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Understanding economic openness: A review of existing measures*

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Abstract

This paper surveys measures of economic openness, the latter being understood as the degree to which non-domestic actors can or do participate in a domestic economy. Building on the existing literature we introduce a typology of openness indicators, which distinguishes between 'real' and 'financial' openness as well as 'de-facto' and 'de-jure' measures of openness. We use data collected on these indicators to analyze trends in openness over time and to conduct a correlation analysis across indicators. Finally, we illustrate the potential consequences of employing different openness measures within a growth regression framework.

Keywords: Economic openness, Trade openness, financial openness, globalization.
JEL codes: F00, F40, F60.

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1. Introduction

The impact of economic openness on domestic economies has been a prime area of interest within both the scientific community as well as the wider public. The relevant debates, however, use a great diversity of concepts to describe the extent of international economic integration: terms like 'trade openness', 'economic integration', 'trade liberalization' and 'globalization' are widely used when the general increase in economic openness during the last decades is addressed. The same observation holds true for the financial dimension, where terms like 'financial openness', 'financial integration' and 'financial globalization' are used regularly and often interchangeably (e.g., Kose et al. 2009; De Nicolo and Juvenal 2014; Saadma and Steiner 2016).

In analogy to this variety of terms and concepts, a large variety of *measures* of economic openness have been developed. These measures typically emphasize different aspects of economic integration. As a consequence, not only the definition, but also the measurement of openness has varied considerably over the past three decades and a corresponding lack of consensus on how to best measure economic openness has been widely acknowledged (e.g. Yanikkaya 2003; Squalli and Wilson 2011; Busse and Koeniger 2012; Huchet-Bourdon et al. 2014; Egger et al. 2019). At the same time, many econometric studies discount the underlying debate on the measurement of economic openness by simply employing the most popular measures without any in-depth explanations or justifications for doing so. Against this backdrop, this paper contributes to the literature by providing a systematic collection, categorization and evaluation of the most prominent openness indicators used in the relevant literature. The main purpose of our work is threefold: first, we provide applied researchers with relevant information to make an informed choice on the use of different openness indicators, which eventually depends on the specific questions and methods employed in their empirical work. Second, we highlight the practical implications of choosing some openness indicator by showing how empirical outcomes change when different openness indicators are used. Third, we compile a data set on openness indicators to be used in further research, where the data are based on 216 countries over the time period 1960 to 2019, although coverage for individual openness variables varies widely in the country and time dimension. This data set is made available via an openly available R package through which researchers can regularly get the most up to date versions of the data discussed in this paper, including references to all the primary sources for the relevant indicators.[4]

[4] The package is available via Github: https://github.com/graebnerc/OpennessDataR. Researchers who do not use R can nevertheless download the fully compiled data, which will be regularly updated by the authors.

In this context we will operate under two restrictions: first, we consider only measures that are available for at least 20 years. Second, we restrict ourselves to direct measures of economic openness. As a consequence, we exclude instrumental variables that are sometimes developed to deal with endogeneity problems and to estimate causal effects of openness indicators on outcome measures such as economic growth,[5] as well as indicators based on extensive models of domestic economies (e.g. Waugh and Ravikumar 2016). While these approaches deserve their own assessment, we confine ourselves to direct measures of economic openness for two main reasons: first, finding a suitable instrument or model capturing trade openness is heavily context-dependent and requires additional theoretical assumptions (e.g. exclusion restrictions). Thus, a *general* assessment of such instruments seems difficult to undertake. Second, direct openness measures as discussed below are not only a prerequisite for instrument design, but also predominant in most of the applied literature (e.g. Dreher et al. 2010; Martens et al. 2015; Potrafke 2015).

The paper proceeds as follows: the next section introduces a typology for openness indicators by discussing the distinction between 'trade' and 'financial' openness, which have a 'de-facto' and 'de-jure' dimension, respectively. We classify the most commonly used openness measures according to this typology. Section 3 provides descriptive trends of the most relevant openness indicators, while section 4 analyzes the relationship of these indicators by inspecting the correlations between different openness measures. Section 5 highlights the practical implications of choosing among different measures within a growth regression framework. Section 6 summarizes and concludes the paper.

2. Measures of economic openness

Economic globalization and openness are often used interchangeably. In the relevant literature, however, openness is the most common term for capturing phenomena of increasing international integration in trade and finance, and we prefer using it to the term "globalization". Existing measures of economic openness, generally understood as the degree to which non-domestic actors can or do participate in a domestic economy, can be grouped in two ways: first, according to the type of openness – 'real' or 'financial' – they aim to measure, and, second, according to the sources utilized in composing the openness measure. These sources are either aggregate economic statistics (de-facto measures) or assessments of the institutional foundations

[5] For example, Frankel and Romer (2000) prominently use predictions from a gravity equation to instrument for trade openness in cross-sectional regressions. Felbermayr and Gröschl 2013 estimate the effects of (instrumented) trade openness on income levels with panel data.

of economic openness, i.e. the legally established barriers to trade and financial transactions (de-jure measures).

In addition, 'hybrid' measures aim to incorporate information on both, real and financial aspects, while "combined" measures also strive to integrate information on de-facto as well as de-jure aspects of economic openness (see Table 1).

<table>
<tr><th></th><th>Evaluation of openness with regard to real flows (goods and services)</th><th>Evaluation of openness with regard to financial flows</th><th>Combined measures</th></tr>
<tr><td rowspan="2">Evaluation of outcomes: De-facto measures of economic openness</td><td>De-facto measures of trade openness, for example: total imports or total exports (relative to GDP)</td><td>De-facto measures of financial openness, for example: FDI inward/outward or foreign financial assets/liabilities</td><td rowspan="4">Measures integrating real and financial aspects</td></tr>
<tr><td colspan="2">Hybrid measures for de-facto openness</td></tr>
<tr><td rowspan="2">Evaluation of legal framework: De-jure measures of economic openness</td><td>De-jure measures of trade openness, for example: tariff rates or non-tariff trade barriers</td><td>De-jure measures of financial openness, for example: FDI restrictions or capital account restrictions</td></tr>
<tr><td colspan="2">Hybrid measures for de-jure openness</td></tr>
</table>

Table 1: Types of openness indicators.

De-facto measures are outcome-oriented indicators, reflecting a country's actual degree of integration into the world economy. De-jure measures, on the other hand, are based upon an evaluation of a country's legal framework: they reflect a country's willingness to be open as expressed by the prevailing regulatory environment. Typically, de-jure measures on trade are based on tariff rates (such as duties and surcharges), information on non-tariff trade barriers (such as licensing rules and quotas) or tax revenues emerging from trade activities relative to GDP. Financial de-jure measures indicate the extent to which a country imposes legal restrictions on its cross-border capital transactions. As de-jure indicators evaluate a country's regulatory environment, it is important to keep in mind that this environment is influenced not only by national policies; they are also shaped by the impact of supranational institutions like the European Union or the World Trade Organization.

The above construction and interpretation of the two main types of indicators, de-facto and de-jure, reveals that these types do indeed measure different facets of openness, which need not be consistent for a given country. For instance, a country could have a defensive legal stance in terms of openness, but still play an important role in the world trading system e.g. due to its

special position as a trade hub (e.g. China) or as a financial hub (e.g. Malta). At the same time, a country may be open to trade in terms of institutions and policy, but nonetheless lag behind in terms of its relative integration in international trade due its geographic remoteness (e.g. Canada) or technological inferiority (e.g. Uganda).[6]

Hence, implications drawn from de-jure indicators can differ strongly from those derived from de-facto indicators as the former are mostly based on a single, yet prominent, factor in shaping actual economic integration – a country's regulatory environment –, while de-facto indicators are focused on overall outcomes. Thus, they capture the *total* impact of a series of different factors, such as the level of technology, geographical location, the existence of natural resources, legal regulations and tax policies, political and historical relationships, multi- and bilateral agreements or the quality of institutions. Therefore, de-facto measures can be seen as a measure that captures the overall impact of all relevant factors without any ambition to delineate their relative contribution to the chosen outcome dimension. It is for these reasons, that any "combined measure" (Table 1) has to be received with great care as it lumps together two qualitatively different approaches towards economic openness and can, hence, lead to ambiguous results with unclear interpretations (Martens et al. 2015).

2.1 Trade openness measures

De-facto openness to trade in goods and services is a prime subject of interest in discussions on economic openness. The core measure in these discussions is *Trade volume relative to GDP* (Fuji 2019). As Table 1 shows, alternative de-facto openness measures are mostly based on sub-components and variations of the Trade/GDP approach.

[6] One might be tempted to correct for such specific characteristics within the openness measure itself, but the problem with such practice would be that it sorts out one particular determinant of trade intensity in a potentially *ad hoc* manner. For example, since remoteness obviously impacts trade flows, a de-facto measure for openness should, ceteris paribus, be lower for more remote countries. There might be cases in which measures correcting for remoteness are useful, but they need to be carefully justified against the specific background of a given application and are, thus, not considered further in this general review.

Name	Components	Scale	Type	Time	Countries	Source
Export share	Exports (X)	% of nominal GDP	Co-Ra	1960-2018	199	World Bank, 2017 (publicly available)
Import share	Imports (M)		Co-Ra			
Trade share	Trade Volume = Exports (X) + Imports (M)		Co-Ra			
Generalized Trade Openness Index	The Index represents the trade volume as a share of a country's GDP factor, defined by a CES-function of its own GDP and the GDP of the rest of the world	0-100	Co-Int	1960-2016	167	Tang, 2011 (own calculations)
Composite Trade Share	Trade Volume (X+M) in % GDP, adjusted by the World Trade Share (WTS)	arbitrary	Co-Int	1977-2016	231	Squalli & Wilson, 2011 (own calculations)
Real trade share	Trade Volume (X+M) in % of GDP at PPP	% of real GDP	Co-Ra	1960-2014	173	Alcala & Ciccone, 2004 (own calculations)
Adjusted trade share	Imports divided by GDP, adjusted for the nation's share in world production	arbitrary	Co-Ra	1960-2016	233	Li et al. 2004, (own calculations)

Notes: In the type column "Co" corresponds to "continuous", "Di" corresponds to "discrete", "Bi" corresponds to "binary", "Int" corresponds to "interval", and "Ra" corresponds to "Ratio".

Table 2: *De-facto trade openness measures.*

The popularity of Trade to GDP probably stems from its availability and its seemingly close alignment to the question at stake. There are also a number of variants, such as exports/GDP or imports/GDP, which can be worthwhile substitutes if one wants to focus on openness understood in either a more 'outward' (Exports) or a more 'inward' sense (Imports), or restrictions of what enters the numerator, such as variants considering solely trade in goods or excluding exports in primary sectors.

However, despite its popularity Trade/GDP and its variants have to be used with caution for a series of reasons, most of them relating to the normalization by GDP.

First, by taking GDP as a reference point, Trade/GDP incorporates a specific size bias as small economies typically show higher trade volumes relative to GDP than large economies – a fact well-known from the estimation of gravity equations (e.g. Feenstra 2015). As a consequence strong domestic economies, which also happen to be major players in international trade (like the U.S., Japan, Germany or China), find themselves at the lower end of any country-ranking composed out of Trade/GDP.

Second, it is not entirely clear what Trade/GDP is actually measuring. Various alternatives to the label 'trade openness', such as *trade dependency ratio, trade openness index*, *trade share* or *trade ratio*, have been suggested. More recently, Fuji (2019) has discussed this question in greater detail. By comparing values for Trade/GDP for international and intra-Japanese trade data on the prefecture-level, he finds that Trade/GDP measures most of all the extent of spatial economic remoteness and the idiosyncrasy in sectoral production distributions. He also finds that on the international level, much of the variation of the measure goes back to variation in GDP,

rather than the trade flows. And indeed, because of the normalization by GDP the Trade/GDP measure also captures cyclical swings of economies.[7] For instance, the financial crisis in 2008/09 made several countries look 'more open' in terms of Trade/GDP, simply because of the disproportionate effect of the crisis on GDP

Finally, the inclusion of Trade/GDP in regression approaches has also been the target of endogeneity concerns (e.g. Frankel & Romer 2000). Hence, empirical researchers are well-advised to think critically about possible endogeneity problems, especially when coupling Trade/GDP with other GDP-related variables in applied work.

At least the size bias of Trade/GDP has been addressed by various authors, leading a couple of alternative indicators (see Table 1). Additional strategies for addressing this size-bias include the incorporation of an inversed Herfindahl-Index of the relative shares of all trading partners (to account for the diversity of exchange relations; e.g. OECD 2010) or regression-based strategies where Trade/GDP is first regressed on a series of demographical and geographical variables and only the residuals of these regressions are interpreted as a for of 'net openness' conditional on some country characteristics (Lockwood 2004, Vujakovic 2010). Whether such a corrective measures are appropriate eventually depends on one's research question and empirical setup. Alternatively, the size-bias of Trade/GDP can be addressed by substituting the Trade/GDP variable with one of the alternatives listed above or by adding additional regressors aiming to control for country size. But it is also evident that every alternative normalization strategy comes with its own problems, which is why the 'best' de-facto measure of trade openness depends on the particular question at hand. In this context, Trade/Population could also be an alternative to Trade/GDP that aims to correct only for country size, but not for average income. However, this final alternative has hardly been employed in the applied economics literature so far.

[7] A common reaction in the literature to address the problem of business cycles has been the use of 5-year averages, a practice that comes with a number of other problems as discussed in Herzer and Vollmer (2012).

