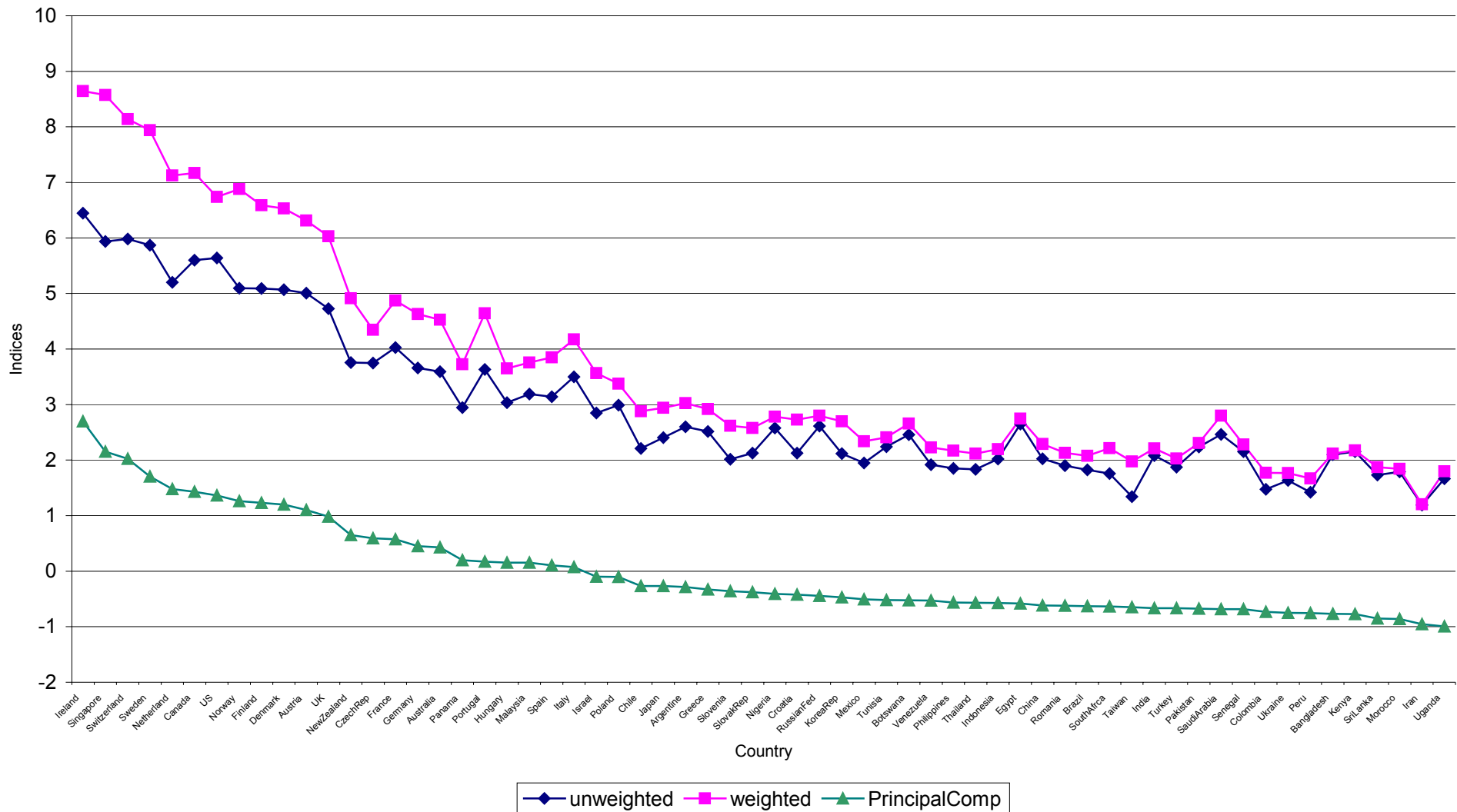
Figure 2. Globalization indices by country

Figure 3. Development of globalization over time