Assessing Measures of Financial Openness and Integration

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Researchers have available to them numerous indicators of financial openness and integration, many of which have yielded substantially differing results in past research, for example, on the relationship of financial openness or integration with economic growth. This article reviews the main indicators and finds that de jure vs. de facto indicators yield systematically different growth results. Among de jure indicators, sample differences account for much of the variation in growth results, with a weaker impact found in more recent data and among advanced economies. It also finds that many indicators capture different and useful facets of financial openness, such as intensive vs. extensive measures, and de facto vs. de jure. A small minority of indices suffer weaknesses that make them not useful for rigorous economic analysis, most notably the Investment Freedom Index by the Heritage Foundation. [JEL F2, F36, F59]

The value of the stocks of cross-border financial assets and liabilities of the average economy has grown to exceed by a substantial margin the value of domestic production in most countries. The incentives for better understanding the economic effects of financial openness and integration are therefore significant, as financial openness and integration create an increasingly complex terrain for policymakers. Policymakers in this environment must strike a balance between the impact of capital account regulations on macro-financial stability and growth, as well as between access to risk-sharing and heightened exposure to financial volatility and contagion.[1] Making a quantitative assessment of the effects of financial globalization on various economic outcomes requires first the measurement of financial globalization and its many facets. However, measuring financial globalization is not straightforward: the number of measures of financial globalization has proliferated, and so has the range of answers to how, say, lifting capital controls affects an economy. (See Eichengreen, 2001.)

The aim of this article is to help researchers better understand the range of choices they have in measuring financial integration and globalization, the pros and cons associated with each, and some of the reasons behind the divergence in findings in the literature. In particular, it describes de jure, de facto, and "hybrid" indicators, and comparatively analyzes their data properties and how these measures relate to one another. Factor and correlation analyses are used to show that different financial globalization variables measure separate phenomena, with de jure and de facto financial globalization variables in particular showing limited information overlap. Over time, many of the de jure indicators converge in information, partly in response to greater openness from the 1990s, and partly because a common source for financial openness data changes structure over time. The paper also shows how the time period covered can matter strongly for findings on, for example, the effects of capital account liberalization on growth, going a long way toward reconciling some of the seemingly disparate findings in the literature. It concludes with suggestions and cautions for researchers in matching their theory more closely to the appropriate indicators by helping them to understand the data trade-offs.

I. Measures of Financial Integration

The various measures of financial integration can be grouped into three broad categories: de jure, de facto, and hybrid indicators, with the latter a combination of the former two. The IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*) is the primary source

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[1]Dell'Ariccia and others (2008); Gourinchas and Jeanne (2006); and Kose, Prasad, and Taylor (2011) provide extensive reviews of the related literature. See also the *IMF Staff Papers* issue (volume 56) on financial globalization.

for most de jure indicators of financial openness.[2] Since volume 1950, *AREAER* reports, in prose format, the rules and regulations that countries use to govern current and capital transactions, as well as the proceeds arising from them, between residents and nonresidents.[3] In volumes 1967 through 1996, *AREAER* includes a table, "Summary Features of Exchange and Trade Systems in Member Countries," which shows if restrictions on residents' payments in various current and capital account categories exist. Hence, de jure indicators can be further categorized as based on the *AREAER* table or on a coding of the text in the body.

De Jure Indicators Based on the AREAER Categorical Table of Restrictions

The table indicators can be converted into binary 0/1 measures (hereafter, IMF_BINARY). Epstein and Schor (1992) developed one of the first such indicators for 16 OECD countries for the period 1967–1986. Alesina, Grilli, and Milesi-Ferretti (1994), Garrett (1995), Grilli and Milesi-Ferretti (1995), and Leblang (1997) each used the categorical measure from the table in regression analysis. Edison and others (2004) and Klein (2003) use a rolling average IMF_BINARY over several years (SHARE).

These measures' informational content is limited due to their binary nature: for example, IMF_BINARY groups together countries that are partly open, those that are substantially but not fully open, and those that are completely closed. Hence, it introduces a systematic measurement error in growth regressions when used as an independent variable, biasing coefficient estimates (Voth, 2003). A further limitation is that IMF_BINARY reports restrictions on residents only.[4] And third, its temporal availability is limited as the table was published only until volume 1996.

The publication of a new tabular format for 1996 (in volume 1997) represented a deep enrichment of the information available in tabular format. The post-1997 *AREAER* structure captures more dimensions of capital account restrictiveness, including by type of investor and asset categories. The new table reports 13 separate aspects of capital account transactions and highlights the diversity across countries regarding choices over the composition of restrictions. (See further discussion below.)

The new enriched tabular format for 1996 in volume 1997 spurred a second generation of measures.[5] Tamirisa (1999) and Johnston and Tamirisa (1998) summed the binary scores for the 13 categories for 40 countries in

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[2]The volume year for *AREAER* reports for the previous calendar year, so, for example, volume 1950 reports for the year 1949.

[3]The *Balance of Payments* defines residence as the "transactor's center of economic interest" (IMF, 1993, p. 20; see also *Balance of Payments Manual*, 6th ed., 2008).

[4]See, for example, Table footnote 6 in Volume 1996.

[5]Volume 1997 reports 12 categories. The 13th, "personal capital movements," was added from volume 1998.

1996. Miniane (2004) averaged the scores in the categories and extended the time period from 1983 to 2000, though at the cost of more limited country coverage (34) and less detail, including the inability to distinguish between inflow and outflow restrictions. Brune and Guisinger (2006) extended the Johnston and Tamirisa (1998) data from 1970 to 2004 for 187 countries by coding the qualitative descriptions in the pre-1997 volumes. Her Financial Openness Index (FOI) represents the cumulative total of the binary score for 12 categories, and distinguishes between inward and outward flows. The data and details on the mapping from qualitative text to binary scores are not publicly available, however.

Abiad and Mody's (2005) and Mody and Murshid's (2005) financial integration index uses four of the *AREAER* table variables: capital account restrictions, current account restrictions, export proceeds surrender requirements, and presence of multiple exchange rates. Their gradated index takes the simple average of these indicators.

Chinn and Ito's (2002, 2006, 2008) KAOPEN uses the *AREAER* table to identify an "extensive" indicator of financial globalization that relies on a data reduction exercise. They use principal component analysis on three categorical indicators of financial current account restrictions (current account restrictions, export proceeds surrender requirements, and presence of multiple exchange rates) plus SHARE, which takes the rolling average of IMF_Binary over the five-year window $t-4$ through t.[6] KAOPEN is the first standardized principle component of four *AREAER* table variables. Higher scores indicate greater openness.

Of the ones reviewed so far, KAOPEN and FOI cover the broadest range of countries and long time periods. FOI also distinguishes between resident and nonresident transactions, and its finely grained treatment of the subcomponents of capital flows may be useful, as it can pick up the last or residual restrictions in nearly open economies. FOI's main drawback is that it is not published. KAOPEN is an extensive indicator of financial openness, and is publicly available.

We note three drawbacks of table-based indicators. (See the appendix for further details.) First, the IMF has never defined methodologically the "switch" point from open to closed or vice versa, and the implied (average) switching point appears to "drift" over time. Second, indicators based on the tables suffer from a structural break between 1995 and 1996. The table from volume 1997 onward has properties incommensurable with those in prior editions. And third, data in the table are "point in time" measures, usually 31 December of the year in question. Roughly a third of the countries have a "point in time" in the subsequent year, however, which can lead unwary

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[6]Chinn and Ito (2002, 2006, 2008) also make some necessary simplifying assumptions to construct KAOPEN. KAOPEN can pose an econometric problem, however, when used as a dependent variable in annual models. Because it is constructed as a five-year average, some components of KAOPEN would be endogenous to any independent variable lagged less than five periods. See Karcher and Steinberg (forthcoming) for further discussion of KAOPEN.

investigators using annual data into misleading inferences. The main advantage of most table-based indicators is that they are generally easy to replicate.

De Jure Indicators Based on Text of AREAER

To address some of the informational problems in the binary and cumulative-binary measures, other investigators created de jure indices that contain elements of intensity, magnitude and/or breadth of financial controls. These indicators also distinguish between resident vs. nonresident transactions.

Quinn (1992, 1997) constructs indicators on capital account (CAPITAL) and financial current account (FIN_CURRENT) regulations based on a coding of the *AREAER* text. The data are available for 122 countries, from 1949 (or when first reporting to the IMF) through 2007 and cover six categories: payment for imports; receipts from exports; payment for invisibles; receipts from invisibles; capital flows by residents; and by nonresidents. (See also Quinn and Toyoda (QT), 2007, 2008.) These categories translate into scores ranging from 0 to 8, reflecting the four categories for FIN_CURRENT; and 0–4, reflecting the two categories for CAPITAL. (The measures are invariably rescaled 0–100 for ease of interpretation.) The measure also makes an assessment of the intensity of those restrictions. The *AREAER* section entitled "Changes During Year" includes the date of key regulation changes, and allows for setting the date to 31 December for each year for each country.

Two measures pay special attention to the dating of reforms. Kaminsky and Schmukler's (2008) chronology of financial liberalization during 1973–2005 in 28 countries, mostly advanced economies and a few large Latin American countries, covers liberalizations of the capital account, the domestic financial system, and the stock market. Each category is coded as "fully liberalized," "partially liberalized," or "repressed." Since the data are monthly, they can be useful for analyzing higher-frequency variables such as stock prices. Kastner and Rector (2003) offer a chronology of policy changes for 19 OECD countries from 1951 to 1988. While this indicator does not measure the magnitude of change, the daily frequency of the data has the advantage of offering specific dates for policy shifts.

The most finely gradated of the *AREAER* text measures is Schindler's (2009) KA index. It covers several subcategories of the "Capital Transactions" section for 91 countries during 1995–2005. Unlike other indices, it provides (binary) codes at the level of individual types of transactions (for example, "issue locally by nonresidents of debt securities") with each category considered unrestricted only if either no restrictions are in place, the restrictions are simple notification requirements, or they fall into some exceptional categories (for example, restrictions related to national security considerations). Aggregating the codes over different subsets of transaction types yields indices by asset category, residency status, and inflows vs. outflows, allowing for an analysis in line with the *Balance of Payment Manual*'s focus on residency (transactor) as well as based on the direction of

capital flows (transaction). KA is especially useful for researchers interested in individual asset categories and those interested in issues related to the sequencing of capital account liberalization.[7]

CAPITAL plus FIN_CURRENT, and KA offer broad country coverage, a finer-grained breakdown of financial openness, some correctives to dating changes of restrictions and the ability to distinguish, in different ways, between resident and nonresident flows. Text-coded indicators have their own, specific drawbacks. They are costly and time-consuming to replicate, and may suffer the perennial problem of intercoder reliability and subjectivity.[8] Similarly, text- and table-based indicators implicitly assume that all subcategories are of equal importance, which is unlikely to be the case in practice. And lastly, while, for example, KA provides a separate FDI category, changing definitions of FDI relative to portfolio equity make the use of this subcategory difficult in practice.[9]

Non-AREAER De Jure Indicators

An influential binary indicator not based on *AREAER* is Bekaert, Harvey, and Lundblad's (BHL) (2005) EQUITY measure, which dates equity liberalization episodes for 95 countries from 1980 to 2006. The measure takes the value of "0" prior to the date of liberalization and "1" afterwards and is based on Bekaert and Harvey's, *A Chronology of Important Financial, Economic and Political Events in Emerging Markets* (last updated 2004, see their webpage at http://www.duke.edu/~charvey/Country_risk/couindex.htm).