Name	Components	Scale	Type	Time	Countries	Source
Sachs-Warner index	Binary variable based on Sachs & Warner (1995) criterion (see text for more details)	0-1	Di-Bi	1960-2010	118	Sachs and Warner, 1995 Extended by Wacziarg & Welch, 2008, and Dollar et. al., 2016 (publicly available)
IMF Tariff Rates (Tariff_RES)	100 – Average of the effective rate (=tariff revenue/import value) and the average unweighted tariff rates	0-100	Co-Int	1980-2005	136	Jaumotte et. al., 2013, based on IMF database (publicly available)
Trade Freedom (HF_trade)	Trade-weighted average tariff rate – Nontariff trade barriers (NTBs)	0-100	Di-Int	1995-2019	182	Miller et. al., 2020: Index of Economic Freedom. Heritage Foundation (publicly available)
Freedom to Trade Internationally (FTI_Index)	1. Tariffs: – Revenue from trade taxes (% of trade sector) – Mean tariff rate – Standard deviation of tariff rates 2. Regulatory trade barriers: – Non-tariff trade barriers – Compliance costs of importing and exporting	0-10	Co-Int	5-year measure: 1970-2000 Yearly data: 2000-2017	161	Gwartney et. al, 2017: Economic Freedom of the World: 2017 Annual Report. Fraser Institute. (publicly available)
Additional variable with improved coverage						
WITS Tariff Rates (Tariff_WITS)	100 – Mean of Effectively Applied (AHS) and Most-Favored Nation (MFN) weighted average tariff rates	0-100	Co-Int	1988-2018	159	Based on tariff data of WITS databank (own calculations)

Notes: In the type column "Co" corresponds to "continuous", "Di" corresponds to "discrete", "Bi" corresponds to "binary", "Int" corresponds to "interval", and "Ra" corresponds to "Ratio".

Table 3: *De-jure trade openness measures.*

In contrast to the outcome-orientation of de-facto measures, the focus of de-jure measures typically lies on tariff rates and other institutional forms of trade-barriers (see Table 3). Unfortunately, there is a lack of de-jure indices that are both methodologically sound and widely available.

One of the earliest and most influential de-jure measures for trade openness is the index by Sachs & Warner (1995). It is a binary index that classifies a country as closed if it meets at least one out of five criteria relating to tariff rates, non-tariff trade barriers, socialist governance in trade relations and the difference between black market exchange rates and official exchange rates. When used in growth regressions, the index mostly suggests a positive relationship between openness and trade (e.g. Harrison 1996; Wacziarg & Welch 2008; Dollar et al. 2016), yet it has been strongly criticized for its ambiguous criterions and its dichotomous output dimension, which classifies countries as either 'open' or 'closed' and, hence, does not allow for a more nuanced analysis (Rodriguez & Rodrik 2001).

An alternative to the Sachs-Warner-index is the tariff-based measure as used in an influential paper by Jaumotte *et al.* (2013), who employ a continuous index based on (1) the ratio

of tariff revenue to import value and (2) average unweighted tariff rates. Thus, it seeks to directly measure the changes in the regulatory framework of countries, which is preferable to the rather crude binary index of Sachs and Warner. Unfortunately, the coverage of the dataset provided by Jaumotte *et al.* (2013) is limited and the authors base their index on internal data of the IMF implying that replicating or expanding their dataset is a non-trivial exercise.

Two further alternatives are provided by two think-tanks, which are known to promote a (normative) free market agenda: the *Trade Freedom Index,* based on the *Economic Freedom Index* of the Heritage Foundation, covers 182 countries from 1995 until 2019, and the *Freedom to Trade Internationally Index*, which is based on the *Economic Freedom of the World Index* of the Fraser Institute. The latter covers the period between 1970-2000 in 5-year intervals and contains yearly data over the period 2000-2017 for 161 countries. Both approaches are composite indices that merge several tariff and non-tariff related variables into a final measure (for details see Table 4). Given the partisan origin of these measures in combination with the observation that the data sources and aggregation methods are relatively opaque (see Table 4 for details), it seems that no strong case for considering these two indicators in econometric research can be made.

Aiming to complement the available data-sources, we developed an additional alternative indicator that closely follows the methodological approach of the tariff-based measures of Jaumotte et al. (2013), but is based on the publicly available World Integrated Trade Solution (WITS) databank of the World Bank. Thus, it is easy to replicate and available for 159 countries in the period between 1988-2018. We calculate the index as 100 minus the average of (1) the effectively applied tariff rates and (2) the weighted average of the most-favored nation tariff rates. The resulting index is strongly correlated with the measure of Jaumotte (with a Pearson coefficient of 0.78 for the joint data points) and, thus, preserves the methodological advantages of the original indicator, while at the same time remedying its drawbacks in terms of coverage and replicability.

Trade Freedom index

$$\textbf{Trade Freedom} = \mathbf{100} \cdot \frac{\mathbf{Tariff}_{max} - \mathbf{Tariff}_{x}}{\mathbf{Tariff}_{max} - \mathbf{Tariff}_{min}} - \boldsymbol{NTB}$$

Variable	Description	Source and further details
$Tariff_X$	Weighted average tariff rate in country X	Miller et al. (2020)
$Tariff_{max}$, $Tariff_{min}$	Upper and lower bounds for tariff rates;	
NTB	Minimum tariff is zero, the upper bound is set to 50 percent. Depending on the use of NTBs a penalty is subtracted from the base score.	

Freedom to Trade Internationally Index

$$\boldsymbol{FTI} = \frac{\mathbf{1}}{\mathbf{5}} \sum_{n=1}^{5} \boldsymbol{\delta_i}$$

Tariff dimension		
Variable	**Description**	**Source**
$\boldsymbol{\delta_1}$	Revenue from trade taxes	Fraser Institute (2020)
$\boldsymbol{\delta_2}$	Mean tariff rate	
$\boldsymbol{\delta_3}$	Standard deviation of tariff rates	
Regulatory trade barriers (included since 1995)		
$\boldsymbol{\delta_4}$	Non-tariff trade barriers	
$\boldsymbol{\delta_5}$	Compliance costs of importing and exporting	

Table 4. *Components of the Trade Freedom and the Freedom to Trade Internationally Index.*

2.2. Financial openness measures

The most popular de-facto measure of financial openness comes from the dataset compiled and continuously updated by Philip Lane and Gian Maria Milesi-Ferretti (2003, 2007, 2017). It is now typically referred to as the "*financial openness index*" and defined as the volume of a country's foreign assets and liabilities relative to GDP (Baltagi et al. 2009). The Lane and Milesi-Ferretti (henceforth LMF) database is publicly available[8] and currently contains data for 203 countries for the period 1970-2015. The LMF database is considered the most comprehensive source of information in terms of financial capital stocks. In addition to the financial openness index, this dataset also contains three more specific indicators focusing on FDI and equity markets that are widely applied in empirical analyses. A comparable set of indicators on FDI can also be obtained from UNCTAD[9] (see Table 5). It is worth mentioning that often these indicators are normalized by GDP and are, therefore, subject to the same criticisms as the de-

[8] The latest LMF dataset is available here: https://www.imf.org/en/Publications/WP/Issues/2017/05/10/International-Financial-Integration-in-the-Aftermath-of-the-Global-Financial-Crisis-44906

[9] Existing differences between the FDI time series provided by Lane and Milesi-Ferretti (2017) in comparison to UNCTAD (2017) can be traced back to a partly different usage of balance of payment manuals: for some countries, the two sources treat reverse investment (between affiliates and parent companies) differently, which leads to deviations in the reported FDI assets and liabilities.

facto trade openness measures discussed in section 2.1 (see also Gygli et al. 2019). They are, however, also available in absolute amounts.

Name	Components	Scale	Type	Time	Countries	Source
Financial Openness Index (LMF_OPEN_gdp)	LMF_OPEN represents the sum of Total Foreign Assests and Total Foreign Liabilities in % GDP	% of GDP	Co-Ra	1970-2015	203	"LMF": Lane & Milesi-Ferretti, 2017 (publicly available)
Equity-based Financial Integration (LMF_EQ_gdp)	LMF_EQ represents the sum of Portfolio Equity Assets and Liabilities (stocks)	% of GDP	Co-Ra	1970-2015	203	
Private Financial Openness Index (OPEN_pv)	OPEN_pv makes a distinction between private and official financial openness by subtracting official development aid from foreign liabilities and international reserves from foreign assets.	% of GDP	Co-Ra	1970-2014	179	Saadma & Steiner, 2016
FDI asset stock (UNCTAD) (UNC_FDI_out_stock_GDP, UNC_FDI_in_stock_GDP)	The inward FDI stock represents the value of foreign investors' equity in and net loans to enterprises resident in the reporting economy. The outward FDI stock represents the value of the resident investors' equity in and net loans to enterprises in foreign economies.	% of GDP	Co-Ra	1980-2018	197	UNCTAD, 2017 (publicly available)

Notes: In the type column: "Co" corresponds to "continuous", "Di" corresponds to "discrete", "Bi" corresponds to "binary", "Int" corresponds to "interval", and "Ra" corresponds to "Ratio".

Table 5: *De-facto financial openness measures.*

Saadma & Steiner (2016) build on the data provided by Lane & Milesi-Ferretti to create an index for private financial openness (OPEN_pv), which can be seen as further development of the financial openness index. It distinguishes between private and state-led financial openness by subtracting development aid (DA) from foreign liabilities (FL) and international reserves (IR) from foreign assets (FA). The motivation of Saadma & Steiner (2016) is to show that correlations between growth and financial openness lead to less ambiguous results when the factors underlying actual capital flows are accounted for in the data.

Name	Components	Scale	Type	Time	Countries	Source
Chinn-Ito-Index (KAOPEN)	Table-based AREAER* measure: - presence of multiple exchange rates - restrictions on current account transactions - restrictions on capital account transactions - the requirement of the surrender of export proceeds	arbitrary	Co-I	1970-2017	181	Chinn and Ito (2006) update in 2015, (publicly available)
Financial Current Account (FIN_CURRENT)	Text-based AREAER* measure FIN_CURRENT is based on how compliant a government is with its obligations under the IMF's Article VIII to free from government restriction the proceeds from international trade of goods and services	0-100	Di-O	1960-2004	95	Quinn & Toyoda, 2008 (publicly available)
Capital Account Liberalization (CAPITAL)	Text-based AREAER* measure CAPITAL is based on restrictions on capital outflows and inflows, with a distinction between residents and non-residents	0 –100	Di-O	1960-2004	94	Quinn & Toyoda, 2008 (publicly available)
Capital Account Restrictions (KA_Index)	Text-based AREAER* measure Similar than CAPITAL and FIN_CURRENT but includes finer-graned sub-categories and information about different types of restrictions, asset categories, direction of flows and residency of agents.	0-1	Di-O	1995-2005	91	Schindler, 2009 (publicly available)
Financial Current and Capital Account (FOI)	Table and text-based AREAER* measure The most comprehensive AREAER* measure. The FOI includes information on twelve categories of current and capital account transactions (more see text)	0-12	Di-O	1965-2004	187	Brune, 2006 (not available)
Investment Freedom (HF_fin)	Non-AREAER* measure Index starts from 100 and then points are deducted due to a penalty catalogue. Information based on official country publications, the Economist and US government agencies, but exact coding/methodology remains unclear.	0-100	Di-O	1995-2019	182	Miller et al. 2020, (publicly available)
Equity market liberalization indicator	Non-AREAER* measure This binary liberalization index corresponds to a date of formal regulatory change after which foreign investors officially have the opportunity to invest in domestic equity securities.	0-1	Di-Bi	1980-2006	96	Bekaert et al. (2013) (not available)

Note: In the type column: "Co" corresponds to "continuous", "Di" corresponds to "discrete", "Bi" corresponds to "binary", "Int" corresponds to "interval", and "Ra" corresponds to "Ratio".

Table 6: *Classification of financial de-jure measures.*

Finally, Table 6 collects the most prominent de-jure indicators in the financial dimension. Three aspects are of particular importance. First, the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAR) obtains a prominent role as these reports serve as a key source for deriving de-jure indicators regarding trade openness (IMF 2016).[10] From this we can distinguish three sub-categories of financial de-jure measures: (i) de-jure indicators that are based on the AREAER Categorical Table of Restrictions, (ii) de-jure indicators that are

[10] The IMF's AREAER report draws on information from official sources and has been prepared in close consultation with national authorities. For more information visit: https://www.imf.org/~/media/Files/Publications/AREAER/AREAER_2016_Overview.ashx

based on the actual text of the AREAER and (iii) de-jure indicators that are not based on the AREAER report (Quinn et al. 2011). Table-based indicators provide comprised data and come with the advantage that they are relatively easy to replicate. In contrast, text-based indicators contain finer-grained information on regulatory restrictions of capital flows. As a consequence text-coded indicators can only be replicated if the authors provide a detailed description of their coding-methodology.

Second, the Chinn-Ito index (KAOPEN) is most widely used in the literature on the impacts of financial openness. It focuses on regulatory restrictions of capital account transactions, is publicly available and covers 181 countries in the period 1970–2017.[11] This comparably huge coverage of the Chinn-Ito Index is a major asset one reason for its popularity. The index is based on information about the restrictions on cross-border financial transactions, as provided in the summary tables of the IMF AREAER report (Chinn and Ito, 2006, 2008). To compose the index, Chinn and Ito (2008) codify binary variables for the four major categories reported in the AREAR, i.e., (1) the presence of multiple exchange rates, (2) restrictions on current account transactions, (3) restrictions on capital account transactions and (4) the requirement of the surrender of export proceeds. Eventually the KAOPEN index (short for capital account openness index) is constructed by conducting a principal component analysis on these four variables.[12]

2.3. Hybrid and combined measures for economic openness

While there exist a series of different indicators for assessing the intensity of globalization in general (see Gygli et al. 2019, Table 2, for an overview), indices that focus specifically on *economic* globalization (as distinguished from e.g. social, political or cultural aspects of globalization) are comparably rare. To derive such more specific measures of economic globalization requires researchers to first isolate the relevant economic dimensions and then identify suitable variables for measuring these dimensions. Among those globalization indicators that could serve as a starting point for assessing the economic dimension of globalization – such as the DHL Connectedness index (Ghemawat and Altman 2016), the New Globalization index (Vujakovic 2010), or the Maastricht Globalization index (Figge and Martens 2014) – the KOF Globalization index (Dreher 2006, Gygli et al. 2019) occupies an exceptional position in terms of coverage, conceptual clarity and transparency. The index is supplied by the Swiss Economic

[11] Note that the covered time period is shorter for some countries due to data availability.
[12] The Chinn-Ito-Index has been criticized for measuring more the *extensity* than the *intensity* of capital controls. In response, Chinn & Ito (2008) compare their index with de-jure indices that focus on the intensity of capital controls (e.g. CAPITAL in Table 6) and find a high correlation between CAPITAL and KAOPEN suggesting that KAOPEN is a valid proxy for the *intensity* of capital controls.

Institute (KOF) and is by far the most widely applied index of economic openness in the economics literature (Potrafke 2015). Most recently, the KOF introduced a series of methodological improvements as well as additional variables to revise and extend the basic methodology for constructing the KOF globalization index (Gygli et al. 2019). In doing so, the KOF also introduced a series of novel sub-indices based on a modular structure, which allows for inspecting different dimensions of economic openness in a disaggregated form.

Name	Components[13]	Scale	Type	Time	Countries	Source
KOF trade de-facto	Trade in goods (40.9%) Trade in services (45%) Trade partner diversification (14.1%)	0-100	Co-Int	1970-2017	221	Gygli et al. 2019, (publicly available)
KOF finance de-facto	Foreign direct investment (27.5%) Portfolio investment (13.3%) International debt (27.2%) International reserves (2.4%) International income payments (29.6%)					
KOF de-facto	KOF trade de-facto (50%) KOF finance de-facto (50%)					
KOF trade de-jure	Trade regulations (32.5%) Trade taxes (34.5%) Tariffs (33%)					
KOF finance de-jure	Investment restrictions (21.7%) Capital account openness (78.3%)					
KOF de-jure	KOF trade de-jure (50%) KOF finance de-jure (50%)					
KOF econ	KOF de-facto (50%) KOF de-jure (50%)					

Notes: In the type column: "Co" corresponds to "continuous", "Di" corresponds to "discrete", "Bi" corresponds to "binary", "Int" corresponds to "interval", and "Ra" corresponds to "Ratio".

Table 7: *The KOF economic globalization index as an example for a hybrid measure.*

3. General trends for the openness indicators

This section illustrates some of the general trends and properties exhibited by the indicators presented so far.

3.1. Trade openness

Panels A and B in Figure 1 show trends of selected trade indicators. We classify countries according to their economic complexity (Hidalgo and Hausmann 2009), a proxy for the level of their technological capabilities.[14] This is motivated by recent findings according to which

[13] For more details see: https://ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/Globalization/2019/KOFGI_2019_structure.pdf (accessed April 22nd, 2020).

[14] The index of economic complexity (ECI) infers the technological capabilities of an economy by considering the products, in which countries have a revealed comparative advantage. It starts from the empirical observation that most developed and technologically advanced countries export a great diversity of products and argues that rare products within these diversified export baskets are associated with a high degree of complexity. In contrast, less technologically developed countries typically show a much smaller degree of diversification in their export basket – as a consequence, their revealed comparative advantage often lies

countries with high economic complexity tend to benefit more from trade (e.g. Carlin et al. 2001; Hausmann et al. 2007; Huchet-Bourdon et al. 2017). Indeed, we observe some substantial differences in de-facto trade openness when considering technological capabilities. Specifically, we find that the trade-to-GDP ratio of high complexity countries started to decouple from the moderate and low complexity countries in the early 1990s.[15] This finding suggests that countries that are technologically superior (and are, thus, likely to benefit more from trade) tend to record higher *de-facto* openness to trade. We can also see that according to de-facto trade openness that trade integration has reached a peak before the start of the financial crisis in 2007/2008. Against the background of changes in trade policy – in particular in the case of the US under president Trump (e.g. Eichengreen 2018) – and the potential repercussions of the COVID-19 crisis on the globalization process, *de-facto* international trade integration may be expected to continuously proceed at a much slower space than in earlier decades.

With regard to the *de-jure* openness to trade, the differences across country groups are less pronounced than in the *de-facto* dimension, as we see convergence since the late 1980s (Figure 1, panel D). The latter observation suggests that countries of moderate and low complexity have opened their regimes in terms of trade policy in the past decades and all countries have approach very high degrees of de-jure openness. Several factors have been discussed in the literature to explain this change in trade policy (especially in developing countries), ranging from the policy-makers' intention to increase trade volumes to the effects of trade agreements within the WTO and policy prescriptions advocated by the IMF and the World Bank (e.g. Baldwin 2016; Rodrik 2018).

in low labor costs or specific natural resources, which come with a low degree of technological complexity. For a detailed description of the methodology see Hidalgo and Hausmann (2009).

[15] The classification into complexity groups and basic information on the data are provided in detail in the appendix.

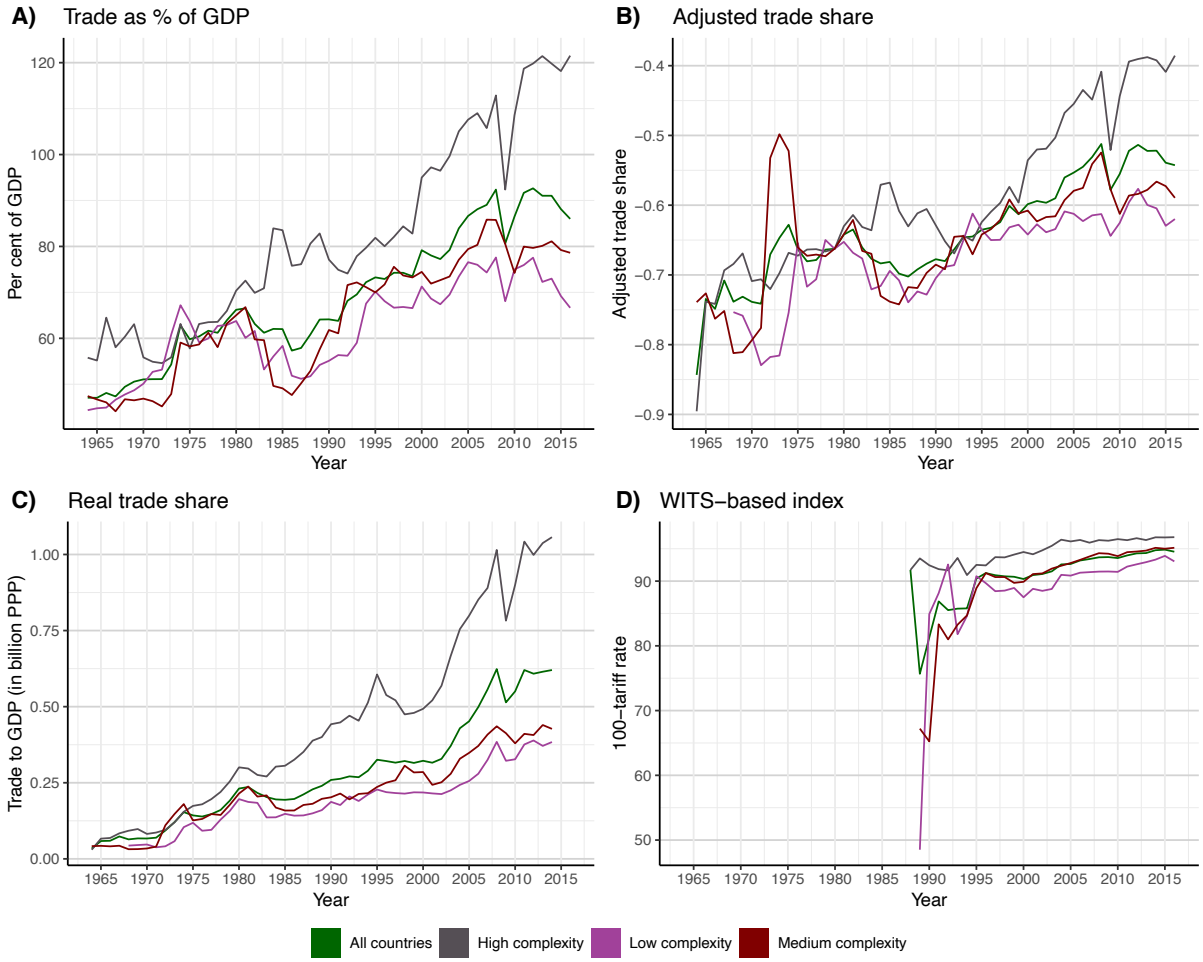

Figure 1. Trends of trade indicators (panels A to C show de-facto measures; panel D a de-jure measure).

3.2. Financial openness

Compared to trade openness, measures of financial openness show a similar, but even stronger trend (see Figure 2, panels A-D). De-facto measures of the high complexity group started to decouple from the other groups between 1995 and 2000, that is, after the foundation of the WTO in 1994. Since then, the gap between the former and the latter two groups has grown substantially, which implies that the integration of financial markets among high complexity countries has proceeded faster than in the rest of the world. The large outward FDI stock of high complexity countries indicates that a large part of FDI in medium- and low complexity countries, where inward FDI is much larger than outward FDI, stems from the high complexity country group. Eventually, we observe that the financial crisis of 07-08 had only a minor impact on financial openness: after a sharp reduction, the level of financial de-facto openness recovered rapidly and continued to grow across all country groups, which has not been the case for de-facto trade openness.

In terms of financial de-jure openness we find that high complexity countries have kept the high level of financial de-jure openness established during the 1990s constant over the past two decades. In contrast, countries with moderate and low complexity have seen their de-jure openness increase till the advent of the financial crisis in 2007/2008 – since then, the Chinn-Ito index (Figure 2, panel D), which is the only index covering all years in the time-span of interest, indicates that financial openness in medium complexity countries has decreased, while it has increased in low complexity countries.

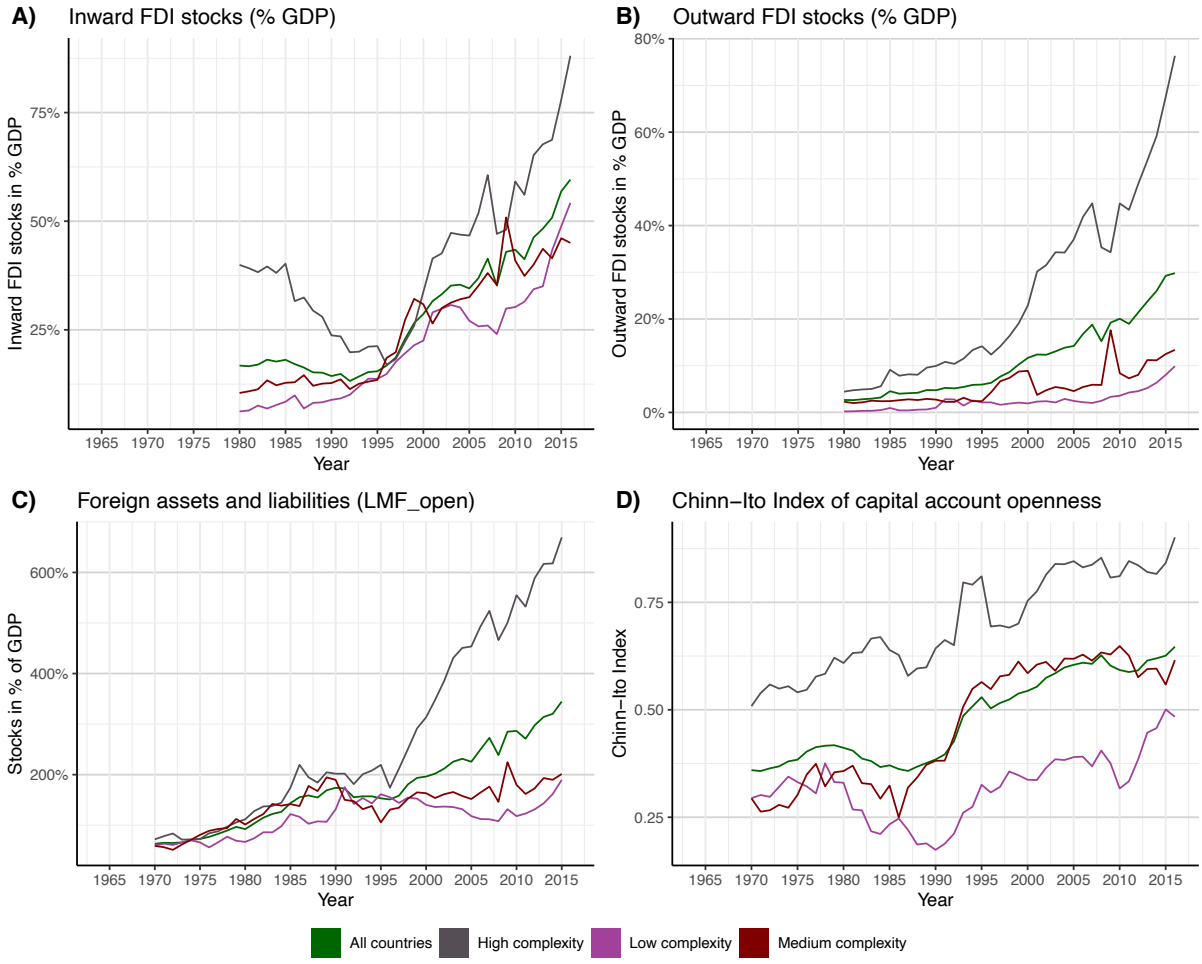

Figure 2: Trends in indicators for financial openness (panels A to C show de-facto measures; panel D a de-jure measure).