The Heritage Foundation's "Investment Freedom" category in its Index of Economic Freedom is also a de jure measure (Heritage Foundation, 2010) (IF_Heritage). Heritage lists on its website a number of official and secondary sources from which it constructs its measurement, but provides little information on how it uses these sources. Heritage is discussed in greater detail below.

De Facto and Hybrid Measures

De jure indices of financial globalization do not reflect the extent to which actual capital flows evolve in response to legal restrictions, either because of

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[7]Various subindices of this data set have been utilized recently in Binici, Hutchison, and Schindler (2010), Prati, Schindler, and Valenzuela (2009) and See Pandya (2011).

[8]Presumably, subjectivity is also an issue in the construction of the *AREAER* Tables, since its compilers must decide on whether a country's rules are restrictive or not.

[9]For the period governed by the *BoPM3* (1961), the prevailing FDI thresholds were 25 to 75 percent; for *BoPM4* (1977), the thresholds were 20 to 50 percent; and since *BoPM5* (1993), the threshold was equity investment of 10 percent or more. The OECD suggested a 10 percent threshold in 1990, which most OECD countries adopted, albeit at their own speed: Britain in 1997 and Germany in 1999, for example. China and India are among the more extreme examples. China defines Inward FDI as investment by international investors of at least 25 percent of the firm's equity, while India conforms to the prevailing IMF 10 percent threshold, but excludes certain items from reported FDI, resulting in underreporting of Indian FDI compared to other countries. (See Bajpai and Dasgupta, 2004.)

a lack of enforcement, or because controls in one area may induce a response in other asset flows. Also, even the more disaggregated indices may not capture subtle, but possibly important differences between countries' capital control regimes. De jure measures, therefore, do not necessarily reflect a country's actual degree of financial integration, highlighted by the fact that even countries with relatively closed capital accounts became substantially more financially integrated over the past decades (see, for example, Dell'Ariccia and others (2008) document). Thus, de facto, or in some cases "blended," measures present an alternative way to measure a country's integration into global finance markets. These can be divided into three categories: quantity-based, price-based, and hybrid measures.

Among quantity-based measures, Lane and Milesi-Ferretti's (2006, 2007) index (TOTAL) is perhaps the most widely used de facto measure of a country's exposure to international financial markets. (See the discussion in Kose and others, 2009.) TOTAL is calculated as a country's aggregate assets plus liabilities relative to its gross domestic product, and includes the categories of portfolio equity, FDI, debt, and financial derivatives, as well as assets and liabilities for each.[10] Other de facto indicators exploit the observable phenomena of increased capital mobility, such as the size of gross capital flows (IMF, 2001). However, capital flow measures are more volatile, and thus noisier, than TOTAL's stock-based measure.

United Nations Commission on Trade and Development (UNCTAD) provides two other quantity measures, which are inward FDI flow and stock from 1970 and 1980 (respectively) onward for most United Nations countries. The data can be normalized with respect to a country's GDP (InFDIGDP) or its share of the world's FDI flows (InFDIW). A comparison of the differences in denominator is made below.

A number of hybrid measures also exist.[11] FORU, developed by Edison and Warnock (2003), is a monthly measure of capital account openness based on the share of domestic equities available for foreign purchase. In its updated version, it covers 1989 through August 2006.[12] The measure is hybrid in the sense that whether a stock is open to foreigners reflects legal restrictions, while the measure's denominator is a quantity. FORU also reflects relative prices as the fact that a stock is restricted to some (foreign) investors likely affects its pricing dynamics.

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[10]The above-mentioned problems of the definition of FDI apply, but are avoided when considering the aggregate TOTAL which sums FDI and portfolio equity data.

[11]The correlation of saving and investment is an early hybrid measure by Feldstein and Horioka (1980), based on the notion that domestic savings and investment should be less correlated in more financially integrated markets. They found a high (near 1) correlation in a cross-section of OECD countries, suggesting less than perfect capital markets. Later works, in contrast, found a decoupling of savings and investment in the euro area (Blanchard and Giavazzi, 2002), and lower savings-investment correlations that also diminish over time (Fujiki and Kitamura, 1995).

[12]Because most other indices are annual, annual averages of FORU are used here.

The Economic Globalization (eGlobe) measure by Dreher (2006) and Dreher, Gaston, and Martens (2008) is a subindex of the broader KOF Index of Globalization and is available for 1970–2007. It ranges from 1 to 100 (100 being the most globalized) and is composed of de facto flows (trade, FDI, portfolio equity); the sum of the 13 binary-coded categories in *AREAER*; indices on mean tariff rates and hidden import barriers taken from Gwartney and Lawson (2009); and taxes on international trade. The subindices are aggregated based on weights derived from principal components analysis. As with KAOPEN and KA, eGlobe can be considered an extensive indicator of economic globalization.

Price-based measures include Levy Yeyati, Schmukler, and Van Horen (2009), Dooley, Mathieson, and Rojas-Suarez (1997), and Quinn and Jacobson (1989). All of these measures consider differences between external and domestic prices and operate on the assumption that among financially integrated economies, price differentials of similar assets in different locations should vanish due to arbitrage. A drawback is that inefficient arbitrage may reflect domestic rather than international financial frictions. From a practical perspective, many such measures are available only for individual country cases.

De facto and hybrid indicators have limitations. Users of indicators that rely on FDI measurement face the problem of inconsistent FDI reporting and treatment across countries and over time. (See the earlier discussion.) A meaningful comparison of FDI data in a panel is thus difficult, a concern that is especially relevant for the UNCTAD measures. De facto measures are also only imperfectly related to a government's policy stance, with the direction of causality going both ways. For example, France, Germany, and the Netherlands saw their values of TOTAL increase from about 100 percent to about 300 percent during 1994 to 2004 without significant changes in capital account openness.[13] Indeed, firms may invest in some countries *because* of certain types of restrictions, for example, to gain privileged access to otherwise blocked markets. Conversely, countries may impose capital controls to manage destabilizing surges in inflows. (See Ostry and others, 2011.) Montiel (1994) points out, as well, that fully financially open countries might have only modest capital flows if their prices closely match world prices.

Special note should be taken of the role of banking centers and tax havens. Financial assets and liabilities in these countries are often large multiples of GDP. Capital account policies are likely to play less of a role than banking and tax policies. For many purposes, these banking center countries can be reasonably considered outliers (Lane and Milesi-Ferretti, 2007).

II. Comparisons Across Indicators

We compare the coding and data properties of 10 de jure and de facto measures of financial globalization: UNCTAD's Inward FDI flows as a

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[13]See Binici, Hutchison, and Schindler (2010) for the link between de jure regulations and de facto outcomes.

percentage of GDP and as a percentage of world FDI flows; FOI; CAPITAL; KA; IF_Heritage; eGlobe; KAOPEN; EQUITY; and TOTAL.[14] Table 1 summarizes these measures for five countries in 2004: the United States, the United Kingdom, the People's Republic of China, Brazil, and India.[15] Relative country assessments differ markedly across indicators—many for reasons that are easily understood, such as some indicators being extensive (KAOPEN, KA, FOI) while others are more intensive (CAPITAL, FIN_CURRENT, eGLOBE). IF_Heritage stands out as being different for reasons not apparent from its sources or coding.

CAPITAL ranks India (score of 50, the 4th-lowest value out of 7 that CAPITAL can assume) as being more open than China (score of 25, 7th out of 7), while KAOPEN ranks China and India equally closed (−1.13, the 2nd-lowest value out of 21). CAPITAL picks up the fact that India has moderated the intensity of its restrictions over time more than China; by contrast, KAOPEN's binary indicators picks up that both types of restrictions continue to be present, but it does not reflect the diverging trends in intensity between India and China. eGLOBE, like CAPITAL, places these two countries far apart in their rankings (86th and 130th for China and India, respectively, out of 141) as eGLOBE captures trade flows as well as financial flows.

The cases of the United States and the United Kingdom highlight why different de jure measures provide different assessments of financial openness. CAPITAL ranks the United States as fully open in 2004, despite a few minor restrictions,[16] as its scoring method balances the severity of restrictions across all categories of financial transactions. KAOPEN also ranks the United States as fully open as the IMF Table indicates the absence of restrictions on the majority of capital account transactions, and none on the financial current account. In contrast, FOI ranks the United States at third out of 13 levels (a score of 10). The *AREAER* volume from which FOI is constructed indicates restrictions on capital market securities, money market investments, and direct investments. The table shows that restrictions exist, but does not indicate that the controls are minor.

In a sense, FOI can be considered a "last" indicator as it captures even residual restrictions. By contrast, CAPITAL, which attempts to measure the intensity of restrictions, and EQUITY, which measures openness from the date on which international investigators can invest in a market, can be considered early indicators of openness. Others, such as KA, are somewhere in between—KA resembles FOI, but as discussed above, does exclude clearly minor restrictions and, for example, codes the United States as nearly, but not fully open.

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[14]This section draws on related work in Quinn and Toyoda (2008).

[15]We can rank order these countries since most indicators, except the binary EQUITY, provide some measure of the magnitude of restrictions on financial transactions that are comparable across countries.

[16]These include restrictions imposed on nonresident investment in sensitive areas such as nuclear energy.

Table 1. Comparison of Nine Measures of Financial Current and Capital Account Openness in Five Countries, 2004

Measure, Scale, Sample	U.K.	U.S.	People's Republic of China	Brazil	India	Type of Measure. Other Comments.
CAPITAL 0–100 122 nations, 1948–2007	100 (tied 1st out of 7 ranks)	100 (tied 1st out of 7 ranks)	25 (tied 7th out of 7 ranks)	50 (tied 4th out of 7 ranks)	50 (tied 4th out of 7 ranks)	De jure, Ordinal, Capital account. Based on coding of *AREAER* text from 1948 to 2007. Scoring includes information about restrictions on residents and nonresidents. Takes into account severity of restrictions balancing across all categories of financial transactions.
KAOPEN −1.80 to 2.54 181 nations, 1970–2006	2.54 (tied 1st out of 21 ranks)	2.54 (tied 1st out of 21 ranks)	−1.15 (tied 20th out of 21 ranks)	0.73 (tied 10th out of 21 ranks)	−1.15 (tied 20th out of 21 ranks)	De jure, Categorical, Financial current and Capital account. Based upon principal component analysis of binary indicators in *AREAER*, which are "multiple exchange rates," "current account," "surrender of export proceeds," and five-year average of IMF_BINARY (called SHARE, as in Klein, 2003).
EQUITY 0,1; 95 nations 1980–99	1	1	n.a.	1 (from 1991)	1 (from 11/1992)	De jure, Categorical, Equity markets. Binary measure of Official Equity Market Liberalization based on chronology of events compiled by BHL (2005). A score of "1" indicates the date by which foreign investors may own equity in a market.
FOI 0–12 172 nations, 1965–2007	10 (tied 3rd out of 13 ranks)	8 (tied 5th out of 13 ranks)	1 (tied 12th out of 13 ranks)	4 (tied 9th out of 13 ranks)	1 (tied 12th out of 13 ranks)	De jure, Categorical, Financial Current and Capital account. Brune's coding of *AREAER* text from 1965 to 2004. Extension of Johnston and Tamirisa (1998) methodology backward from 1997 to 1965. Binary subcomponents of *AREAER* are added to produce a score.