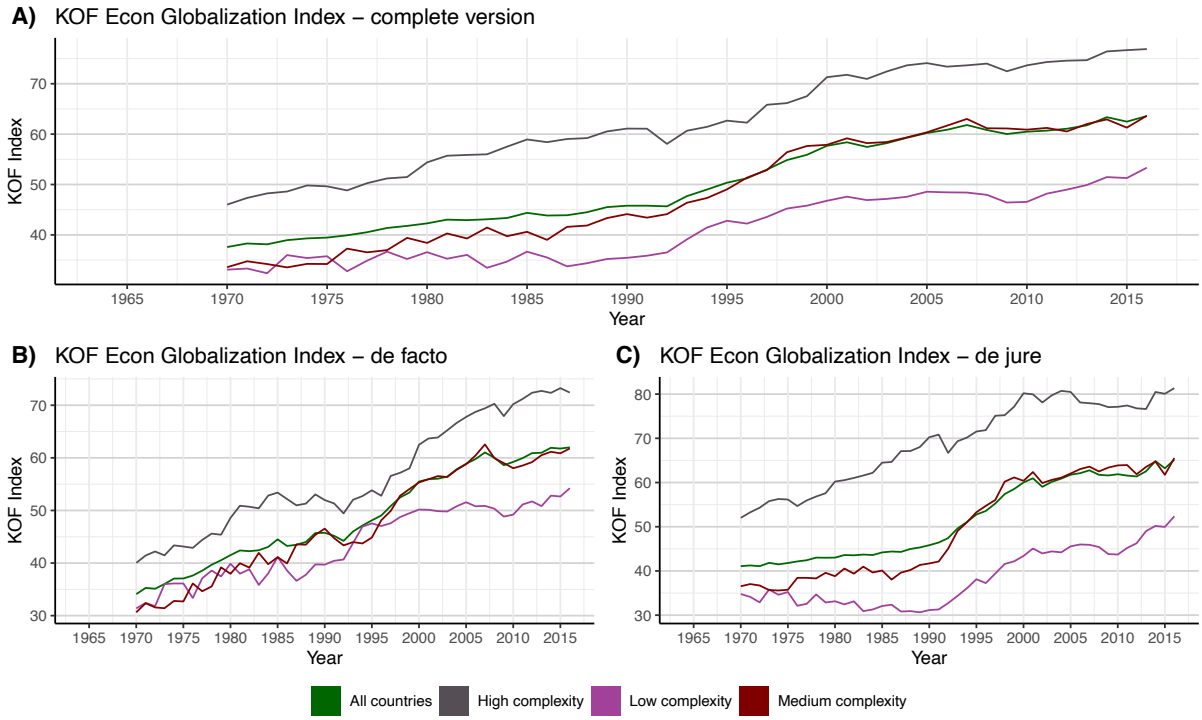

Figure 3: The KOF globalization index as a hybrid measure.

The KOF index provides a more complete view on the increase of economic openness in the previous decades and the plateauing of the economic globalization process since the global financial crisis. As can be seen from Figure 3, the index captures the overall trend of increasing openness from the 1970s to the 2000s (plot A) and mimics the somehow different dynamics in the de-facto and de-jure dimension (plots B and C). In the de-facto dimension, the KOF-index clearly depicts the on-going divergence in terms of economic openness between high complexity countries and the rest of the world, which has already been visible in Figure 1 and 2. Similarly, the weak but persistent trend for a convergence in terms of the de-jure openness is picked up by the KOF-index. From a global perspective, the main increase in de-jure openness had happened in the 1990s, in which all three country-groups, on average, experienced a significant increase in the de-jure openness.

4. Do different measures of openness agree? A correlation analysis

After introducing the most prominent indicators for economic openness and discussing their conceptual differences, we will now examine the empirical relationship between these openness indicators. Given the previous discussion, we would expect that indicators within the same group (e.g. de-facto trade openness) measure similar aspects of economic openness and, therefore, are strongly correlated with each other. To corroborate this hypothesis and to study the relationship between indicators belonging to different types, we now conduct a comprehensive correlation

analysis of all available openness indicators (as well as their specific sub-components and variants) presented so far, which are technically suitable for such an analysis.

Since many papers use the first difference of these indicators, we pay attention to both, correlations of the variables in levels as well as across the time-series in first differences.[16] This exercise is useful for answering a variety of questions: for instance, whether indicators that were built to measure the same type of openness are consistent with each other or to what extent financial and trade indicators do behave similarly. In addition, such an approach allows for clarifying the degree of alignment between one-dimensional indicators on the one hand and hybrid and combined indicators on the other hand. Finally, studying the relationship between different indicators is a relevant preliminary exercise for examining the question whether the choice of indicators matters for empirical applications. In our analysis, we use the Spearman rank coefficient since it requires only few assumptions on the scale and distribution of the compared time-series (e.g. Weaver et al. 2017). We report the results using the Pearson coefficient, which are qualitatively equivalent, in the accompanying appendix. While Figure 4 illustrates the correlation of the various measures in levels, Figure 5 depicts correlations among the time series of the various indicators in first differences. The correlation analysis is based on 216 countries from 1965 to 2019, but for the individual indicators there are restrictions in the underlying country and time periods (see tables 2 to 7). Given these data restrictions, we calculate pair-wise correlations.

When inspecting Figures 4 and 5, we can identify clusters of closely related openness measures: we generally find stronger associations among the indicators within each type (trade de-facto; trade de-jure; financial de-facto; financial de-jure), but only weak to moderate correlations of indicators can be established across different types (e.g. trade de-facto vis-à-vis financial de-facto) – with some notable exceptions to be discussed below. Thereby, correlations are consistently lower whenever one compares the differenced indicator (Figure 5), with indicators of different types now being almost completely uncorrelated. Furthermore, these correlations reveal that de-jure measures on trade and financial openness are more closely correlated than its de-facto counterparts, while the correlation between de-facto and de-jure in both dimensions (trade and finance) is weak. This result implies that economic policy in terms of trade and finance tends to be more convergent than de-facto outcomes; furthermore, countries that decide to reduce institutional obstacles to trade generally do it simultaneously for real and

[16] Unit roots tests for the individual time series are provided in the appendix. The Sachs-Warner as an index is excluded from this analysis.

financial flows. Our findings lend support to the argument that de-facto indicators generally represent more than just the outcome of economic policy, while de-jure indicators measure the legal foundations of economic policy.

Across the four major types of openness, the cluster relating to de-facto financial openness measures is the least visible cluster, which indicates that this dimension exhibits the greatest diversity in terms of indicators with different conceptual underpinnings. Notably, we find that the KOF economic globalization index is correlated with almost all other indices, which illustrates its ability to integrate different aspects of economic openness.

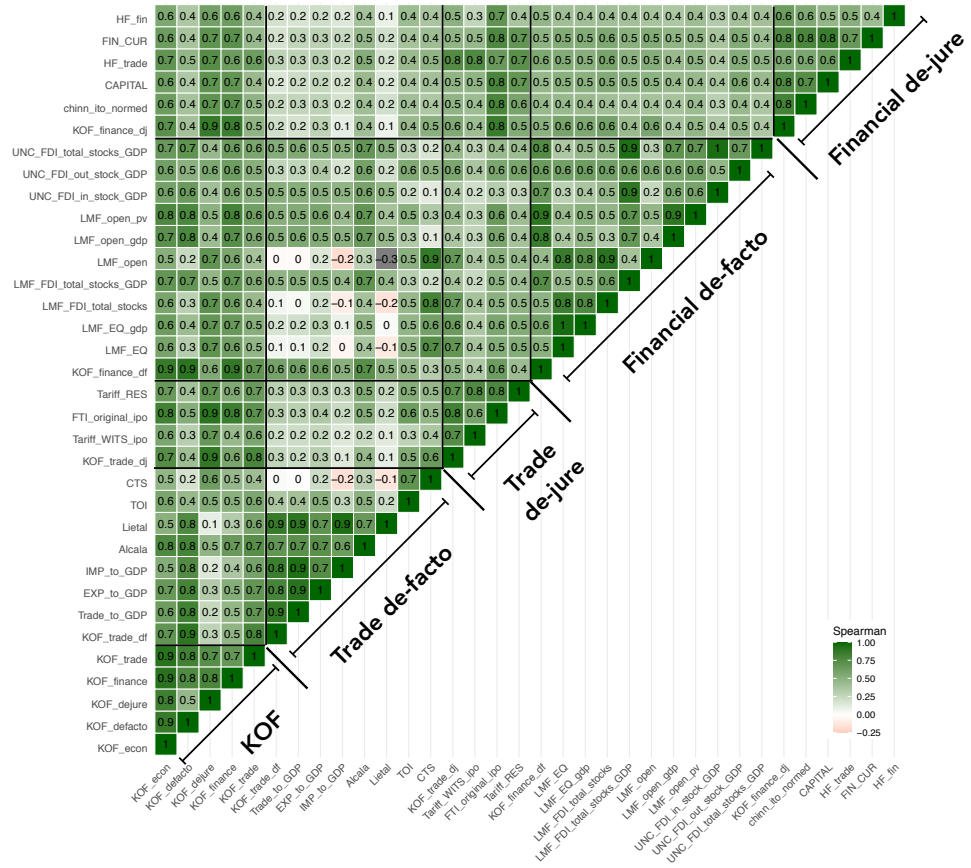

Figure 4: Spearman correlation coefficients for the levels of the openness indicators discussed in this paper.

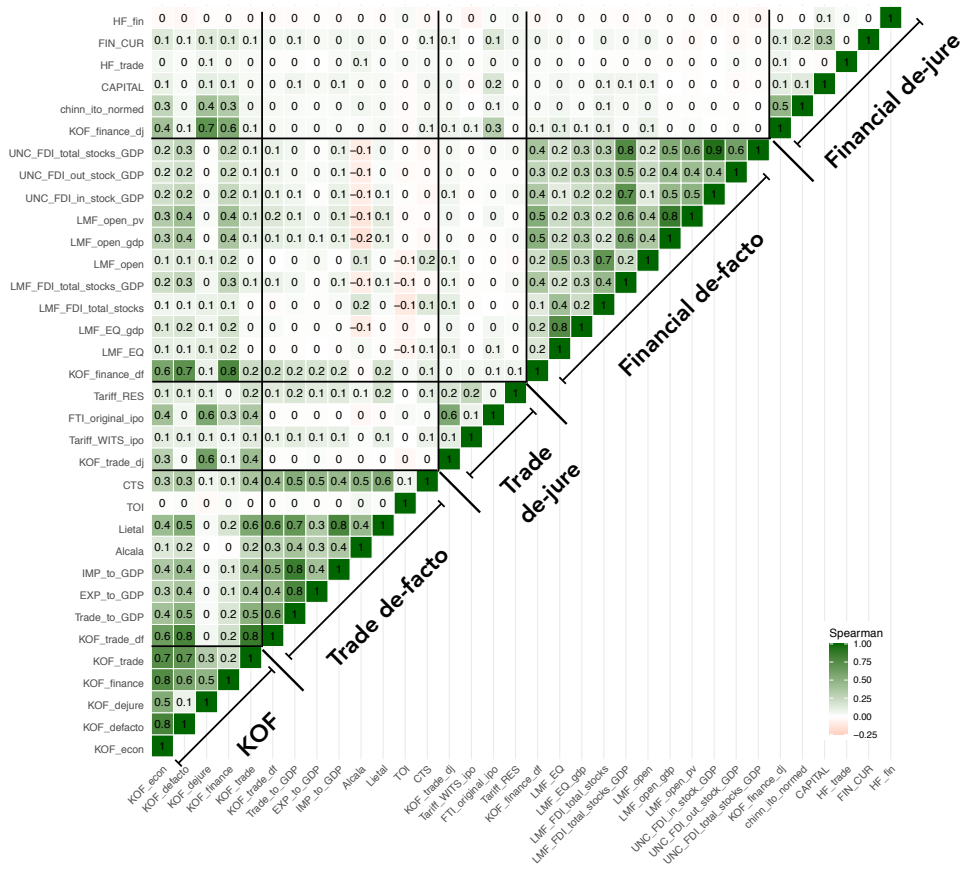

Figure 5: Spearman correlation coefficients for the first differences of the openness indicators discussed in this paper

In sum, the correlation analysis suggests that the concept of 'economic openness' has many facets, and various measures capture quite different aspects of this 'openness'.

5. Application: The choice of economic openness measures makes a difference in growth regressions

We continue by posing a question that is of particular interest to empirical researchers: what do the findings from the correlation analysis in the previous section imply for the choice of openness variables in regression specifications? For illustration purposes, we run growth regressions based on a data set for 65 countries over the time period 1995-2014. The choice of this data sample was driven by data restrictions: we only included observations when data for all the different economic openness indicators were available. If we would allow for differences in the data sample used for estimating models with various openness indicators, we would be unable to provide a clear interpretation about whether using different openness measures has an

impact on the reported results. Our choice of the data sample, on which we provide more detailed information in the appendix, therefore, facilitates comparative interpretations.

There exists a large literature on the determinants of economic growth (e.g. Barro, 1991; Barro, Sala-i-martin 1995; Aghion and Howitt, 2008), which has partly focused on the impact of increasing economic openness (e.g. Dollar 1992; Sachs and Warner 1995; Frankel and Romer 2000; Arora and Vamvadikis 2005). While this literature has produced mixed results regarding the link between openness and growth (e.g. Rodriguez and Rodrik 2001; Eichengreen and Leblang 2003; Singh 2010), a number of studies has highlighted that the choice of the openness indicator can have a pronounced impact on the obtained regression results (e.g. Rodriguez and Rodrik, 2001; Yanikkaya 2003; Aribaz Fernandez et al. 2007; Quinn et al. 2011). Against this background, we apply the trade and financial openness indicators analyzed in the first sections of this paper in a standard growth regression framework; by doing so, we illustrate how the choice of the openness variable matters.

Over the last decades, many economists have put forward the argument that economies that are more open to trade grow more quickly. Potrafke (2015, p. 518) puts the dominant prediction in a nutshell: "Globalisation is expected to spur economic growth for many reasons. Trade openness enables, for example, countries to exploit comparative advantages, to gain from specialisation, to foster innovation and efficient production." When it comes to financial globalisation, the most forceful prediction with the most influence on policy debates has also clearly pointed to overall positive growth effects, especially during the times of the "Washington Consensus" (e.g. Rodrik 2006). Although the theoretical predictions concerning the effect of economic openness on growth can be seen to be less clear-cut on closer inspection, especially when it comes to financial openness (e.g. Stiglitz 2004), this broad theoretical conviction has guided large parts of the econometric literature.

Our regression equation closely follows standard specifications as used in the existing literature (Barro, Sala-i-martin 1995; Arora and Vamvadikis 2005) and can be summarized as follows:

$$GDPg_{i,t} = \alpha open_{i,t} + \delta Z_{i,t} + FE_i + \epsilon_{i,t}\,, \qquad (1)$$

where $GDPg_{i,t}$ represents the growth rate of real GDP per capita for country i in period t. $open_{i,t}$ is the main explanatory variable of interest, defined as the natural logarithm of one of several (trade or financial) openness indicators, which we introduce below. $Z_{i,t}$ represents a vector of additional explanatory variables, which are explained in Table 8 (data sources and

summary statistics are available in the accompanying appendix). FE_i are country-fixed effects, which we include to account for unobservable, time-invariant country-specific characteristics that may influence $GDPg_{i,t}$. In this setup, we express all variables as non-overlapping five-year averages (except for the initial level of GDP per capita) to dampen the effects of short-run business cycle fluctuations on GDP per capita growth (e.g. Arora and Vamvadikis 2005). Additionally, and to account for the correlation structure found for the times series in first differences (compare Figures 4 and 5), we also estimate a corresponding version of equation (1) in first differences (FD):[17]

$$\Delta GDPg_i = \Delta open_{i,t}\alpha + \Delta Z_{i,t}\delta + \epsilon_{i,t} \qquad (2)$$

The results on the sign and statistical significance of the estimated coefficients are summarized in Table 8. It should again be emphasized that the purpose of the growth regressions is simply to illustrate how using different openness variables can affect the results when we use a consistent data sample, and not to come up with a definitive or comprehensive growth model.

While our specifications will contain misspecifications, most notably due to endogeneity issues, the outcomes reveal interesting patterns, both within and between the various dimensions of openness, and thereby highlight the implications of choosing among different openness measures. Within the cluster of de-facto trade openness measures, and for the case of 5-year averages in levels, the Generalized Trade Openness Index (Tang 2011) suggests a negative relationship between openness and growth. The remaining indicators, on the other hand, suggest a positive relationship, and only the real trade share obtains statistical significance. The picture is more ambiguous when we consider the first-difference estimations based on annual data: in this case, the Generalized Trade Openness Index and the KOF de-facto indicator show a negative sign, but only the latter is statistically significant. The remaining four indicators are positively correlated with growth, with trade to GDP being significantly so. These marked differences in how openness indicators correlate with GDP growth can be traced back to the methodological approach underlying the construction of different openness indicators, which is why our comparison of growth regressions results provides an illustration for the theory-ladenness of observation (Hanson 1958) in the context of measuring economic openness. The fact that moving from one measure for de-facto openness to another has such profound effects on the estimation results – remember that the underlying data sample in the different regressions is the

[17] Notably, we use annual data (and not 5-year averages as in equation (1)) to estimate the first difference specification in equation (2).

same – strengthens our point that the choice of the indicator is important and requires both a case-based theoretical justification as well as thorough robustness checks.

Dependent variable: GDP per capita growth

		Direction of relationship		Significance		Controls
		5-year averages	FD yearly	5-year-averages	FD yearly	
Trade de-facto	Trade to GDP	+	+	0	**	log(human capital), population growth, inflation, log(investment share) *For 5-year estimations additionally:* log(initial GDP),
	Real trade share	+	+	***	0	
	Adjusted trade share	+	+	0	0	
	Composite trade share	+	+	0	0	
	Generalized Trade Openness Index	-	-	0	***	
	KOF de-facto	+	-	0	***	
Trade de-jure	KOF_de-jure	+	+	**	0	
	Tariff_WITS	+	-	***	0	
	FTI_Index	+	-	0	0	
	HF_trade	+	+	0	0	
Financial defacto	LMF_open	+	-	0	**	
	LMF_EQ	-	-	0	***	
	FDI inward stocks	+	-	0	***	
	FDI outward stocks	+	-	0	0	
Finan. de-	KAOPEN	+	+	0	0	
	HF_fin	-	-	0	0	
	CAPITAL	+	+	0	**	

Table 8: *The results from estimating equations (1) and (2) with different measures for economic openness. We use 5-year averages when estimating equation (1) and annual data when estimating equation (2). The dependent variable is GDP per capita growth and the openness measures were transformed into natural logarithms. Statistical inference is based on clustered (heteroskedasticity-robust) standard errors. "FD yearly" denotes First Differences based on annual observations. *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively. Note: Country- and time-fixed effects were included. When running the specifications in first differences, however, the country-fixed effects drop out algebraically. All models estimated with data based on 65 countries over the period 1995-2014.*

The results within the cluster of trade de-jure measures are also mixed: in case of the five-year averages, all indicators (KOF_dejure, Tariff_WITS, HF_trade and the FTI index) are positively correlated with growth, but only the first two variables are statistically significant. The results for the FD-specifications show that the Tariff_WIT and the FTI index coefficients switch signs, although they also remain statistically insignificant.

The conclusion for measures of de-facto financial openness is also ambiguous: in case of the five-year averages, three of the four de-facto measures suggest a positive relationship (LMF_open, FDI inflows, FDI outflows), with two of them being statistically significant, while one LMF openness indicator (LMF_EQ) has a negative sign. The results are more straightforward when the FD estimator is used: here all indicators suggest a negative relationship and all these correlations, except for the FDI outflows, are considered as statistically significant at the 5% or 1% percent level.

Finally, we also observe ambiguous patterns for the financial de-jure measures with KAOPEN and CAPITAL being positively, and HF_fin being negatively associated with growth, for both the estimations based on first differences and five-year averages. However, only the CAPITAL coefficient in the FD-case shows statistical significance.

These exercises reveal that there is not only considerable variation in outcomes when different types of economic openness are considered, but that results may also vary within a certain conceptual dimension as different indicators are constructed in different ways. To arrive at a fuller picture of the empirical assessment of economic openness, we estimate a more complete regression equation in the next step. In doing so, we augment the baseline specification by explicitly including measures for different types of economic openness in each single model.

The results regarding the determinants of GDP per capita growth obtained from these estimations are again sensitive to both the dimensions of economic openness actually considered as well as the set of openness indicators chosen to represent different dimensions of openness (see Table 9). When we only include the KOF_econ indicator, we find a positive but statistically insignificant coefficient regarding the impact of economic openness on growth. However, when separating trade and financial openness using the KOF_trade and KOF_finance subindicators in models (3) and (4), we arrive at a more nuanced result: while the coefficient of KOF_trade is always positive and significant, KOF_finance is negative and in the FD specification statistically significantly so. In models (5) and (6), we find that the KOF de-jure measures (both in the trade and in the finance dimension) generally correlate positively with economic growth, but no such consistent observation is possible for the de-facto measures. The even more disaggregated models (7) and (8) suggest that openness to trade tends to correlate positively with growth in both de-facto and de-jure terms, but that financial openness is related negatively to growth when the de-facto dimension is considered. We find mixed results for the trade openness dimensions based on models (9) and (10). While the trade-to-GDP variable correlates positively with growth but is statistically insignificant, the Tariff_WITS coefficient is negative when we use the FD-specification. LMF_open has a negative sign, but it is only significant in model (9). KAOPEN shows positive correlation coefficients, which are, however, linked to large standard errors.

While we do not claim that we provide a fully-fledged estimation framework or that we show a definite answer on the relationship between economic openness and growth – both of which would require a much more careful consideration of possible endogeneity and reverse causality issues –, we can nevertheless use the standard regression framework to derive some general conclusions on the use of openness indicators. Our results indicate that operationalizing economic openness for econometric research requires explicit theoretical justifications of the relevant dimensions as well as the available indicators within these dimensions. Differences in

how openness indicators correlate with economic growth illustrate the theory-laddenness of observation (Hanson 1958), i.e. the assumptions underlying the construction of different openness indicators make an important difference. At the same time, specifying growth regressions with more than one openness indicator, or running extensive robustness checks with different indicators, can provide hints regarding how different types of economic openness relate to GDP growth or other variables of interest.

Full specification

	Dependent variable: GDP per capita growth									
	FD (1)	5-year av (2)	FD (3)	5-year av (4)	FD (5)	5-year av (6)	FD (7)	5-year av (8)	FD (9)	5-year av (10)
log(KOF_econ)	2.465	1.191								
	(2.701)	(1.077)								
log(KOF_trade)			6.240***	1.516*						
			(2.258)	(0.881)						
log(KOF_finance)			-3.707*	-0.058						
			(2.084)	(0.742)						
log(KOF_defacto)					-0.651	0.068				
					(1.938)	(0.896)				
log(KOF_dejure)					5.492***	1.253				
					(1.973)	(0.844)				
log(KOF_trade_df)							4.297**	0.331		
							(1.726)	(0.749)		
log(KOF_trade_dj)							2.569**	0.989*		
							(1.295)	(0.558)		
log(KOF_finance_df)							-4.739***	-0.056		
							(1.776)	(0.629)		
log(KOF_finance_dj)							1.280	0.277		
							(1.772)	(0.517)		
log(Trade_to_GDP)									5.221	0.366
									(3.245)	(0.601)
log(Tariff_WITS_ipo)									-8.872	0.392
									(5.567)	(1.209)
log(LMF_open)									-8.179***	-0.556
									(2.104)	(0.458)
log(KAOPEN)									0.421	0.006
									(0.392)	(0.333)
log(hc)	6.018	0.124	8.715	0.161	4.295	-0.014	9.459	-0.150	-24.647	3.438
	(8.634)	(1.695)	(9.543)	(1.668)	(8.111)	(1.659)	(9.616)	(1.708)	(16.191)	(3.471)
pop_growth	-0.565**	-0.512**	-0.565**	-0.495**	-0.566**	-0.503**	-0.564**	-0.490**	-0.820*	-0.598***
	(0.276)	(0.203)	(0.270)	(0.204)	(0.279)	(0.201)	(0.277)	(0.201)	(0.471)	(0.193)
inflation	0.001	-0.002***	0.001	-0.002***	0.001	-0.002***	0.001	-0.002***	0.001***	-0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0001)	(0.0001)
log(inv_share)	-0.058	1.503***	-0.241	1.433**	-0.055	1.469***	-0.381	1.415**	0.559	0.639
	(1.460)	(0.558)	(1.457)	(0.575)	(1.466)	(0.552)	(1.464)	(0.570)	(2.386)	(1.285)
Constant	-0.103		-0.106		-0.105		-0.094		0.291*	
	(0.098)		(0.106)		(0.095)		(0.110)		(0.171)	
Observations	5,127	1,179	5,127	1,179	5,102	1,173	5,096	1,172	1,807	460
R^2	0.002	0.066	0.005	0.068	0.004	0.067	0.007	0.069	0.046	0.033
F Statistic	2.187* (df = 5; 5121)	14.561*** (df = 5; 1033)	4.045*** (df = 6; 5120)	12.522*** (df = 6; 1032)	3.093*** (df = 6; 5095)	12.302*** (df = 6; 1027)	4.656*** (df = 8; 5087)	9.436*** (df = 8; 1024)	10.807*** (df = 8; 1798)	1.424 (df = 8; 334)
Note:										*p<0.1; **p<0.05; ***p<0.01

Table 9: Statistical inference based on clustered (heteroskedasticity-robust) standard errors. Note: Country- and time-fixed effects were included. When running the specifications in first differences, however, the country-fixed effects drop out algebraically.

6. Conclusions

This paper has reviewed existing measures and empirical practices regarding economic openness, which we can generally understand as the degree to which non-domestic actors can or do participate in the domestic economy. We have compiled openness indicators by merging publicly available data from different sources – the data set is published together with this article – and have categorized the indicators using a typology of economic openness, which distinguishes between 'real' and 'financial' openness, as well as a 'de-facto' dimension (based on aggregate economic statistics) and a 'de-jure' dimension (focusing on institutional foundations of openness), respectively. The data set consists of 216 countries over the time period 1965 to 2019, although there is wide variation in the coverage of the country and time dimension across different openness variables.

We have used this data set to analyze the correlation across indicators, both in levels and in first differences. We find that indicators that belong to the same category of openness measures indeed tend to be correlated more strongly. Correlations among openness indicators are, however, in general much weaker in the case of first differences. By using a standard growth regression framework, we have shown how different types of economic openness as well as different indicators capture the impact of openness on economic growth in different ways. From this finding, it follows that applied researchers are well advised to motivate their choice of openness indicator rigorously, since different research questions might also entail different conceptions of economic openness. At the same time, it can be argued that the identification of reasons for why different measures of economic openness yield different results is an important and rewarding research activity.

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Appendix: Understanding economic openness

A review of existing measures

Supplementary material*

Abstract

We provide the descriptive statistics for all data used in the paper in section A. In section B we describe how we grouped countries for the analysis in section 3 in the main paper, and provide for the figures with countries grouped according to their level of income (section C). We then rank countries according to their openness in selected indicators, as well as the discrepancy between their *de facto* and *de jure* openness in section D. In section E we replicate the correlation analysis of section 4 in the main paper using the Pearson instead of the Spearman correlation coefficient. Finally, in section F we provide more detailed information about the regression results underlying table 8 in the main paper.

Contents

A Descriptive statistics and country set **2**

A.1 The full data set 2

A.2 The reduced data set 7

B Country groups according to economic complexity **9**

C Trends in openness based on income groups **9**

D Rankings **12**

E Correlation analysis with alternative correlation measures **15**

F More detailed regression results **17**

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A Descriptive statistics and country set

A.1 The full data set

Table 1 provides the descriptive statistics for the variables used in the paper.[1]

Table 1: Descriptive statistics for all indicators included in the data set.