Table 1 *(concluded)*

Measure, Scale, Sample	U.K.	U.S.	People's Republic of China	Brazil	India	Type of Measure. Other Comments.
eGlobe—KOF 20–99 141 nations, 1970–2007	77.7 (28th out of 141)	67 (50th out of 141)	56 (86th out of 141)	58.7 (79th out of 141)	36.7 (130th out of 141)	De jure, Categorical/ordinal, Blended de facto/de jure,. Based on "actual flows" of trade, FDI, portfolio, and remittances, plus "restrictions" on imports, tariffs, taxes on trade and capital account restrictions. Political and social globalization measures also available.
TOTAL 39% to 19,975% 145, 1970–2007	715% (11th out of 145)	254% (55th out of 145)	83% (126th out of 145)	95% (tied, 117th out of 145)	58% (139th out of 145)	De facto. An extensive and comprehensive measure of a country's aggregate assets and liabilities (summed) over its gross domestic product. Composition includes FDI, equity investment, external debt, and official reserves controlling for valuation.
IF_HERITAGE Changing scale 183;1995–2010	70 (tied for 2nd out of 5 ranks)	70 (tied for 2nd out of 5 ranks)	30 (tied for 4th out of 5 ranks)	50 (tied for 3rd out of 5 ranks)	50 (tied for 3rd out of 5 ranks)	De jure, Categorical/ordinal, "Investment Freedoms." Assessment of policies governing domestic and international investments including investment restrictions, national treatment, and payment restrictions. Scale intervals change in 2007 and 2010.
KA (overall) 0–1 91 nations; 1995–2005	1 (tied for 1st out of 17 ranks)	0.875 (tied for 3rd out of 17 ranks)	0 (tied for 17th out of 17 ranks)	0.67 (tied for 6th out of 17 ranks)	0.42 (tied for 10th out of 17 ranks)	De jure, Ordinal, Capital account. Coding of *AREAER* text from 1995 to 2005. Scoring includes information about restrictions on six types of instruments; the direction of flows; and the residency of agents. 19 discrete categories available.
Inward FDI as % of GDP (World FDI) 153, 1970–2009	2.58% 97th (7.62% 3rd)	1.56% 133rd (18.5% 1st)	3.13% 85th (8.25% 2nd)	2.73% 92nd (2.46% 11th)	0.83% 146th (0.8% 22nd)	De facto. An extensive and comprehensive measure of a country's inward FDI as a % of either gross domestic product or World FDI. Three differing definitions of FDI are embedded, creating structural breaks in the data. Source: United Nations Conference on Trade and Development.

Notes: See text for discussions.

IF_Heritage gives the United States a score of 70 in 2004 (2nd out of 5 ranks), equal to that of Albania, Algeria, and the Republic of Mozambique, all of which are widely regarded as less financially open than the United States. Each, for example, received in 2004 scores of 37.5 (out of 100) in CAPITAL and similarly low scores in FOI and KAOPEN. Why the United States received this low score by the IF index is puzzling, especially since it measures restrictions on domestic investment as well as international investment.[17] The United States does not evidently impose extensive restrictions in either category. None of the restrictions listed in the 2005 *AREAER* would appear to justify a low coding.[18] The source documents for Heritage are "official country publications" and sources from the *Economist* and U.S. government agencies. How these sources are coded is not evident. More generally, IF_Heritage appears to code advanced economies as more restrictive than do other de jure indicators.[19]

A further point of note is that the scaling of IF_Heritage has changed repeatedly over time: from a "Likert-type" scale of 1 to 5 (1 = "very free") to a five-point scale with values 10, 30, 50, 70, 90 and reversed ordering, to a 10-point scale (10–100) in 2007. The U.S. score moved from 70 to 80 during the 2007 switch, even though the *AREAER* does not indicate any policy liberalizations. In 2010, the IF scale became a 20-point scale in increments of five, and the U.S. score decreased to 75. The coding rubric also changed in 2010, from assigning a 10-point rank based on summary qualitative descriptions for each rank, to a method in which 5 to 25 points are deducted for restrictions in each of seven separate categories, with up to an additional 20 points deducted for indirect barriers to investment (such as security problems or lack of infrastructure). (Total scores that fall in the negative range are set to zero.) Whether the changes in the U.S. score in each case occurred due to policy changes or due to rescaling or change in coding method is unclear. It appears that past scores are not recalibrated on the basis of the methodological change, so the scores across time are not fully comparable.

TOTAL ranks the United States at 55 out of 145 ranks. Because TOTAL divides aggregate assets plus liabilities by GDP, it corrects for the size of the U.S. economy—that is, relative to its aggregate income, its financial integration with world financial markets is relatively modest. As noted above,

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[17]See http://www.heritage.org/index/Investment-Freedom.aspx. The subcomponents listed include capital controls, foreign exchange controls, expropriation of investments, sectoral investment restrictions, land ownership restrictions, foreign investment code, and national treatment of foreign investment.

[18]These include some national security investment restrictions, restrictions of commercial activities with selected countries, and certain registration requirements. See IMF (2005, pp. 1023–1025).
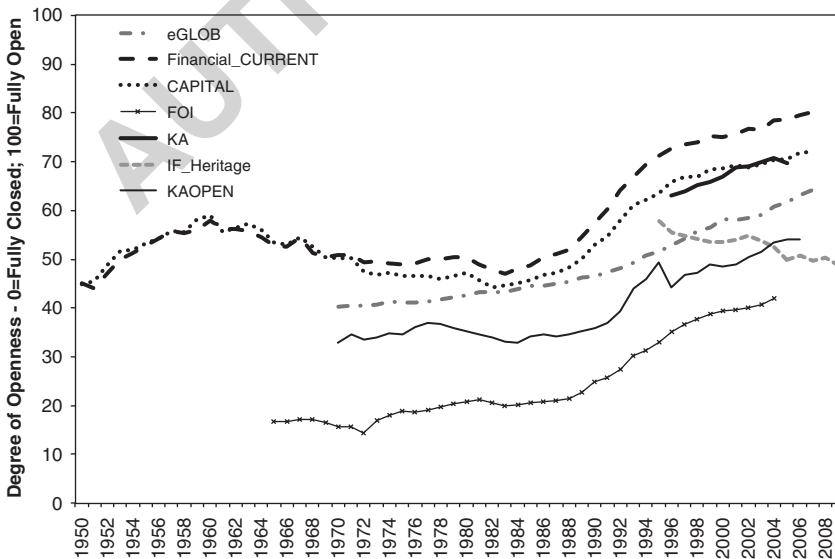
[19]From 1995 to 2007, the 22 "traditional" OECD members averaged a score of 94 (out of 100) on CAPITAL but 69.5 (out of 90) on IF_Heritage. For 96 emerging markets, the scores were 63 on CAPITAL and 52 on IF_Heritage.

UNCTAD's FDI data can be normalized as a percentage of a country's GDP (InFDIGDP), or as its share of the world's FDI flows (InFDIW). Banking centers and tax havens have much higher levels of InFDIGDP; InFDIW, on the other hand, shows that the leading economies attract the largest share. The United States and the People's Republic of China are far more highly ranked by InFDIW. The differences in ranking across the various indicators lend support to the notion that one index is not necessarily "better" than another, but rather that they pick up different facets of financial openness.

Figure 1 shows the global averages for 1950–2007 (where available) for CAPITAL, FIN_CURRENT, KAOPEN, eGlobe, KA, FOI, and IF_Heritage. The data are rescaled to 0–100, with 100 being a fully open economy. The general pattern since the 1980s has been for the global averages to trend upward. IF_Heritage is an outlier, showing *decreasing* financial openness between 1995 and the present. The figure also reveals important differences in the data properties of the measures. FOI, despite an overall upward trend, shows lower levels of financial openness than CAPITAL and KA: while many emerging market economies maintained some capital account restrictions, their intensity lessened over time.

KAOPEN shows evidence of the structural break in the *AREAER* tables between 1995 and 1996; the value of KAOPEN drops at a time when most other indicators show increasing openness. CAPITAL and FIN_CURRENT show evidence of two "waves" of liberalization (1950s, 1990s), and one "wave" of closure (1960s/early 1970s). CAPITAL and FIN_CURRENT

Figure 1. Global Averages of Capital Account and Current Account Indicators Rescaled 0 to 100–1950–2009

Sources: See text descriptions.

show similar levels of openness until the early1980s, when liberalization of the financial current account (as required of IMF Article VIII members) accelerated.

The aggregate indices hide substantial heterogeneity across countries and subcategories. As documented in Schindler (2009, Figure 3), along with the trend toward increased liberalization in the aggregate, countries have on average started to rely relatively more on outflow controls, while equalizing restrictions on different asset categories. In addition, although the *average* country liberalized over time, many individual countries tightened restrictions.

III. Methodology and Data

What do the conceptual differences imply for how the various indicators compare in the context of past research in which they were used? The literature on the effects of capital account liberalization on growth is known to have produced conflicting evidence, counter to a presumably strong theoretical link—after all, freer capital movement should allow countries to access a broader pool of financing, and at lower rates, which should spur investment and raise economic growth. (See Mishkin, 2009; Obstfeld, 2009; Rodrik and Subramanian, 2009.) Kose, Prasad, and Taylor (2011) argue that these benefits should be especially important for developing countries with relatively low capital-to-labor ratios.[20]

The lack of strong evidence, however, has not been evenly distributed across all indices. Especially EQUITY (Bekaert, Harvey, and Lundblad, 2005) and CAPITAL (Quinn, 1997; Quinn and Toyoda, 2008) have produced robust support for a positive (causal) link from financial liberalization to increased growth, while studies based on TOTAL, IMF_BINARY, or SHARE have found weaker support (see Kose, Prasad, and Taylor, 2011). (See Kose and others (2009) and Edison and others (2004) for surveys of the literature.)

What is behind those differences? Studies in the literature differ not only by the proxy of capital account openness, but also by conditioning information used, country sample, time coverage, and estimation methodology. Previous efforts at reconciliation include Cline (2010), Edison and others (2004), and Quinn and Toyoda (2008).[21]

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[20]However, the theoretical link may not be quite that clear either, as Henry (2007) points out. Theory predicts only *temporary* growth effects on a country's transition to a new steady state, helping to understand why tests for *permanent* growth effects may not come out significantly.

[21]Cline (2010) undertakes a meta-analysis of existing studies and interprets the evidence as supportive of financial integration having a large positive effect on growth. Edison and others (2004) replicate a series of specifications in a cross-section and find only cautious and qualified support for a positive effect. Quinn and Toyoda (2008) replicate six prior studies, including Edison and others (2004) and Rodrik (1998), but using only CAPITAL as the capital account indicator, with a positive and statistically significant association of CAPITAL with growth in all cases.

To distinguish among these factors, we submit all indices to the same experiment, by running two benchmark specifications for each of them. More specifically, Quinn and Toyoda (2008, henceforth QT) estimate a growth regression using a set of relatively standard control variables employing dynamic fixed-effects panel regression with GMM methodologies.[22] Bekaert, Harvey, and Lundblad (2005, henceforth BHL) use a different set of control variables, including educational attainment, and estimate their model using OLS in a seemingly unrelated regression (SUR) structure and GMM.