Indicator	Observations	Countries	Year_min	Year_max
Alcala	5446	173	1960	2014
CAPITAL	3858	95	1960	2004
chinn_ito_normed	7235	181	1970	2017
CTS	7090	231	1977	2016
EXP_to_GDP	8322	199	1960	2018
Exports_USD_constant	6383	189	1960	2018
Exports_USD_current	8265	198	1960	2018
FIN_CUR	3858	95	1960	2004
FTI_original	2514	161	1995	2017
FTI_original_ipo	2718	161	1995	2017
FTI_panel	3125	162	1970	2017
FTI_reduced	2522	161	1995	2017
FTI_reduced_ipo	2730	161	1995	2017
GDP_pc_growth	8956	180	1960	2017
hc	7656	144	1960	2017
HF_econ	4043	181	1995	2019
HF_fin	4071	182	1995	2019
HF_trade	4062	182	1995	2019
IMP_to_GDP	8331	199	1960	2018
Imports_USD_constant	6383	189	1960	2018
Imports_USD_current	8274	198	1960	2018
inflation	7711	185	1960	2018
inv_share	9224	180	1960	2017
KAOPEN	7235	181	1970	2017
KOF_defacto	8933	204	1970	2017
KOF_dejure	8553	193	1970	2017
KOF_econ	8841	201	1970	2017
KOF_finance	8901	202	1970	2017
KOF_finance_df	9032	204	1970	2017
KOF_finance_dj	8768	198	1970	2017
KOF_trade	8861	200	1970	2017
KOF_trade_df	9128	206	1970	2017
KOF_trade_dj	8291	193	1970	2017
Lietal	7441	233	1960	2016
LMF_EQ	7393	200	1970	2015
LMF_EQ_gdp	7375	200	1970	2015
LMF_FDI_total_stocks	7543	202	1970	2015
LMF_FDI_total_stocks_GDP	7525	202	1970	2015
LMF_open	7564	203	1970	2015
LMF_open_gdp	7545	203	1970	2015

[1]The data, as well as the code to reproduce the estimation results and figures will be available online after publication: [github link blinded for review]. Moreover, we provide an R package that allows one to automatically download the most recent versions of the indicators from the internet.

LMF_open_pv	6406	179	1970	2014
Penn_GDP_PPP	9224	180	1960	2017
Penn_GDP_PPP_log	9224	180	1960	2017
pop_growth	9119	180	1960	2017
pop_log	9224	180	1960	2017
population	12577	215	1960	2018
rgdpo	9224	180	1960	2017
Tariff_RES	3057	136	1980	2005
Tariff_WITS	2316	159	1988	2018
Tariff_WITS_ipo	2860	159	1988	2018
TOI	7079	167	1960	2016
Trade_to_GDP	8322	199	1960	2018
UNC_FDI_in_stock_GDP	6646	197	1980	2018
UNC_FDI_out_stock_GDP	4891	174	1980	2018
UNC_FDI_total_stocks_GDP	4839	174	1980	2018

Table 2 provides information for all countries present in the data set, as well as the total number of available observations for each country.

Table 2: Countries included in the full data set.

Country	Observations	Year_min	Year_max
Aruba	1187	1960	2018
Afghanistan	918	1960	2019
Angola	1625	1960	2019
Albania	1758	1960	2019
Andorra	140	1960	2018
United Arab Emirates	1715	1960	2019
Argentina	2424	1960	2019
Armenia	1278	1960	2019
American Samoa	178	1960	2018
Antigua & Barbuda	1454	1960	2018
Australia	2452	1960	2019
Austria	2281	1960	2019
Azerbaijan	1235	1960	2019
Burundi	2182	1960	2019
Belgium	2273	1960	2019
Benin	2272	1960	2019
Burkina Faso	2172	1960	2019
Bangladesh	2303	1960	2019
Bulgaria	1877	1960	2019
Bahrain	2063	1960	2019
Bahamas	1984	1960	2019
Bosnia & Herzegovina	1095	1960	2019
Belarus	1234	1960	2019
Belize	1835	1960	2019
Bermuda	896	1960	2018
Bolivia	2470	1960	2019
Brazil	2475	1960	2019
Barbados	2010	1960	2019
Brunei	1471	1960	2019

Bhutan	1566	1960	2019
Botswana	2350	1960	2019
Central African Republic	1830	1960	2019
Canada	2510	1960	2019
Switzerland	2202	1960	2019
Chile	2481	1960	2019
China	2179	1960	2019
Côte d'Ivoire	2206	1960	2019
Cameroon	2328	1960	2019
Congo - Kinshasa	1471	1960	2019
Congo - Brazzaville	2363	1960	2019
Colombia	2508	1960	2019
Comoros	1589	1960	2019
Cape Verde	1721	1960	2019
Costa Rica	2468	1960	2019
Cuba	541	1960	2019
Curaçao	258	1960	2018
Cayman Islands	748	1960	2018
Cyprus	2149	1960	2019
Czechia	1365	1960	2019
Germany	2377	1960	2019
Djibouti	1252	1960	2019
Dominica	1637	1960	2019
Denmark	2394	1960	2019
Dominican Republic	2385	1960	2019
Algeria	2393	1960	2019
Ecuador	2418	1960	2019
Egypt	2469	1960	2019
Eritrea	627	1960	2019
Spain	2369	1960	2019
Estonia	1314	1960	2019
Ethiopia	1843	1960	2019
Finland	2371	1960	2019
Fiji	1856	1960	2019
France	2439	1960	2019
Faroe Islands	323	1960	2018
Micronesia (Federated States of)	581	1960	2018
Gabon	2350	1960	2019
United Kingdom	2379	1960	2019
Georgia	1190	1960	2019
Ghana	2269	1960	2019
Gibraltar	140	1960	2018
Guinea	1827	1960	2019
Gambia	2041	1960	2019
Guinea-Bissau	1801	1960	2019
Equatorial Guinea	1489	1960	2019
Greece	2390	1960	2019
Grenada	1599	1960	2018
Greenland	215	1960	2018
Guatemala	2443	1960	2019
Guam	226	1960	2018
Guyana	1586	1960	2019
Hong Kong SAR China	2318	1960	2019

Honduras	2406	1960	2019
Croatia	1289	1960	2019
Haiti	2104	1960	2019
Hungary	1876	1960	2019
Indonesia	2452	1960	2019
Isle of Man	133	1960	2018
India	2490	1960	2019
Ireland	2261	1960	2019
Iran	2210	1960	2019
Iraq	1468	1960	2018
Iceland	2351	1960	2019
Israel	2436	1960	2019
Italy	2379	1960	2019
Jamaica	2326	1960	2019
Jordan	2341	1960	2019
Japan	2370	1960	2019
Kazakhstan	1273	1960	2019
Kenya	2454	1960	2019
Kyrgyzstan	1297	1960	2019
Cambodia	1692	1960	2019
Kiribati	980	1960	2019
St. Kitts & Nevis	1455	1960	2018
South Korea	2445	1960	2019
Kuwait	2047	1960	2019
Laos	1768	1960	2019
Lebanon	1783	1960	2019
Liberia	1814	1960	2019
Libya	1348	1960	2019
St. Lucia	1567	1960	2019
Liechtenstein	200	1960	2019
Sri Lanka	2461	1960	2019
Lesotho	2065	1960	2019
Lithuania	1297	1960	2019
Luxembourg	1877	1960	2019
Latvia	1297	1960	2019
Macau SAR China	1477	1960	2019
Saint Martin (French part)	59	1960	2018
Morocco	2406	1960	2019
Monaco	59	1960	2018
Moldova	1278	1960	2019
Madagascar	2358	1960	2019
Maldives	1584	1960	2019
Mexico	2468	1960	2019
Marshall Islands	629	1960	2018
Macedonia	1266	1960	2019
Mali	2290	1960	2019
Malta	2134	1960	2019
Myanmar (Burma)	1843	1960	2019
Montenegro	1102	1960	2019
Mongolia	1687	1960	2019
Northern Mariana Islands	178	1960	2018
Mozambique	1823	1960	2019
Mauritania	2242	1960	2019

Mauritius	2285	1960	2019
Malawi	2187	1960	2019
Malaysia	2489	1960	2019
Namibia	1737	1960	2019
New Caledonia	422	1960	2018
Niger	2128	1960	2019
Nigeria	2394	1960	2019
Nicaragua	2334	1960	2019
Netherlands	2377	1960	2019
Norway	2417	1960	2019
Nepal	2210	1960	2019
Nauru	171	1960	2018
New Zealand	2327	1960	2019
Oman	1970	1960	2019
Pakistan	2421	1960	2019
Panama	2352	1960	2019
Peru	2440	1960	2019
Philippines	2440	1960	2019
Palau	519	1960	2018
Papua New Guinea	1473	1960	2019
Poland	1903	1960	2019
Puerto Rico	319	1960	2018
North Korea	165	1960	2019
Portugal	2359	1960	2019
Paraguay	2379	1960	2019
Palestinian Territories	823	1970	2018
French Polynesia	326	1960	2018
Qatar	1731	1960	2019
Romania	1434	1960	2019
Russia	1413	1960	2019
Rwanda	2241	1960	2019
Saudi Arabia	2064	1960	2019
Sudan	2095	1960	2019
Senegal	2442	1960	2019
Singapore	2496	1960	2019
Solomon Islands	1156	1960	2019
Sierra Leone	2217	1960	2019
El Salvador	2423	1960	2019
San Marino	321	1960	2018
Somalia	765	1960	2018
Serbia	1182	1970	2019
South Sudan	138	1960	2018
São Tomé & Príncipe	1218	1960	2019
Suriname	1428	1960	2019
Slovakia	1315	1960	2019
Slovenia	1344	1960	2019
Sweden	2449	1960	2019
Swaziland	2021	1960	2018
Sint Maarten	193	1998	2018
Seychelles	1843	1960	2019
Syria	2037	1960	2019
Turks & Caicos Islands	524	1960	2018
Chad	2039	1960	2019

Togo	2282	1960	2019
Thailand	2484	1960	2019
Tajikistan	1098	1960	2019
Turkmenistan	858	1960	2019
Timor-Leste	381	1960	2019
Tonga	1247	1960	2019
Trinidad & Tobago	1972	1960	2019
Tunisia	2396	1960	2019
Turkey	2406	1960	2019
Tuvalu	193	1960	2018
Taiwan	1014	1960	2019
Tanzania	2097	1960	2019
Uganda	2305	1960	2019
Ukraine	1352	1960	2019
Uruguay	2465	1960	2019
United States	2434	1960	2019
Uzbekistan	969	1960	2019
St. Vincent & Grenadines	1562	1960	2019
Venezuela	2388	1960	2019
British Virgin Islands	663	1960	2018
U.S. Virgin Islands	171	1960	2018
Vietnam	1744	1960	2019
Vanuatu	1118	1960	2019
Samoa	1209	1960	2019
Yemen	1211	1960	2019
South Africa	2518	1960	2019
Zambia	2087	1960	2019
Zimbabwe	1993	1960	2019

A.2 The reduced data set

Table 3 provide more information about the reduced data set used for the regressions in the main paper.

Table 3: The countries used in the regressions of the main paper.

Country	Observations
Albania	11
Armenia	11
Australia	20
Benin	11
Burkina Faso	10
Bangladesh	11
Bahrain	15
Bolivia	12
Brazil	19
Botswana	14
Canada	20
Chile	20
China	15
Côte d'Ivoire	10

Cameroon	15
Congo - Brazzaville	8
Colombia	20
Costa Rica	15
Algeria	10
Egypt	20
Guatemala	15
Hong Kong SAR China	17
Honduras	11
Croatia	13
Indonesia	15
India	20
Iceland	18
Israel	16
Jamaica	10
Jordan	15
Japan	19
Kenya	15
South Korea	20
Kuwait	10
Sri Lanka	15
Morocco	13
Moldova	10
Madagascar	15
Mexico	20
Mali	15
Mongolia	11
Mauritius	15
Malawi	13
Malaysia	20
Namibia	12
Nigeria	11
Nicaragua	10
Norway	19
New Zealand	15
Pakistan	12
Peru	20
Philippines	19
Russia	19
Senegal	13
Singapore	19
El Salvador	14
Thailand	20
Tunisia	15
Turkey	20
Ukraine	15
Uruguay	15
United States	20
Venezuela	5
Vietnam	10
South Africa	20
Total	971

B Country groups according to economic complexity

We classified countries according to their complexity as defined by Hidalgo and Hausmann. We decided to set thresholds such that the three groups (*high*, *medium*, and *low* complexity) consist of approximately the same number of countries. This yields to the following classification, according to which we classify countries every year anew (i.e. countries can in principle switch between groups):

High complexity	$ECI > 0.5$
Medium complexity	$0.5 \geq ECI \geq -0.5$
Low complexity	$ECI < -0.5$

C Trends in openness based on income groups

In the main paper we classified countries according to their complexity as defined by Hidalgo and Hausmann and as explicated in section B. Here we complement this presentation by providing the same kind of visualization, but according to the income groups as provided by the World Bank. The World Bank assigns countries into four income groups – high, upper-middle, lower-middle, and low. The assignment is based on the GNI per capita in current US dollars calculated using the Atlas method. The threshold levels are determined at the start of the Bank's fiscal year in July and remain fixed for 12 months regardless of subsequent revisions to estimates. Thus, as for the classification into complexity groups, countries may move among income groups over the years. Currently, the following classification scheme is used:

	GNI p.c. in current USD
High income	> 12235
Upper middle income	$3956 - 12235$
Lower middle income	$1006 - 3955$
Low income	< 1005

The figures of section 3 in the main text are replicated in figures 1 (for figure 1 in the main text), 2 (for figure 2 in the main text), and 3 (for figure 3 in the main text) using the World Bank classification. Note that since our sample is restricted to European countries only high and upper medium income countries show up.

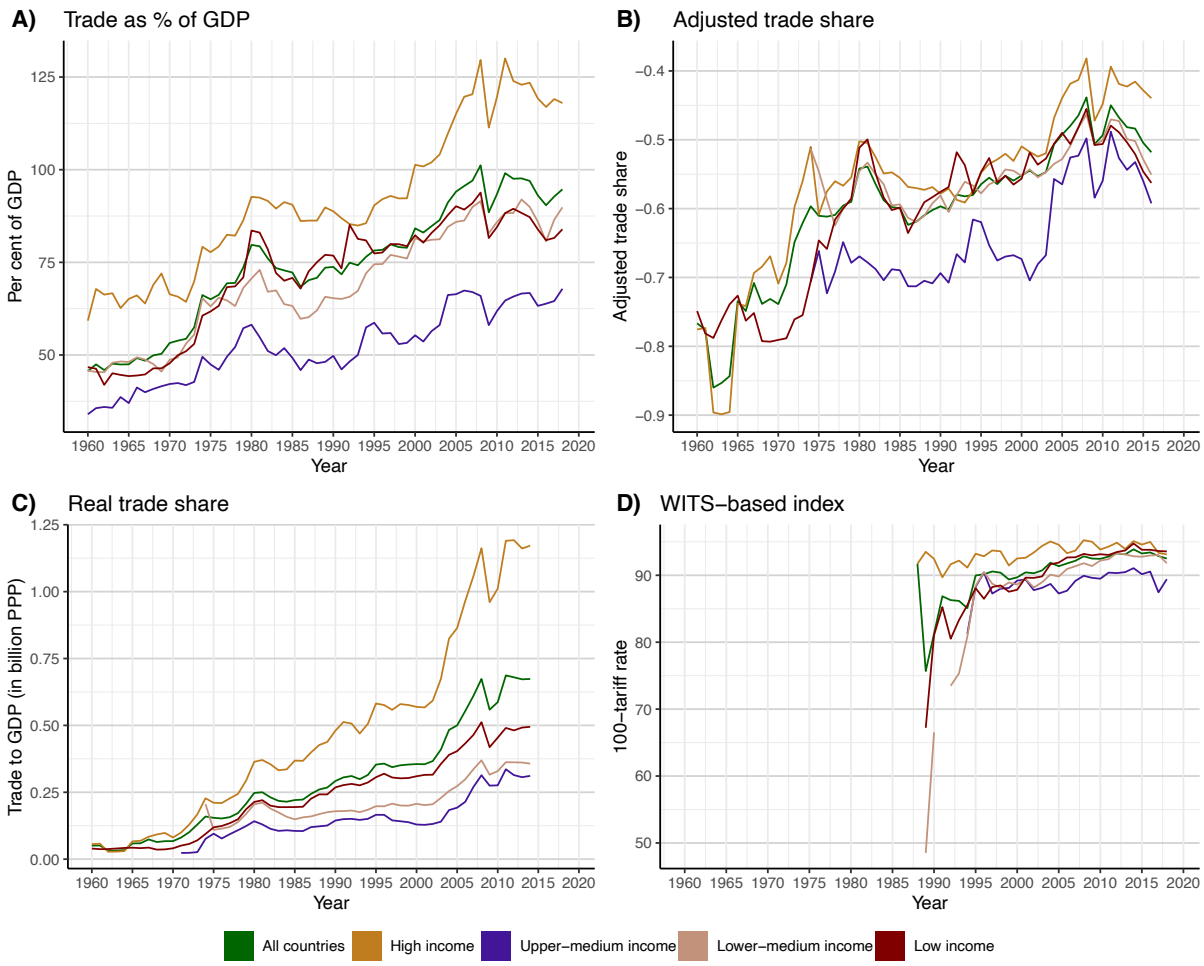


Figure 1: Replication of figure 1 in the main text: the dynamics of trade openness measures.

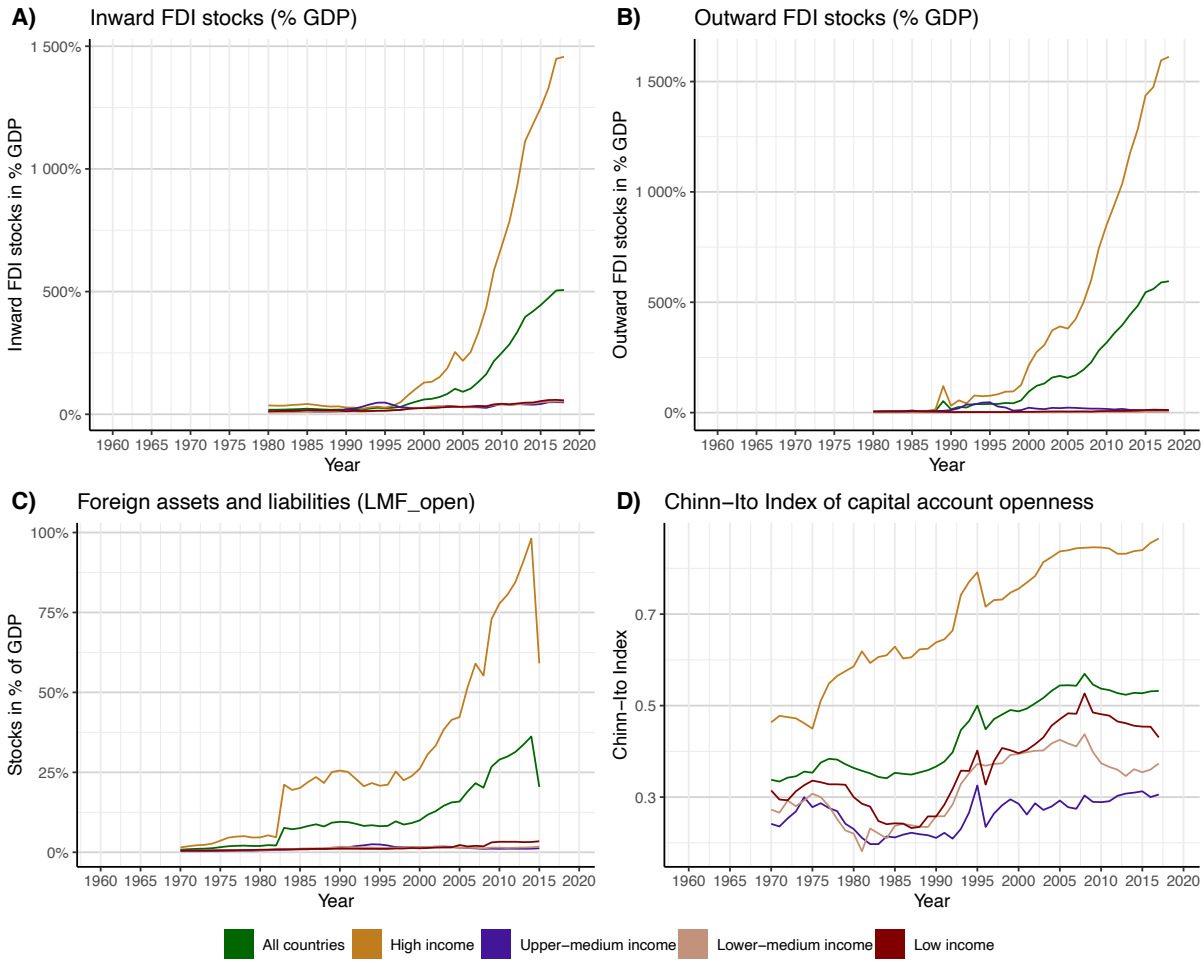


Figure 2: Replication of figure 2 in the main text: the dynamics of financial openness measures.

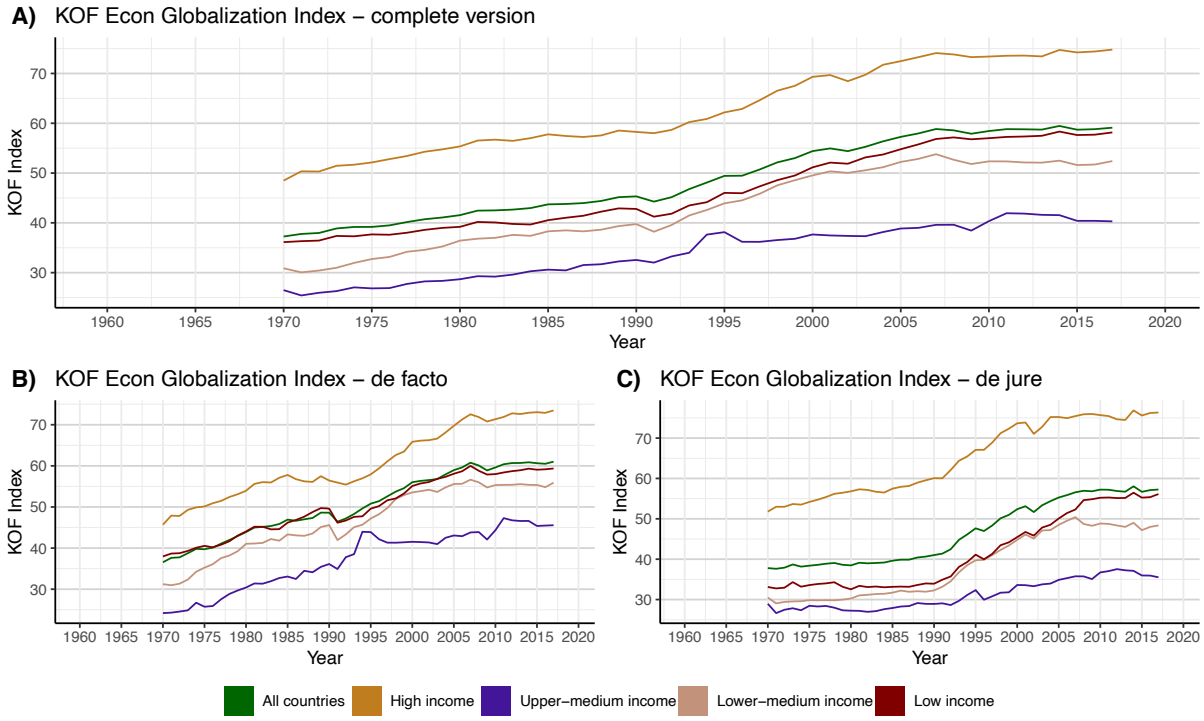
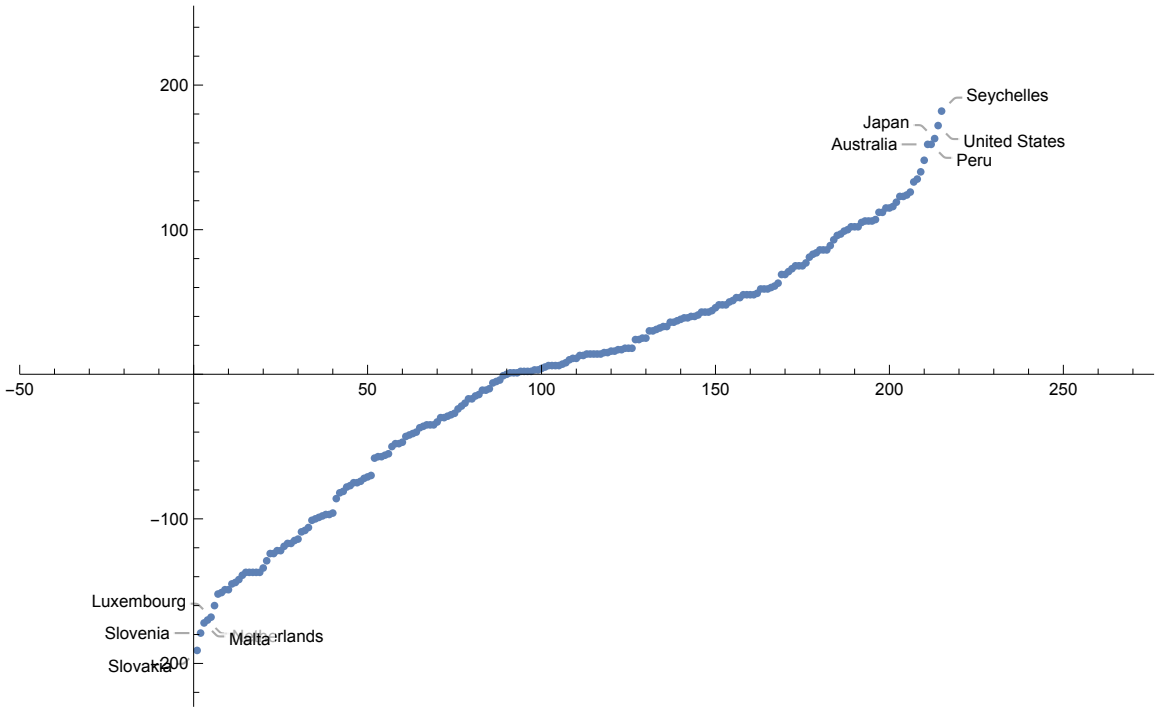


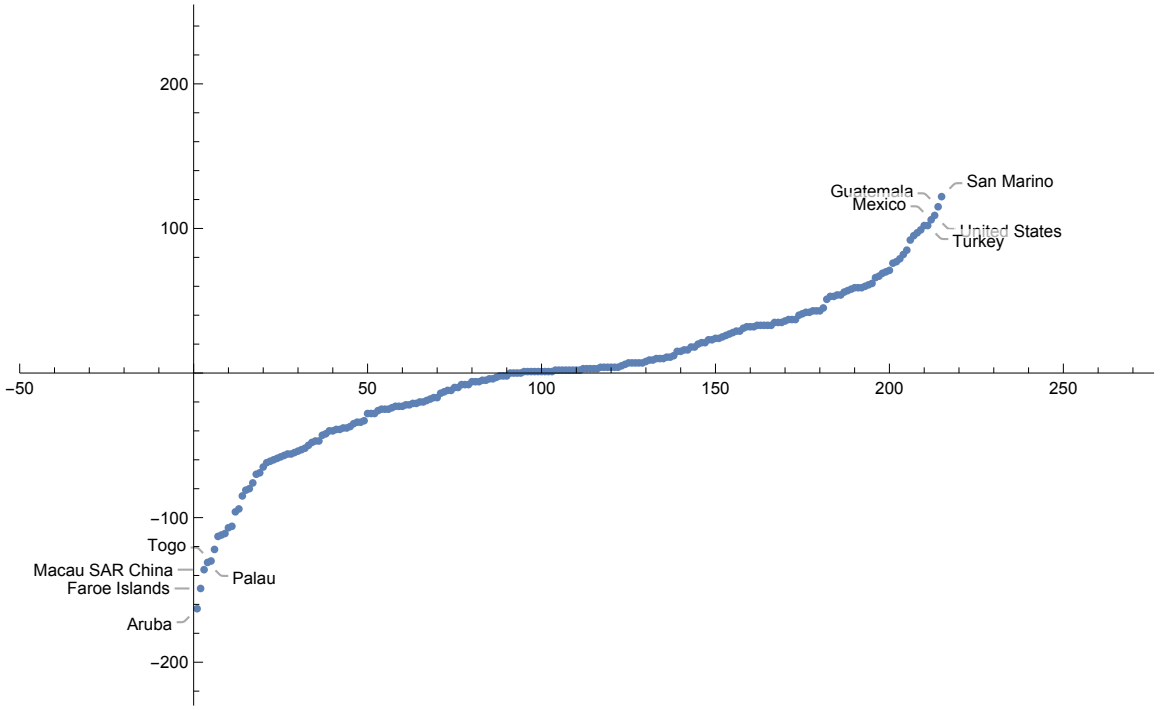
Figure 3: Replication of figure 3 in the main text: the dynamics of the KOF hybrid measure.