We re-examine the financial globalization and growth question using these two baseline specifications with various financial globalization variables. The specifications are pooled, cross-section, time-series (PCSTS) models because the variation in the dependent variable comes from both the time series and the cross-sections. Both the QT (2008) and the BHL (2005) specifications are estimated with fixed-effects where appropriate because the Wald tests generally reject the use of random effects models. Fixed effects models are particularly appropriate in cases where unobservable, country-specific characteristics might affect the dependent variable and be correlated with the independent variables, as is the case here.

These are annuals models, with $i = 1, 2, \ldots, 187$ indicating countries in the sample and the index t representing an annual period. Owing to the issues raised earlier about the timing of the IMF *AREAER* indicators in models using annual data and the resulting endogeneity concerns, the second lag for the de jure *AREAER* is employed in the annual models. Time and unit fixed effects are employed. Both the QT and the BHL models employ the Generalized Method of Moments system estimator (GMM-SYS) proposed in Arellano and Bover (1995) and Blundell and Bond (1998).[23]

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[22]Kose, Prasad, and Taylor (2011) use a set of control variables that is, roughly speaking, a convex combination of those used in BHL (2005) and QT (2008). Klein and Olivei (2008) are another recent study considering the effects of capital account liberalization on growth. They, however, focus on its interaction with financial depth and consider cross-sections only—by contrast, we are particularly interested in examining the time variation in the various indices and thus focus more on the studies based on panel datasets. Another strand of literature is more microeconomic: Chari and Henry (2004), using firm-level data, find evidence that liberalization brings risk-sharing benefits; using an event-study approach around equity market liberalizations. Also using firm-level data, Prati, Schindler, and Valenzuela (2009) find that capital market liberalizations can provide firms with broader access to credit.

[23]The GMM-SYS models explicitly treat independent variables as endogenous, and use internal instruments and fixed effects to account for these endogenous relationships. The GMM-SYS estimation combines transformed and level equations. The instruments for the transformed equation are lag 3 of the right-hand-side variables plus some instrument (global democracy). The instruments for the levels equations are lag one of the right-hand side variables and the country fixed effects. We also use global averages of world democratization (net of home country democracy lagged two periods) as an external instrument for home country capital account liberalization in both equations. Eichengreen and Leblang (2008) find the causal chain runs from democratization to capital account liberalization.

The base models from QT (2008) and BHL (2005) respectively are:

$$\Delta GDP_{i,t} = \beta_0 + \beta_1(\Delta\text{Financial Globalization Variable}_{i,t-1(2)})$$
$$+ \beta_2(\text{Income}_{i,t-1}) + \beta_3(\Delta\text{Trade Openness}_{i,t-1})$$
$$+ \beta_4(\Delta\text{Investment}_{i,t-1}) + \beta_5(\Delta\text{Population Growth}_{i,t-1})$$
$$+ \text{unit effects} + \text{period dummies} + \varepsilon_{i,t} \quad \text{for } i = 1, 2, \ldots, 187, \quad (1)$$

$$\Delta GDP_{i,t} = \beta_0 + \beta_1(\Delta\text{Financial Globalization Variable}_{i,t-1(2)})$$
$$+ \beta_2(\text{Income}_{i,t-1}) + \beta_3(\text{LifeExpectancy}_{i,t-1})$$
$$+ \beta_4(\Delta\text{EducationalAttainment}_{i,t-1}) + \beta_5(\Delta\text{Population Growth}_{i,t-1})$$
$$+ \beta_6(\Delta\text{GovernmentExpenditure}_{i,s-1}) + \text{period dummies}$$
$$+ \text{unit effects} \quad \text{for } i = 1, 2, \ldots, 187 \quad (2)$$

No serial correlation is indicated in GMM-SYS models when the ABm2 test for second-order serial correlation is not significant, and the ABm1 test shows evidence of significant negative serial correlation in the differenced residuals. Our GMM models include an additional transformation of the right-hand-side variables. The income, trade openness, government expenditures, life expectancy, education attainment, and several of the financial globalization variables exhibit persistence over time, a persistence that is exaggerated by five-year averaging. These variables are correlated with the unit effects. The persistence in these variables and their correlation with unit effects could induce correlation with the error term and thus biased estimates. We therefore employ the difference transformation described in Doornik and others (2006, pp. 65–71). Without this difference transformation, the residuals unfailingly exhibit serial correlation.

The models using annual observations do have some disadvantages. Many variables are measured with error annually, and five-year averaging attenuates the errors (see Johnson and others, 2009). These are five-year nonoverlapping models, with $i = 1, 2, \ldots, 187$ indicating countries in the sample and the index s representing five-year intervals, starting at 1955–59 and continuing to 2005–09. Thus, for example, $\Delta GDP_{i,s}$ for the $s = 1985$–89 period is constructed as the difference of GDP in the 1985–89 period and the $s-1 = 1980$–84 period. The difference transformation employed to remove serial correlation makes it impossible to estimate series with fewer than 15 observations per country in a five-year panel setting and so KA and IF_Heritage cannot be included in the analysis.

To assess the effects of financial globalization variables on growth over time, we create a year-by-year interaction for the financial globalization by

time, *Financial Globalization$_i$, $t-1^*$Period,$t-1$:

$$\Delta GDP_{i,t} = \beta_0 + \beta_1(\Delta \text{Financial Globalization Variable}_{i,t-1})$$
$$+ \beta_2(\text{Period}_{,t-1}) + \beta_3(\text{FGV} * \text{Period}_{(i,t-1)})$$
$$+ \beta_4(\Delta \text{Financial Globalization Variable}_{i,t-2})$$
$$+ \beta_5(\text{Period}_{,t-2}) + \beta_6(\text{FGV} * \text{Period}_{(i,t-2)})$$
$$+ [\ldots\ldots]\beta_x(\Delta \text{Financial Globalization Variable}_{i,t-z})$$
$$+ \beta_x(\text{Period}_{i,t-z}) + \beta_x(\text{FGV} * \text{Period}_{(i,t-z)})$$
$$+ \beta(\Delta X_{i,t-1}) + \text{unit effects} + \varepsilon_{i,t} \quad \text{for } i = 1, 2, \ldots, 187 \quad (3)$$

In model (3), β $(\Delta Xi, t-1)$ represents a vector of explanatory variables and the subscript z represents the final observed time period in the sample. In Equation (3), the constant is suppressed, and the interaction between the financial globalization variable and the time variable indicates the estimated effects of financial globalization during that period with proper standard errors.

For the dependent variable of per capita economic growth, we use GDP estimates from the Penn World Table (PWT). The PWT provides GDP measures corrected for purchasing power parity and converted to international prices for 189 countries/territories for 1950–2009. Data for indicators of per capita national income, trade openness, and growth in population are also taken from PWT 7. The Educational Attainment variable (of adults 25 years and older) is from Barro and Lee (2010) and are five-year initial period observations, which we interpolate for annual models. The remaining data for the BHL (2005) models are taken from WDI 2010. Change in political regime, used in QT (2008), is taken from Polity 2010.

IV. Results

Correlations and Factor Analyses

Table 2 reports the pairwise correlations for 78 pairs of trade and finance indicators in changes: annual (panel a) and five-year panels (panel b). It is useful to examine correlations in differences since the problems of trends, serial correlation, and unit roots are frequently addressed econometrically through differencing. Of the 78 pairwise correlations in Table 2a, 28 are statistically significant, four of which are negative. The highest correlations are between pairs of *AREAER* de jure measures but the correlations are in the 0.2** to 0.3** range. The de jure and de facto measures of financial globalization are largely uncorrelated in changes, suggesting that they capture different phenomena (see also the factor analysis below). Change in

Table 2. Correlations of De Jure and De Facto Indicators of Capital Account or Financial Current Account Openness 1966 (or First Date) to 2007—Annual and Five-Year Observations

(a) Annual Changes

	ΔFOI	ΔCAP	ΔCUR	ΔWW	ΔKAOPEN	ΔEGLOB	ΔTOTAL	ΔFDI/GP	ΔFDI/W	ΔEQUITY	ΔHerit	ΔKA	ΔFORU
ΔFOI	1.00												
ΔCAP	**0.20**	1.00											
ΔCUR	**0.21**	**0.51**	1.00										
ΔWW	**0.05**	**0.09**	**0.15**	1.00									
ΔKAOPEN	**0.20**	**0.23**	**0.29**	0.02	1.00								
ΔEGLOB	0.04	**0.10**	**0.11**	0.05	0.06	1.00							
ΔTOTAL	−0.02	0.01	0.03	**−0.05**	0.01	0.02	1.00						
ΔFDI/GDP	0.01	0.01	0.00	**−0.05**	0.01	**0.15**	**0.09**	1.00					
ΔFDI/WI	0.02	0.00	−0.01	−0.02	0.01	0.02	0.02	0.02	1.00				
ΔEQUITY	0.02	**0.10**	**0.07**	**0.04**	0.03	0.02	−0.01	−0.01	−0.02	1.00			
ΔIF_HERIT	0.01	0.03	−0.02	**−0.05**	0.01	0.04	0.03	0.04	0.04	**−0.09**	1.00		
ΔKA	**0.11**	**0.31**	**0.25**	−0.05	**0.19**	**0.09**	−0.02	0.02	−0.01	−0.00	0.03	1.00	
ΔFORU	−0.07	−0.01	−0.03	−0.05	0.03	0.09	−0.03	−0.01	0.04	**0.16**	0.01	0.02	1.00
	ΔFOI	ΔCAP	ΔCUR	ΔWW	ΔKAOPEN	ΔEGLOB	ΔTOTAL	ΔFDI/GP	ΔFDI/W	ΔEQUITY	ΔHerit	ΔKA	ΔFORU

(b) Five-Year Changes

	ΔFOI	ΔCAP	ΔCUR	ΔWW	ΔKAOPEN	ΔEGLOB	ΔTOTAL	ΔFDI/GDP	ΔFDI/W	ΔEQUITY	ΔHerit	ΔKA	ΔFORU
ΔFOI	1.00												
ΔCAP	**0.61**	1.00											
ΔCUR	**0.56**	**0.74**	1.00										
ΔWW	**0.17**	**0.24**	**0.35**	1.00									
ΔKAOPEN	**0.67**	**0.55**	**0.54**	**0.13**	1.00								
ΔEGLOB	**0.35**	**0.37**	**0.34**	**0.11**	**0.34**	1.00							
ΔTOTAL	−0.01	0.03	0.00	−0.04	−0.03	−0.04	1.00						
ΔFDI/GDP	0.03	0.05	0.05	−0.03	0.03	0.24	**0.08**	1.00					
ΔFDI/WI	0.03	0.00	−0.03	−0.05	0.03	0.03	0.02	−0.01	1.00				
ΔEQUITY	**0.18**	**0.26**	**0.24**	**0.15**	**0.23**	**0.12**	−0.04	−0.01	−0.03	1.00			
ΔIF_HERIT	0.10	**0.14**	0.08	0.08	**0.10**	**0.17**	0.06	**0.09**	0.06	0.09	1.00		
ΔKA	**0.72**	**0.66**	**0.57**	−0.11	**0.57**	**0.37**	0.07	0.07	−0.02	—	0.05	1.00	
ΔFORU	0.12	0.19	**0.30**	−0.10	0.14	0.22	0.00	0.00	−0.11	0.06	0.05	0.20	0.28	1.00
	ΔFOI	ΔCAP	ΔCUR	ΔWW	ΔKAOPEN	ΔEGLOB	ΔTOTAL	ΔFDI/GDP	ΔFDI/W	ΔEQUITY	ΔHerit	ΔKA	ΔFORU

Notes: The correlations are pair-wise Pearson correlations, with statistically significant coefficients (two-tail test) at the 0.05 p-value or beyond in bold. See Table 1 for definitions and descriptions of the indicators; in addition, FORU is from Edison and Warnock (2003); WW is from Wacziarg and Welch (2008).

IF_Heritage is either uncorrelated or negatively correlated with all other indicators. The de facto financial globalization variables, the trade-influenced variables, the de jure indicators, EQUITY, and IF_Heritage are, by this evidence, measuring different phenomena.

Five-year averages can help reduce measurement error associated with dating changes in policy and the "point-in-time" problem (see the appendix). In five-year average changes (Table 2b), 32 of 77 correlation coefficients are statistically significant. The correlations for the de jure measures rise from between 0.2 and 0.3 to between 0.5 and 0.7. The de facto and de jure *AREAER* financial globalization indicators remain uncorrelated. Change in the hybrid eGlobe is modestly, but statistically significantly, correlated with most de jure financial globalization indicators. IF_Heritage is either weakly positively or uncorrelated with the other indicators.

If the low correlations are also the result of the limited information available in the IMF table before 1996, then post 1997, the correlations for the de jure text and table indicators should converge. Figure A1 in the supplemental appendix shows the evolution of de jure levels correlation coefficients over time. The correlations in levels on a year-by-year basis between CAPITAL and KAOPEN rise from 0.65 to 0.75 to post-1997 volume to nearly 0.9. These higher correlations are also the case when comparing CAPITAL with KA, an indicator that is only available since 1995. The post-1997 editions of the *AREAER* bring information provided in the text and in the tables closer together in information content.

As a result, divergences in measurement between text and table de jure IMF indicators—and therefore presumably measurement error—have diminished. But significant differences among the de jure indicators remain, and they reflect a number of sources. As previously discussed, different indices capture different aspects: for example, some cover resident and nonresident restrictions, while others only resident restrictions. The indicators by Quinn (1997) cover financial current (FIN_CURR) and capital (CAPITAL) restrictions separately, while KAOPEN contains elements of both. eGlobe also contains trade information, and EQUITY captures investability by foreigners, which is related, but not identical, to legal restrictions on equity flows. Also, the annual vs. five-year averaging distinction becomes complicated in the case of KAOPEN, which even in its annual version is based in part on five-year averages (the SHARE component).

Pairwise correlation analyses do not account for the deeper inter-correlation structure of the data. Factor analysis can help establish whether the different de jure *AREAER* indicators are measuring the same or different phenomena by identifying underlying components or factors that explain the pattern of correlations in a data set, such as those we observe in Table 2. (See Kim and Mueller (1978) for a discussion of factor analysis.) In this setting, factor analysis allows us to ask, for example, how ΔCAPITAL, ΔKA, ΔeGlobe, and ΔKAOPEN are collectively intercorrelated.

Pairwise factor analyses are conducted on changes in the financial globalization variables from Table 2 in both annual and five-year panels. In

the annual data, five well-defined factors are found in the annual data, accounting for 75 percent of the cumulative variance in the data set. See Table 3. The first factor accounts for 26 percent of the variance, and all of the *AREAER* text-based de jure indicators load on this factor. The second factor accounts for 13 percent of the variance, and the *AREAER* table-based indicators (KAOPEN and FOI) load on that factor. HERITAGE, TOTAL, and eGlobe separately load on the third through fifth factors, respectively, with each accounting for roughly 11–12 percent of the variance. (EQUITY cannot be entered into the annual factor analysis since 0,1 indicators cannot be validly used in factor analyses.)

In the five-year average panel data, three factors are identified. The first factor contains all the de jure *AREAER* indicators (table and text) plus eGlobe. Heritage and TOTAL continue to be members of separate factors. In longer periods of aggregation, the differences in timing changes matter less between and among the *AREAER* measures. It is clear that IF_Heritage is not a member of the other two financial factors.

The implication is that various financial globalization indicators capture different facets of financial globalization. The first set of indices captures broadly similar phenomena, essentially, the extent of legal capital account restrictions. The de facto indicator TOTAL clearly captures developments that are distinct from the legislative capital account restrictions covered. (IF_Heritage is outside any of these classifications, and it is unclear what aspect of financial globalization it represents.) Thus, it is not a priori unreasonable to include multiple indicators from different factors. The various findings suggested by correlation and factor analysis are supported by regression analysis below.

Growth Regressions

The regression analyses in this section use the two aforementioned models to explore the origins of the diverse findings in the empirical growth and financial liberalization literature. Do divergent results emerge because of differences in measures, methods, conditioning information in the models, or samples (or some of each)? Results are presented in Tables 4 and 5, and in Appendix Tables A1, A2, and A3. For better comparability of the estimates, the de jure indicators are scaled 0 to 100.

The first noteworthy result from Tables 4 and 5 is that the de jure indicators yield a broadly similar picture, even though the samples differ by time and country composition, and the conditioning information differs between Tables 4 and 5. That is, the estimates for the de jure indicators' coefficients are generally positive, and in many cases statistically significant, though not in all. KA's coefficient estimates are positive and of similar sign and magnitude to the other de jure indicators, but are not statistically significant; we discuss this finding in more detail below. (This is also true for FOI in the QT specification.) EQUITY has a (seemingly) large, positive, and highly statistically significant coefficient estimate, consistent with prior

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Table 3. Factor Analysis

Index	Annual Data					Five-Year Averaged Data		
	1	2	3	4	5	1	2	3
ΔCapital	0.775					0.842		
ΔKA_all	0.726					0.844		
ΔFin_Current	0.699					0.809		
ΔFoi		0.871				0.852		
ΔKaopen		0.575				0.790		
ΔHeritage			0.993				0.961	
ΔTotal (no bank centers)				0.996				0.959
ΔeGlobe					0.996	0.477		
Total	2.081	1.049	0.988	0.959	0.902	3.734	1.084	1.003
% of Variance	26.013	13.113	12.349	11.988	11.281	46.677	13.556	12.542
% Cumulative	26.013	39.127	51.476	63.463	74.744	46.677	60.232	72.774
Description	*AREAER* Text	*AREAER* Table	Heritage foundation	Real financial flows	Econ. globalization (incl. Trade)	*AREAER*/eGlobe	Heritage	Real flows

Notes: The factor analysis was done employing eigenvalues that explain 10percent or more of the variance in the data set as the criterion for inclusion. Factor analysis cannot be validly undertaken on 0,1 variables or variables with an arbitrary zero point, and variables with these characteristics are excluded. The analysis is done pairwise.

Table 4. Annual Data, GMM-System Estimations

(Conditioning information from QT RFS (2008) (with time and unit fixed effects))

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Variable	1953–2009	1972–2008	1970–2007	1970–2009	1981–2000	1997–2009	1997–2007	1973–2008	1973–2008	1974–2007	1974–2007	1974–2007
$\Delta Capital(t-2)$	0.017** (0.009)									0.029* (0.017)		0.038*** (0.014)
$\Delta KAOPEN(t-2)$		0.021** (0.010)								0.017 (0.013)		
$\Delta FOI(t-2)$			0.017 (0.013)							−0.022 (0.018)		
$\Delta eGlobe(t-1)$				0.135*** (0.043)						0.096*** (0.043)		
$\Delta Equity(t-1)$					2.223*** (0.755)							
$\Delta IF\_Heritage(t-1)$						−0.003 (0.0459)						
$\Delta KA\_ALL(t-2)$							0.017 (0.018)					
$\Delta Total\ (t-1)$								0.001 (0.001)	−0.004 (0.005)	−0.001 (0.001)		
$\Delta 1st\ PCA\ (\Delta Cap.,\Delta FOI, \Delta KAOPEN\ \Delta Tot.,\Delta eGlobe)$											0.015* (0.008)	
$\Delta logIncome\ (t-1)$	−8.721*** (1.454)	−13.20*** (2.075)	−12.24*** (1.766)	−11.50*** (1.606)	−0.333 (0.211)	−23.0*** (4.259)	−26.9*** (6.925)	−12.097 (1.800)	−12.22*** (1.884)	−13.18*** (2.039)	−13.52*** (2.134)	−13.20*** (2.081)
$\Delta logTrade\ Openness\ (t-1)$	2.680*** (0.956)	4.837*** (1.360)	4.862*** (1.010)	2.973*** (1.123)	1.061*** (0.348)	2.517 (3.214)	7.834*** (3.157)	4.241*** (1.186)	3.875*** (1.271)	2.214** (1.113)	2.311** (1.095)	2.548*** (1.114)
$\Delta logInvestment\ (t-1)$	1.668** (0.859)	2.272 (2.566)	1.574 (2.097)	1.228 (0.977)	0.340 (0.588)	3.983 (2.679)	0.831 (3.589)	2.312 (2.534)	3.157 (2.579)	0.015 (1.27)	0.721 (1.361)	0.393 (1.39)
$\Delta PopGrow\ (t-1)$	−0.119 (0.749)	−0.054 (0.493)	−0.071 (0.374)	−0.353 (0.324)	−0.225 (0.237)	0.997 (0.403)	0.852 (0.922)	0.190 (0.481)	−0.028 (0.333)	−0.356 (0.292)	−0.031 (0.279)	−0.323 (0.269)
Adj. *R*-square	0.072	0.065	0.059	0.08	0.03	0.154	0.14	0.072	0.078	0.129	0.120	0.123
ABm1 [*p*-value]	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.00]**	−[0.000]**
ABm2 [*p*-value]	−[0.925]	−[0.189]	−[0.062]	−[0.333]	[0.596]	**−[0.045]***	−[0.128]	**−[0.030]***	−[0.136]	−[0.114]	−[0.09]	−[0.091]
Obs./Countries	5,433/120	5,188/177	5,758/180	4,880/140	1,744/94	2,085/94	1,001/91	5,288/173	4,902/160	2,760/102	2,760/102	2,760/102

Notes: The dependent variable is per capita economic growth PPP-adjusted. (Δ1st PCA) is the product of a first principal component analysis of the financial globalization variables in model 10. Models 9 and 10 exclude banking centers. No serial correlation is indicated in GMM-SYS models when, in second stage analysis, the ABm2 test for second-order serial correlation is not significant, and the AR1 test shows evidence of significant negative serial correlation in the differenced residuals. For a discussion, see Doornik and others (2006). Standard errors are listed below the coefficients.