D Rankings

Here we first rank countries according to selected openness measures (see table 4) and, second, illustrate the fact that a high degree of *de jure* openness does not necessarily implies a high degree of *de facto* openness: figure 4 illustrates this difference and highlights those countries with the strongest discrepancy between *de facto* and *de jure* openness.



(a) Differences in the ranks of trade-to-GDP (trade *de facto*) and the WITS-based index (trade *de jure*).



(b) Differences in the ranks of KOF *de facto* and KOF *de jure*.

Figure 4: Comparisons of *de facto* and *de jure* openness.

Country	Rank
Luxembourg	1
Hong Kong SAR China	2
Singapore	3
Malta	4
Djibouti	5
Sint Maarten	6
Ireland	7
Slovakia	8
Vietnam	9
United Arab Emirates	10
San Marino	206
São Tomé & Príncipe	207
Suriname	208
Syria	209
Turks & Caicos Islands	210
Trinidad & Tobago	211
Tuvalu	212
Taiwan	213
British Virgin Islands	214
Vanuatu	215
Yemen	216

(a) Rank according to trade-to-GDP (trade *de facto*).

Country	Rank
Hong Kong SAR China	2
Macau SAR China	2
Singapore	3
Mauritius	4
Georgia	5
Peru	6
New Zealand	7
Switzerland	8
Ukraine	9
United States	10
Turkmenistan	206
Timor-Leste	207
Tonga	208
Trinidad & Tobago	209
Tuvalu	210
Taiwan	211
Uzbekistan	212
Venezuela	213
British Virgin Islands	214
U.S. Virgin Islands	215
Vanuatu	216

(b) Rank according to the WITS-based index (trade *de jure*).

Country	Rank
Singapore	1
Netherlands	2
Malta	3
Hong Kong SAR China	4
United Arab Emirates	5
Belgium	6
Bahrain	7
Ireland	8
Mauritius	9
Seychelles	10
Romania	206
San Marino	207
Somalia	208
South Sudan	209
Sint Maarten	210
Turks & Caicos Islands	211
Timor-Leste	212
Tuvalu	213
Taiwan	214
British Virgin Islands	215
U.S. Virgin Islands	216

(c) Rank according to the KOF *de facto* index.

Country	Rank
Luxembourg	1
Singapore	2
Ireland	3
United Kingdom	4
Czechia	5
Finland	6
Sweden	7
Estonia	8
Netherlands	9
Belgium	10
Romania	206
Somalia	207
South Sudan	208
Sint Maarten	209
Turks & Caicos Islands	210
Turkmenistan	211
Timor-Leste	212
Tuvalu	213
Taiwan	214
British Virgin Islands	215
U.S. Virgin Islands	216

(d) Rank according to the KOF *de jure* index.

Table 4: The most and least open countries according to selected openness measures.

E Correlation analysis with alternative correlation measures

Here we replicate the correlation matrix of section 4 in the main paper with the Pearson correlation coefficient (see figure 5 for correlations among levels and 6 for correlations among differences). The assumptions for this measure are somehow more restrictive than for the Spearman coefficient, yet the results are more pronounced, and the clusters of trade vs. financial, and de facto vs. de jure measures are easier to spot.

Figure 5: The correlation analysis for level data using the Pearson correlation coefficient.

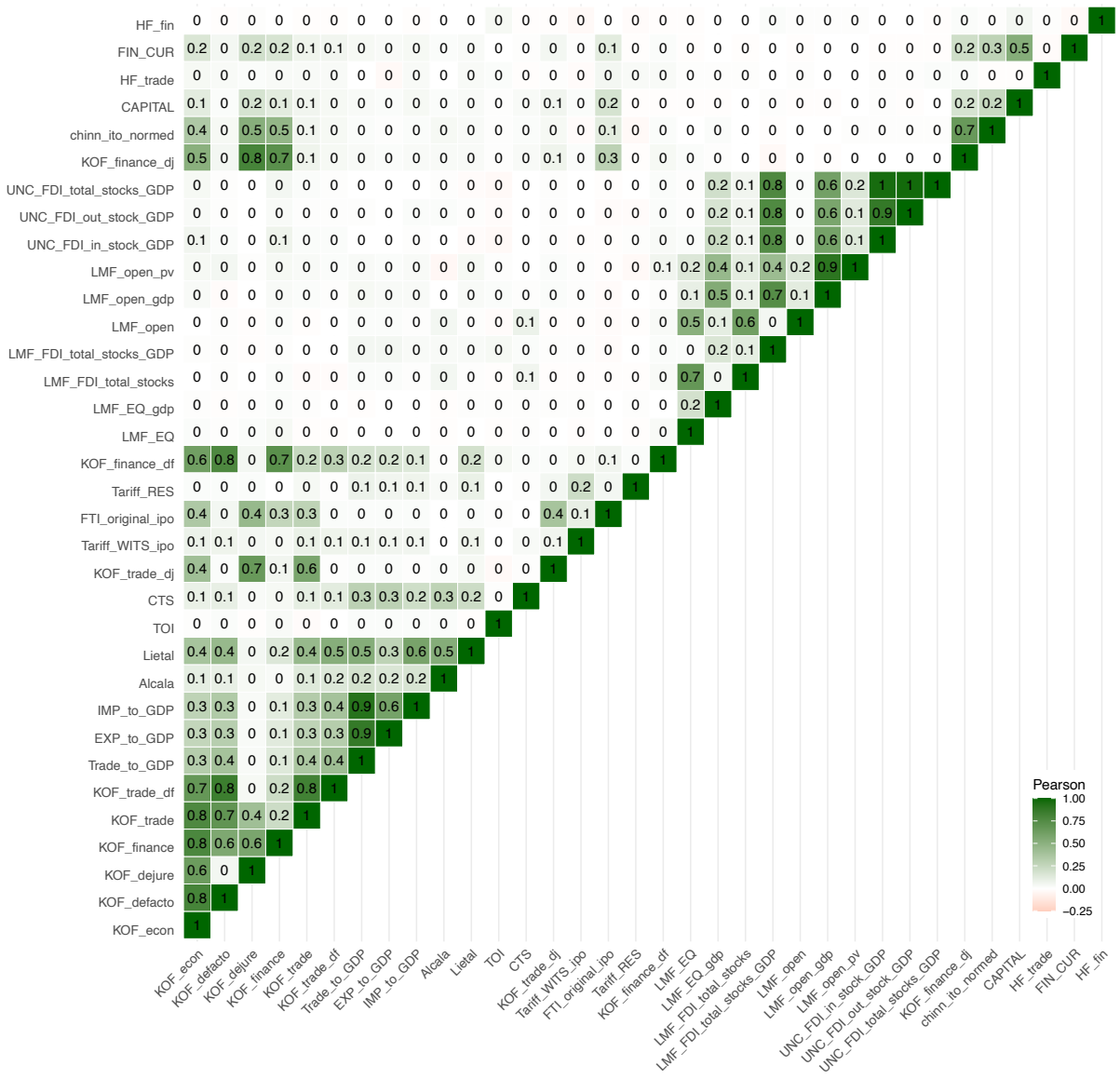


Figure 6: The correlation analysis for differenced data using the Pearson correlation coefficient.

F More detailed regression results

Here we provide the detailed results for the regressions summarized in table 7 in the main paper.

Table 5 provides the results for de facto trade openness measures, table 6 for de jure trade openness measures, table 7a for de facto financial openness measures, and, finally, table 7b for de jure financial openness measures.

	Dependent variable: GDP per capita growth					
	(1)	(2)	(3)	(4)	(5)	(6)
log(Trade_to_GDP)	0.777					
	(1.813)					
log(Alcala)		2.844***				
		(0.974)				
log(Lietal)			1.512			
			(2.725)			
log(TOI)				−1.372		
				(2.293)		
log(KOF_defacto)					1.923	
					(0.875)	
log(CTS)						2.000
						(2.045)
log(initial_GDP_pc)	−7.036***	−7.746***	−6.994***	−7.435***	−7.094***	−7.710***
	(1.152)	(1.062)	(1.106)	(1.351)	(−6.114)	(−6.266)
log(hc)	22.138***	15.880**	21.508***	23.016***	21.323	20.511
	(5.591)	(6.139)	(5.574)	(5.322)	(3.725)	(3.854)
pop_growth	−0.335	−0.209	−0.359	−0.403	−0.325***	−0.340***
	(0.455)	(0.494)	(0.442)	(0.429)	(−0.721)	(−0.764)
inflation	0.006***	0.006***	0.006***	0.006***	0.006	0.006
	(0.001)	(0.001)	(0.001)	(0.001)	(5.078)	(5.570)
log(inv_share)	3.843***	3.115***	3.738***	3.753***	3.858	3.334
	(0.953)	(0.987)	(1.008)	(0.929)	(4.051)	(3.174)
Observations	269	269	269	269	269	269
R^2	0.242	0.278	0.243	0.243	0.245	0.268
F Statistic	10.219***	12.302***	10.300***	10.251***	10.408***	11.708***
Note:						*p<0.1; **p<0.05; ***p<0.01

Table 5: Detailed regression results for de facto trade openness measures.

	Dependent variable: GDP per capita growth			
	(1)	(2)	(3)	(4)
log(KOF_dejure)	3.399**			
	(1.538)			
log(Tariff_WITS_ipo)		19.811***		
		(6.568)		
log(FTI_original_ipo)			7.619	
			(4.827)	
log(HF_trade)				1.716
				(2.225)
log(initial_GDP_pc)	−7.321***	−7.463***	−6.962***	−7.378***
	(1.146)	(1.178)	(1.166)	(1.224)
log(hc)	20.983***	16.592***	21.152***	21.125***
	(5.364)	(6.086)	(5.537)	(5.993)
pop_growth	−0.185	−0.300	−0.368	−0.308
	(0.419)	(0.406)	(0.423)	(0.441)
inflation	0.006***	0.005***	0.006***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
log(inv_share)	3.605***	3.683***	3.543***	3.444***
	(0.956)	(0.927)	(0.974)	(1.119)
Observations	269	269	269	268
R^2	0.254	0.273	0.252	0.244
F Statistic	10.891***	12.041***	10.801***	10.259***
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 6: Detailed regression results for de jure trade openness measures.

	Dependent variable: GDP per capita growth			
	(1)	(2)	(3)	(4)
log(LMF_open_gdp)	0.144			
	(0.497)			
log(LMF_EQ_gdp)		−0.087		
		(0.271)		
log(UNC_FDI_in_stock_GDP)			0.620	
			(0.509)	
log(UNC_FDI_out_stock_GDP)				0.278
				(0.361)
log(initial_GDP_pc)	−7.080***	−7.013***	−7.172***	−7.338***
	(1.159)	(1.160)	(1.050)	(1.228)
log(hc)	22.745***	23.594***	20.201***	21.887***
	(5.133)	(5.512)	(5.436)	(5.625)
pop_growth	−0.362	−0.378	−0.382	−0.353
	(0.445)	(0.438)	(0.506)	(0.449)
inflation	0.006***	0.006***	0.006*	0.006***
	(0.001)	(0.001)	(0.003)	(0.001)
log(inv_share)	3.907***	3.928***	3.777***	4.020***
	(0.891)	(0.958)	(1.070)	(0.888)
Observations	269	269	269	269
R^2	0.241	0.241	0.247	0.245
F Statistic	10.173***	10.186***	10.485***	10.408***
Note:				*p<0.1; **p<0.05; ***p<0.01

(a) Table 7a: Detailed regression results for de facto financial openness measures.

	Dependent variable: GDP per capita growth		
	(1)	(2)	(3)
log(chinn_ito_normed)	0.280		
	(0.797)		
log(HF_fin)		−1.570	
		(1.423)	
log(CAPITAL)			0.768
			(1.652)
log(initial_GDP_pc)	−7.063***	−7.097***	−17.246***
	(1.153)	(1.141)	(3.822)
log(hc)	22.960***	22.008***	42.094**
	(5.257)	(5.225)	(19.934)
pop_growth	−0.364	−0.353	−0.220
	(0.441)	(0.436)	(1.971)
inflation	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.002)
log(inv_share)	3.820***	3.770***	4.464**
	(0.961)	(0.906)	(1.864)
Observations	269	269	99
R^2	0.241	0.250	0.473
F Statistic	10.188***	10.662***	6.871***
Note:			*p<0.1; **p<0.05; ***p<0.01

(b) Table 7b: Detailed regression results for de jure financial openness measures.