Table 5. Annual Data, GMM-System Estimations

(Conditioning information from BHL JFE (2005))

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
$\Delta Capital(t-2)$	0.03*** (0.011)							
$\Delta KAOPEN(t-2)$		0.038*** (0.01)						
$\Delta FOI(t-2)$			0.044*** (0.014)					
$\Delta eGlobe(t-1)$				0.213*** (0.041)				
$\Delta Equity(t-1)$					2.08** (1.030)			
$\Delta IF\_Heritage(t-1)$						−0.003 (0.041)		
$\Delta KA\_ALL(t-2)$							0.019 (0.017)	
$\Delta Total\ (nonbank)\ (t-1)$								−0.01 (0.009)
$\Delta logIncome\ (t-1)$	−8.285*** (1.506)	−10.97*** (1.66)	−10.26*** (1.641)	−9.863*** (1.437)	−19.87*** (3.91)	−22.22*** (4.686)	−19.52*** (4.75)	−1.288*** (0.33)
$\Delta logLifeExpect(t-1)$	0.1 (0.089)	0.022 (0.129)	0.03 (0.1)	−0.065 (0.126)	0.204 (0.238)	0.329 (0.391)	−0.831 (0.593)	0.132*** (0.041)
$\Delta EdAttain\ (t-1)$	−0.261 (0.385)	−0.338 (0.399)	−0.078 (0.424)	−0.38 (0.388)	0.009 (0.8)	−1.343 (1.015)	0.637 (1.314)	0.252 (0.117)
$\Delta PopGrow\ (t-1)$	−0.323 (0.391)	−0.196 (0.353)	−0.106 (0.344)	−0.304 (0.243)	−0.247 (0.329)	0.231 (0.525)	0.304 (0.779)	−0.054 (0.212)
$\Delta GovExpend(t-1)$	−1.526 (1.106)	0.764 (1.517)	−0.742 (1.267)	0.512 (1.065)	4.73* (2.608)	1.33 (2.671)	3.597 (3.09)	0.287 (0.477)
Adjusted R-square	0.068	0.071	0.056	0.079		0.187	0.17	0.066
ABm1 [p-value]	−[0.000]**	−[0.000]**	−[0.000]**	−[0.000]**	−[0.002]**	−[0.000]**	−[0.002]**	−[0.000]**
ABm2 [p-value]	[0.728]	−[0.562]	−[0.318]	−[0.593]	[0.455]	−[0.026]*	−[0.414]	−[0.865]
Obs./Countries	4,419/110	4,040/138	4,513/140	4,187/124	1,594	1,791/136	930/85	3,926/128

Notes: The dependent variable is per capita economic growth PPP-adjusted. No serial correlation is indicated in GMM-SYS models when, in second stage analysis, the ABm2 test for second-order serial correlation is not significant, and the AR1 test shows evidence of significant negative serial correlation in the differenced residuals. For a discussion, see Doornik and Hendry (2001, p. 69). Standard errors are listed below the coefficients.

*p-value <0.10; **p-value <0.05; ***p-value <0.01.

studies. Another noteworthy result is that the coefficient estimates for the financial globalization de jure variables are systematically larger in the BHL models. The BHL models do not contain information about trade or investment, information which overlaps with the financial globalization variables. The factor analysis suggested that eGlobe, TOTAL, and IF_Heritage measure different facets of financial globalization from the other indicators. Both IF_Heritage and TOTAL have coefficient estimates that are essentially zero. For the nonbanking center version of TOTAL, the coefficient turns negative, though not statistically significantly so. eGlobe, which measures a broader concept of openness, has a very large and highly statistically significant coefficient, especially in the BHL model.

The results based on annual data are broadly confirmed when re-estimating the models with five-year averaged data (see Table A1 in the supplemental appendix). In Tables A2 and A3, we also report results for regressions with identical samples (where feasible) in both specifications. The coefficient estimates for the de jure IMF variables (CAPITAL, KAOPEN, and FOI) are all positive and very similar in size and level of statistical significance, although that of eGlobe is triple the size of the others. The regression specification—in terms of control variables—is not crucial: the BHL and QT specifications yield similar results. TOTAL (nonbanking countries) shows a negative (though not statistically significant) coefficient estimate in both specifications. (KA and IF_Heritage cannot be used in this experiment.)

The results of the factor analyses suggest that financial globalization variables represent multiple underlying factors with modest to zero correlations. In principle, investigators will potentially improve the fit of the models by including indicators representing these different facets of globalization. An alternative is for a researcher to produce components from the different indices, and use the resulting first principal component (1st PCA) in empirical work to represent financial globalization (for example, Chinn and Ito's KAOPEN). A third method is for investigators to use the variable with the largest loading on the first principal component. The first approach will be more appealing when multiple underlying well-defined substantive factors are present. The 1st PCA approach will appeal when the underlying structure of the data has one dominating underlying factor that is crudely measured by available indicators, which is true in the case of KAOPEN.[24] The third approach is suitable when, as in the second case, a single factor dominates the data, but at least some of the available indicators are relatively precisely measured.

As an experiment, we explore all three approaches in Table 4, models 10, 11, and 12. The models are constrained to an identical sample of countries and years, based on the QT variables, for which CAPITAL, KAOPEN, FOI,

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[24]The PCA transformation will produce as high a variance as possible for the first component. The necessary assumption is that the data are normally distributed.

eGlobe, and TOTAL (nonbanking) are all jointly available. CAPITAL, KAOPEN, FOI, eGlobe, and TOTAL (nonbanking) are entered into model 10 in Table 4. The finding from the factor analysis that the indicators can be divided into groups of similar underlying information is borne out also in the regressions where more than one indicator is included simultaneously. In the annual and five-year models, both CAPITAL and eGlobe retain their positive and statistically significant coefficient estimates.[25] In the five-year models (Tables A2 and A3—available in the appendix), TOTAL nonbanking has a negative and statistically significant coefficient estimate. The explanatory power of the models is improved by including multiple indicators of financial globalization.

Model 11 includes the 1st Principal Component from CAPITAL, KAOPEN, FOI, eGlobe, and TOTAL (nonbanking).[26] The 1st PCA variable is positive and statistically significant (at the 0.1 level), but the explanatory power of the model decreases. Entering the variable with the largest loading in the 1st PCA by itself (CAPITAL) in model 12 modestly improves the explanatory fit over model 11, but the best fit is still achieved in model 10 through inclusion of multiple variables.

More generally, if the underlying indicators are crude, then creating a composite financial globalization measure from available measures using the 1st PCA can be a good solution (as, for example, was the case of KAOPEN given binary underlying variables). But, in employing 1st PCA when other available indicators are precisely measured, some identifying variance will be lost, so using a well-measured indicator, or multiple ones if the investigator is interested in multiple facets of financial globalization, would be preferable.

As another experiment, separate models are estimated for advanced industrial (OECD, 22 countries) and other countries. In all six specifications, the coefficient estimates are positive and statistically significant. The estimated coefficients for the non-OECD sample are systematically larger than the estimates for OECD countries, supporting the supposition that country sample can matter. Given that OECD economies are, on average, more liberalized than non-OECD economies, this is a plausible finding if there are "diminishing returns to liberalization," that is, if the biggest dividend is achieved during the early stages of liberalization.[27]

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[25]See model 6 in Table A2, and model 6 in Table A3 in the supplemental appendix. In the five-year models (Tables A2 and A3), TOTAL nonbanking has a negative and statistically significant coefficient estimate.
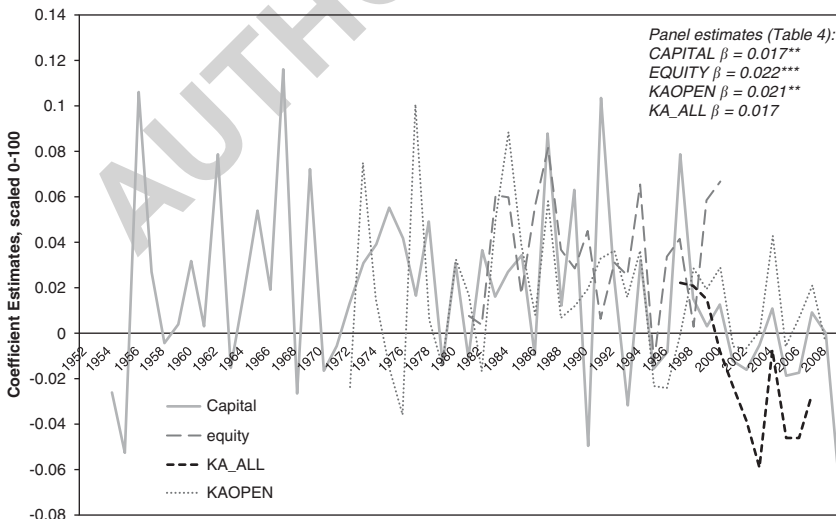
[26]The PCA loadings are 0.7 for $\Delta Capital$; 0.69 for $\Delta KAOPEN$; 0.636 for ΔFOI; 0.303 for $\Delta eGLOBE$; and 0.041 for $\Delta TOTAL$.

[27]Edison and others (2004) also test Rodrik's (1998) conjecture that capital account liberalization is a proxy for government reputation (as measured in Knack and Keefer, 1995) and find support for it. An important methodological point raised by Cline (2010, pp. 165–6), however, is that the Government Reputation variable is endogenous to rater expectations about future growth based upon past growth. In results not reported here, we find strong evidence supporting Cline's supposition of the endogeneity of government reputation to economic growth.

The results discussed above suggest that most indices provide overlapping information, although the results for de facto indicator TOTAL are different, which is expected from the correlation and factor analysis. KA is insignificant despite the previous findings of a close similarity with CAPITAL. Figure 2 provides a (partial) answer as to why. The figure is based on estimating coefficients estimates per year for CAPITAL, EQUITY, KAOPEN, and KA (see specification (3) above). All the variables are scaled 0 to 100. The coefficients estimates are fairly similar across all four indicators, exhibiting a decline in the effects in the more recent period. When estimating the impact on growth, it is important to note that CAPITAL and KAOPEN are indicators that are available for a longer time period—thus, their average estimated effects draw on the full period, with strong positive effects of financial globalization on growth during the 1970s to the 1990s.

KA, by contrast, is available only for the recent period in which all indicators indicate a weakening or even negative impact—it is unsurprising, then, that the estimated coefficient is not statistically significant. The higher estimated coefficients for EQUITY are also a result of time period: CAPITAL and KAOPEN have many statistically significant and positive coefficient estimates of the same magnitude as EQUITY for the 1980–99 period. KAOPEN and CAPITAL converge in parameter estimates in the later period, though show substantial divergence in the 1970s. Thus, the time-period

Figure 2. Yearly Coefficient Estimates of the Effects of Financial Openness Indicators on Growth, 1954–2009 (GMM-System Estimations Using QT RFS Models)

Notes: See text for sources and descriptions. All indicators are scaled to 0–100 for comparability. Period dummies are used in the models.

matters—apparent differences in information conveyed by various indicators are in part due to differences in the time period covered.

We also explored the importance of estimators and conditioning information, using CAPITAL for the experiment (because of its long temporal sample). Figure A2 in the supplemental appendix plots annual estimates of CAPITAL's effect on growth for the full range of countries using OLS (not reported but available on request) and GMM system estimators on the QT specification, and GMM system estimators on the BHL sample. Differences in estimators and conditioning information do not appreciably influence the results as the yearly parameter estimates move closely together.

As a final experiment, we considered regional differences. (Figure A3 in the supplemental appendix plots yearly estimates for CAPITAL by period for OECD and non-OECD countries.) Consistent with Figures 2 and A2, the parameter estimates are smaller in recent panels. The gains of financial openness for OECD countries occur early in the sample, and turn negative during the recent financial crises. Estimates for emerging market countries are always positive, but are larger earlier in the period studied.

In summary, estimation methods and conditioning information in the models have at most modest influence on the parameter estimates. Measurement, in contrast, does matter in the sense that different variables are associated with different factors of financial globalization. The factor represented by TOTAL (real flows) has a zero to modestly negative effect. The factor represented by eGlobe (economic globalization in general) has a large, positive, and robust statistically significant effect on growth. The factor represented by de jure text indicators (CAPITAL especially) has a modest but robust positive and statistically significant effect, and so does EQUITY. KA indicates a similar magnitude of effects, though not statistically significant. The factor represented by the IMF categorical tables (KAOPEN and FOI) has a generally positive and often statistically significant effect, broadly similar to those of CAPITAL.

Apart from the real flows vs. financial openness distinction, the other main differences arise from sample composition. The dominant effect is the time period under consideration. Studies undertaken using data from the 1980s and 1990s (BHL, 2005) or 1960s through 1990s (QT, 2008) are more likely to report positive effects than those undertaken more recently. During the recent financial crisis, the effects of openness under some conditions turn negative. Another important sample effect is the composition of advanced vs. other countries, as the parameter estimates for nonadvanced economies are systematically larger than for OECD countries.

V. Conclusions

In this article, we have described a broad range of measures of financial globalization and integration, including de jure, de facto, and hybrid measures. Table 6 offers a summary overview of the main measures, describing each measure's main properties, strengths, and weaknesses. A key result is that most

Table 6. Comparison of Financial Globalization Measures

Measure	Scale/Countries/Years	Description	Advantages	Disadvantages
CAPITAL	0–100/122/1949–2007	De jure, **Interval, Capital account**. Coding of *AREAER* text. Includes information about restrictions on residents and nonresidents.	Resident, nonresident; severity of restrictions balancing across all categories of financial transactions. Broad sample size. Longest period available.	Intercoder reliability (text); costly to replicate.
eGlobe—KOF	20–99/141/1970–2007	**Blended de facto**/de jure, **Categorical/ordinal**, Based on "actual flows" of trade, FDI, portfolio, and remittances, plus "restrictions" on imports, tariffs, taxes on trade and capital account restrictions.	Extensive measure covering trade and financial variables.	Too broad a measure for some financial globalization applications. 50% of information trade based. Persistent serial correlation.
EQUITY	0,1/95/1980–99	De jure, **Categorical, Equity markets**. Binary measure based on chronology of Official Equity Market Liberalization events compiled by BHL (2005). "1" indicates the date by which foreign investors may own equity in a market.	Provides precise chronology of clearly defined equity liberalizations.	Smaller sample size; specific to equity liberalizations; binary measure does not capture variations in liberalization. Reversals not accounted for.
FIN_CURRENT	0–100/122/1948–2007	De jure, **Interval, Current account**. Coding of *AREAER* text. Includes information about restrictions on residents and nonresidents.	Resident, nonresident; severity of restrictions balancing across all categories of financial transactions. Broad sample size. One of few data sets on services restrictions. Longest period availability.	Intercoder reliability (text); costly to replicate.
FOI	0–12/187/1970–2007	De jure, **Categorical, Financial Current and Capital account**. Extension of Johnston and Tamirisa (1998) methodology backward from 1997 to 1965. Binary subcomponents of *AREAER* are added to produce a score.	Broad country and time coverage; inward/outward distinction; gradated index.	Intercoder reliability (table and text). Nontransparent coding methods; not publicly available.
FORU	0–1 (reversed)/31/1989–2006	Blended de facto/de jure. Measures degree of restriction on foreign access to a countries equity markets	Monthly frequency; clearly defined measure of equity market investability.	Limited sample size; specific to equity market liberalization.

Table 6 *(concluded)*

Measure	Scale/Countries/Years	Description	Advantages	Disadvantages
KA	0–1/91/1995–2005	De jure, **Ordinal, Capital account**. Coding of *AREAER* text from 1995 to 2005. Information about restrictions on six types of instruments; the direction of flows; and the residency of agents. 19 discrete categories available.	Transparent coding and construction; multiple dimensions: controls by residency, direction of flows and by asset categories; aggregates provide gradated extensive information.	Intercoder reliability (text). More limited sample coverage (91 countries during 1995–2005); expensive to replicate/extend.
KAOPEN	−1.80–2.54/181/1970–2006	De jure, **Categorical, Financial current and Capital account**. Based on principal component analysis of binary indicators in *AREAER*,: "multiple exchange rates," "current account," "surrender of export proceeds," and five year average of IMF_BINARY (called SHARE, as in Klein, 2003).	Easy to replicate; comprehensive measure of overall de jure financial globalization; available for all IMF member countries represented in *AREAER* Table.	Intercoder reliability (table). Structural break in the Tables 1995–1996; five-year moving average of IMF_Dummy; mixes different types of financial restrictions.
IF_HERITAGE	Varies (see text)/179/1995–2011	De jure, **Categorical/ordinal, "Investment Freedoms."** Assessment of policies governing domestic and international investments including investment restrictions, national treatment, and payment restrictions. Scale intervals change in 2007 and 2010.		Not recommended for use in panel studies.
Inward FDI	% of GDP (World FDI)/153/1970–2010	De facto. An extensive measure of a country's inward FDI as a % of either gross domestic product or World FDI, from UNCTAD. Three differing definitions of FDI are embedded, creating structural breaks in the data.	Easily accessed online. Large sample size.	Changing thresholds of FDI and Portfolio; inconsistent definitions of FDI and portfolio investment; may not measure financial globalization.
TOTAL	39%—19,975%/145/1970–2007	De facto. A country's aggregate assets and liabilities (summed) over its gross domestic product. Composition includes FDI, equity investment, external debt, and official reserves controlling for valuation.	Comprehensive time and country coverage; differentiation by key asset categories.	Banking center nations exhibit extreme values in many cases; Many series characterized by explosive properties.

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of the measures provide information that is linked in a meaningful way to economic outcomes. The exception is IF_Heritage, an indicator that we found not to be correlated with other indices, to have no measurable impact on economic growth, and to be linked in the factor analysis to unique dynamics that are not easily interpretable. Correlation and factor analyses suggest that investigators using de facto indicators of financial globalization will find differing identifying variances from those found in the de jure measures. In part, this is because de facto measures likely reflect the influences of many political and economic factors, of which legal restrictions of the capital accounts, as indicated by the de jure measures, are but one.

Many of the de jure indicators provide similar information, reflecting in part the fact that most of them draw on information contained in the IMF's *AREAER*. While coding textual information involves a certain degree of subjectivity, the fact that different indices provide similar information should instill confidence in researchers using these measures.

For most de jure measures, therefore, researchers can be reasonably assured they are capturing meaningful facets of international financial openness. Reflecting this, researchers should be primarily guided by (1) how well the index coverage matches that of their sample and (2) the desired degree of disaggregation. If more aggregate information suffices, CAPITAL and KAOPEN provide the broadest country and time coverage, though researchers should take note of the structural break in KAOPEN in 1996. If a more disaggregate perspective is important, such as differences between restrictions on different asset classes or those on inflows and outflows, then KA may be the best choice, albeit at the expense of a more restricted sample size. Authors interested specifically in equity liberalizations will want to also examine EQUITY in addition to the equity-subcategory of KA.

Other de jure indices have certain drawbacks. IMF_Binary imparts measurement error due to its binary nature while FOI is not publicly available. IF_Heritage suffers from methodological drawbacks given its "scaling" shifts, unclear methodology, and idiosyncratic data properties, as well as limited time coverage.

De facto measures are the main alternative to de jure measures, and they capture information on financial integration that is distinct from that contained in the de jure indicators. The index of choice here is TOTAL, which has a broad sample coverage and which has become the "industry standard" among de facto variables. Researchers specifically interested in FDI flows may also consider the Inward_FDI variable by UNCTAD. However, FDI data generally suffer from inconsistencies in definition across countries and time, making it difficult to clearly separate between actual differences in FDI and those resulting from different definitions. (This drawback applies also to the FDI subcategory of TOTAL.) A point of note is that the exclusion or inclusion of banking center data in the financial flows data can strongly influence estimations.

Hybrid indicators are another alternative, among which eGlobe stands out as a preferred measure. One drawback is that information about financial

globalization is only part of eGlobe: trade information accounts for 50 percent of the index' components (Dreher, 2006). However, it does provide information that is distinct from others, and its broad sample coverage, especially on the country dimension, can make it an appealing measure of economic integration.

Within each group, sample effects—both the time period covered, and the mix of advanced and nonadvanced economies—can often have a more substantial impact on regression estimates than the estimation method, or the precise set of control variables. Regarding the time dimension, the positive relationship of capital account liberalization on growth appears to have declined over time—thus, a focus on more recent years will tend to yield lower coefficient estimates. On the country dimension, the estimated effects are larger in emerging than in advanced economies, so the country composition will, again, affect estimates.

The bottom line of this paper is that researchers in this field have an unusually large choice of indicators, most of which are valid, with unique advantages and disadvantages. Different research objectives will lead researchers to choose different indices, but a comparison of results across different indicators will only be informative once sample differences are controlled for.

Some directions for future work on measuring financial openness follow directly from our analysis. Continuous updates of the many valid measures, as well as extensions to broader country samples, will be important for continued research to make further progress, especially in light of the importance of the time dimension. There is also scope for new measures to capture facets not yet reflected in existing measures. For example, little work exists on prudential regulations—the *AREAER* contains some information in this regard which has not yet been sufficiently exploited. Importantly, however, our analysis highlights that to be useful, any new measure must be transparent, objective, and consistent across countries and time.

REFERENCES

Abiad, A., and A. Mody, 2005, "Financial Reform: What Shakes It? What Shapes It?" *American Economic Review*, Vol. 95, pp. 66–88.

Alesina, A., V. Grilli, and G.M. Milesi-Ferretti, 1994, "The Political Economy of Capital Controls," in *Capital Mobility: The Impact on Consumption, Investment, and Growth*, ed. by L. Leiderman and A. Razin (New York: Cambridge University Press).

Arellano, M., and O. Bover, 1995, "Another Look at the Instrumental Variables Estimation of Error-Components," *Review of Economic Studies*, Vol. 68, pp. 277–97.

Bajpai, N., and N. Dasgupta, 2004, "What Constitutes Foreign Direct Investment? Comparison of India and China," CGSD Working Paper No. 1.

Barro, R., and J.W. Lee, 2010, "A New Data Set of Educational Attainment in the World, 1950–2010," NBER Working Paper #15902.

Bekaert, G., and C.R. Harvey, 2002, "A Chronology of Important Financial Economic and Political Events in Emerging Markets," Available via the Internet: www.duke.edu/~Charvey/Country_risk/couindex.htm.

Bekaert, G., C.R. Harvey, and C. Lundblad, 2005, "Does Financial Liberalization Spur Growth?" *Journal of Financial Economics*, Vol. 77, pp. 3–55.

Binici, M., M. Hutchison, and M. Schindler, 2010, "Controlling Capital? Legal Restrictions and the Asset Composition of International Financial Flows," *Journal of International Money and Finance*, Vol. 29, pp. 666–84.

Blanchard, O.J., and F. Giavazzi, 2002, "Current Account Deficits in the Euro Area: The End of the Feldstein-Horioka Puzzle?" *Brookings Papers on Economic Activity*, Vol. 2, pp. 147–209.

Blundell, R.W., and S.R. Bond, 1998, "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, Vol. 87, pp. 115–43.

Brune, N.E., and A. Guisinger, 2006, "Myth or Reality? The Diffusion of Financial Liberalization in Developing Countries," Available via the Internet: www.princeton.edu/~pcglobal/conferences/IPES/papers/brune_guisinger_F900_1.pdf.

Chari, A., and P.B. Henry, 2004, "Risk Sharing and Asset Prices: Evidence from a Natural Experiment," *Journal of Finance*, Vol. 59, pp. 1295–324.

Chinn, M.D., and H. Ito, 2002, "Capital Account Liberalization, Institutions and Financial Development: Cross Country Evidence," National Bureau of Economic Research Working Paper No. 8967.

———, 2006, "What Matters for Financial Development?" *Journal of Development Economics*, Vol. 81, pp. 163–92.

———, 2008, "A New Measure of Financial Openness," *Journal of Comparative Policy Analysis*, Vol. 10, pp. 309–22.

Cline, W.R., 2010, *Financial Globalization, Economic Growth, and the Crisis of 2007–09* (Washington, DC: Peterson Institute for International Economics).

Dell'Ariccia, G., others 2008, "Reaping the Benefits of Financial Globalization," IMF Occasional Paper No. 264 (Washington, DC: International Monetary Fund).

Dooley, M.P., D.J. Mathieson, and L. Rojas-Suarez, 1997, "Capital Mobility and Exchange Market Intervention in Developing Countries," IMF Working Paper No. 96/131 (Washington, DC: International Monetary Fund).

Doornik, J., and D.F. Hendry, 2001, *Econometric Modeling Using PCGive 10: Volume III* (London: Timberlake Consultants).

Doornik, J, D.F. Hendry, M. Arellano, and S. Bond, 2006, "Panel Data Models (DPD)," in *Econometric Modeling: PCGive 11*, ed. by Doornik J. and D.F. Hendry (London: Timberlake Consultants).

Dreher, A., 2006, "Does Globalization Affect Growth?: Evidence From a New Index of Globalization," *Applied Economics*, Vol. 38, pp. 1091–110.

Dreher, A., N. Gaston, and P. Martens, 2008, *Measuring Globalization: Gauging its Consequences* (New York: Springer).

Edison, H.J., and F. Warnock, 2003, "A Simple Measure of the Intensity of Capital Controls," *Journal of Empirical Finance*, Vol. 10, pp. 81–103.

Edison, H.J., M.W. Klein, L. Ricci, and T. Sløk, 2004, "Capital Account Liberalization and Economic Performance: Survey and Synthesis," *IMF Staff Papers*, Vol. 51, No. 2, pp. 22–56.

Edwards, S., 2005, "Capital Controls, Sudden Stops and Current Account Reversals," National Bureau of Economic Research Working Paper No. 11170.

Eichengreen, B.J., 2001, "Capital Account Liberalization: What Do The Cross-Country Studies Tell Us?" *World Bank Economic Review*, Vol. 15, pp. 341–66.

Eichengreen, B.J., and D. Leblang, 2008, "Democracy and Globalization," *Economics and Politics*, Vol. 20, No. 3, pp. 289–334.

Epstein, G.A., and J.B. Schor, 1992, "Structural Determinants and Economic Effects of Capital Controls in OECD Countries," in *Financial Openness and National Autonomy*, ed. by T. Banuri and J.B. Schor (Oxford: Clarendon Press).

Feldstein, M., and C. Horioka, 1980, "Domestic Saving and International Capital Flows," *Economic Journal*, Vol. 90, pp. 314–29.

Fujiki, H., and Y. Kitamura, 1995, "Feldstein-Horioka Paradox Revisited," *BoJ Monetary and Economic Studies*, Vol. 13, pp. 1–16.

Garrett, G., 1995, "Capital Mobility, Trade, and the Domestic Politics of Economic Policy," *International Organization*, Vol. 49, pp. 657–87.

Gourinchas, P.O., and O. Jeanne, 2006, "The Elusive Gains from International Financial Integration," *Review of Economics Studies*, Vol. 73, pp. 715–41.

Grilli, V., and G.M. Milesi-Ferretti, 1995, "Economic Effects and Structural Determinants of Capital Controls," *IMF Staff Papers*, Vol. 42, pp. 517–51.

Gwartney, J., and R. Lawson, 2009, *Economic Freedom of the World* (Washington, DC: Cato Institute).

Henry, P.B., 2007, "Capital Account Liberalization: Theory, Evidence, and Speculation," *Journal of Economic Literature*, Vol. 45, pp. 887–935.

Heritage Foundation/Wall Street Journal, Various years. 1992 on, *Index of Economic Freedom*, Available via Internet: http://www.heritage.org/index.

International Monetary Fund, Various years, 1950 on, *Annual Report on Exchange Restrictions*, International Monetary Fund. Continued by *Annual Report on Exchange Arrangements and Exchange Restrictions* after 1979 and *Exchange Arrangements and Exchange Restrictions* after 1989.

———, 1993, *Balance of Payments Manual* (Washington, DC: IMF, 5th ed.).

International Monetary Fund (IMF), 2001, *World Economic Outlook*, October), pp. 145–73.

International Monetary Fund, 2008, *Balance of Payments Manual* (Washington, DC: IMF, 6th ed.).

Johnson, S., W. Larson, C. Papageorgiou, and A. Subramanian, 2009, "Is Newer Better? Penn World Table Revisions and Their Impact on Growth Estimates," National Bureau of Economic Research Working Paper No. 15455.

Johnston, R.B., and N.T. Tamirisa, 1998, "Why Do Countries Use Capital Controls?," IMF Working Paper No. 98/181 (Washington, DC: International Monetary Fund).

Kaminsky, G., and S.L. Schmukler, 2008, "Short-Run Pain, Long-Run Gain: The Effects of Financial Liberalization," *Review of Finance*, Vol. 12, pp. 253–92.

Karcher, S., and D.A. Steinberg, forthcoming, "Assessing the Causes of Capital Account Liberalization: How Measurement Matters," *International Studies Quarterly*, Vol. 57, No. 1.

Kastner, S.L., and C. Rector, 2003, "International Regimes, Domestic Veto-Players, and Capital Controls Policy Stability," *International Studies Quarterly*, Vol. 47, pp. 1–22.

Kim, J.-O., and C.W. Mueller, 1978, *Factor Analysis. Statistical Methods and Practical Issues* (Beverly Hills, CA: Sage University Paper Series on Quantitative Applications in the Social Sciences).

Klein, M.W., 2003, "The Variety of Experience of the Effect of Capital Account Openness on Growth," National Bureau of Economic Research Working Paper No. 9500.

Klein, M.W., and G.P. Olivei, 2008, "Capital Account Liberalization, Financial Depth, and Economic Growth," *Journal of International Money and Finance*, Vol. 27, pp. 861–75.

Knack, S., and P. Keefer, 1995, "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures," *Economics and Politics*, Vol. 7, pp. 207–27.

Kose, M.A., E. Prasad, K. Rogoff, and S.J. Wei, 2009, "Financial Globalization: A Reappraisal," *IMF Staff Papers*, Vol. 56, No. 1, pp. 8–62.

Kose, M.A., E.S. Prasad, and A.D. Taylor, 2011, "Thresholds in the Process of International Financial Integration," *Journal of International Money and Finance*, Vol. 30, pp. 147–79.

Lane, P.R., and G.M. Milesi-Ferretti, 2006, "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004," IMF Working Paper No. 06/69.

————— , 2007, "The External Wealth of Nations, Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004," *Journal of International Economics*, Vol. 73, pp. 223–50.

Leblang, D., 1997, "Are Capital Controls Obsolete? Evidence from the Developed and Developing World, 1967–1986," *International Studies Quarterly*, Vol. 41, pp. 435–54.

Levy Yeyati, E., S.L. Schmukler, and N. Van Horen, 2009, "International Financial Integration Through The Law of One Price: The Role of Liquidity and Capital Controls," *Journal of Financial Intermediation*, Vol. 18, pp. 432–63.

Miniane, J., 2004, "A New Set of Measures on Capital Account Restrictions," *IMF Staff Papers*, Vol. 51, pp. 276–308.

Mishkin, F.S., 2009, "Why We Shouldn't Turn Our Backs on Financial Globalization," *IMF Staff Papers*, Vol. 56, No. 1, pp. 139–70.

Mody, A., and A.P. Murshid, 2005, "Growing Up With Capital Flows," *Journal of International Economics*, Vol. 65, pp. 249–66.

Montiel, P., 1994, "Capital Mobility in Developing Countries: Some Measurement Issues and Empirical Estimates," *World Bank Economic Review*, Vol. 8, pp. 311–50.

Obstfeld, M., 2009, "International Finance and Growth in Developing Countries: What Have We Learned?" *IMF Staff Papers*, Vol. 56, No. 1, pp. 63–111.

Ostry, J.D, A.R. Ghosh, M. Chamon, and M.S. Qureshi, 2011, "Capital Controls: When and Why?" *IMF Economic Review*, Vol. 59, No. 3, pp. 562–80.

Pandya, Sonal S., 2011, "Trading Spaces: The Political Economy of Foreign Direct Investment Restrictions, 1970–2000," University of Virginia Typescript.

Prati, A., M. Schindler, and P. Valenzuela, 2009, "Who Benefits from Capital Account Liberalization? Evidence from Firm-Level Credit Ratings Data," IMF Working Paper No. 09/210.

Quinn, D., 1997, "The Correlates of Change in International Financial Regulation," *American Political Science Review*, Vol. 91, pp. 531–51.

Quinn, D.P., 1992, "Measuring International Financial Openness," paper presented at the 1992 Annual Meetings of the American Political Science Association Meetings.

Quinn, D.P., and A.M. Toyoda, 2007, "Ideology and Voter Sentiment as Determinants of Financial Globalization," *American Journal of Political Science*, Vol. 51, pp. 344–63.

———— , 2008, "Does Capital Account Liberalization Lead to Growth?" *Review of Financial Studies*, Vol. 21, pp. 1403–49.

Quinn, D.P., and R. Jacobson, 1989, "Industrial Policy through the Restriction of Capital," *American Journal of Political Science*, Vol. 33, pp. 700–36.

Rodrik, D., 1998, "Who Needs Capital-Account Convertibility?" in *Should the IMF Pursue Capital-Account Convertibility?* ed. by Stanley Fischer and others, Essays in International Finance No. 207, International Finance Section, Department of Economics, Princeton University.

Rodrik, D., and A. Subramanian, 2009, "Why Did Financial Globalization Disappoint?" *IMF Staff Papers*, Vol. 56, No. 1, pp. 112–38.

Schindler, M., 2009, "Measuring Financial Integration: A New Data Set," *IMF Staff Papers*, Vol. 56, pp. 222–38.

Tamirisa, N., 1999, "Exchange and Capital Controls as Barriers to Trade," *IMF Staff Papers*, Vol. 46, pp. 69–88.

United Nations Conference on Trade and Development, various years, *World Investment Report*.

Voth, H.J., 2003, "Convertibility, Currency Controls and the Cost of Capital in Western Europe, 1950–99," *International Journal of Finance and Economics*, Vol. 8, pp. 255–76.

Wacziarg, R., and K.H. Welch, 2008, "Trade Liberalization and Growth: New Evidence," *World Bank Economic Review*, Vol. 22, pp. 187–231.

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