

# Measuring Economic Openness:

## A Review of Existing Measures and Empirical Practices

Claudius Gräbner, Philipp Heimberger, Jakob Kapeller and  
Florian Springholz





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CLAUDIUS GRÄBNER  
PHILIPP HEIMBERGER  
JAKOB KAPELLER  
FLORIAN SPRINGHOLZ

Claudius Gräbner is a Research Associate at the Institute for the Comprehensive Analysis of the Economy (ICAE), Johannes Kepler University (JKU) Linz, Austria. Philipp Heimberger is Economist at The Vienna Institute for International Economic Studies (wiiw) and a Research Associate at ICAE, JKU Linz. Jakob Kapeller is Head of the ICAE and Assistant Professor in the Department of Economics, JKU Linz. Florian Springholz is a Research Associate at ICAE, JKU Linz.

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# Abstract

This paper surveys existing measures of economic openness understood as the degree to which non-domestic actors can or do participate in a domestic economy. We introduce a typology of openness indicators which distinguishes between 'real' and 'financial' openness as well as between 'de facto' and 'de jure' measures of openness, and show that this classification indeed captures different dimensions of economic openness. The main contribution of the paper is to supply a comprehensive and novel data set of openness indicators available for interested researchers. Based on this effort, we analyse some trends in economic openness over time and provide a correlation analysis across indicators. Finally, we explore the practical implications of choosing from different openness measures within a growth regression framework and highlight that researchers should make the choice of the indicator based on explicit theoretical justifications that correspond to their specific research questions.

Keywords: economic openness, trade openness, financial openness, globalisation

JEL classification: F00, F40, F60



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# 1. Introduction

The impact of global economic integration and increased economic openness of 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 liberalisation’ and ‘globalisation’ 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 globalisation’ 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, which typically emphasise different aspects of economic integration. Thus, not only the definition, but also the measurement of openness has varied considerably over the past three decades (Squalli and Wilson, 2011).

While a lack of consensus on how to best measure economic openness has been widely acknowledged (e.g. Yanikkaya, 2003; Busse and Koeniger, 2012; Huchet-Bourdon et al., 2014), most econometric works discount the underlying debate on the measurement of economic openness by simply employing the most popular measures without providing in-depth explanations or justifications for doing so. Against this backdrop, this paper contributes to the literature by providing a systematic collection, categorisation and evaluation of the most prominent openness indicators used in recent literature. Hence, the main purpose of our work is threefold: first, we provide applied researchers with the 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 want to highlight the practical implications of choosing some openness indicator by showing how empirical outcomes change when different openness indicators are used. Third, we supply a novel and comprehensive data set on openness indicators to be used in further research.<sup>1</sup>

In this context we will restrict ourselves to direct measures of economic openness. As a consequence, we exclude instrumental variables that are sometimes developed to substitute openness indicators whenever one expects endogeneity problems (e.g. Frankel and Romer, 1999, who use predictions from a gravity equation, or Felbermayr and Gröschl, 2013, who use the effects of natural disasters) as well as indicators based on extensive models of domestic economies (such as 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 of additional theoretical assumptions (e.g. exclusion restrictions). Thus, a *general* assessment of such instruments seems difficult to undertake. Second, the direct openness measures discussed below currently dominate much of the applied literature (e.g. Dreher et al., 2010; Martens et al., 2015; Potrafke, 2015), which is why we are convinced that they deserve a proper treatment on their own.

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<sup>1</sup> The data, as well as the code to reproduce the estimation results and figures will be available online after peer-reviewed publication.

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 analyses the mutual relationship of these indicators by inspecting the correlations of different openness measures. Section 5 highlights the practical implications of choosing among different measures within a growth regression framework. Section 6 summarises and concludes the paper.

## 2. Measures of economic openness

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 utilised in composing the openness measure. These sources are either aggregate economic statistics (de facto measures) or assessments of the institutional foundations 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 1 / Types of openness indicators**

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

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 licencing 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 not only influenced by national policies; they are also shaped by the impact of supranational institutions like the European Union or the World Trade Organisation.

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).<sup>2</sup>

Hence, implications drawn from de jure indicators can differ strongly from those derived from de facto indicators: while the former are mostly based on a single, yet prominent, factor in shaping actual economic integration – a country's regulatory environment – de facto indicators are focused on overall outcomes. Hence, 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 way to capture 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. These discussions are strongly coined by one core measure of trade openness, namely *Trade volume relative to GDP*. As Table 1 shows, alternatives to Trade to GDP do indeed exist and are mostly based on sub-components and variations of the Trade/GDP approach.

Notwithstanding the fact that the popularity of Trade to GDP as a central measure of reference stems from its intuitive interpretation and its seemingly close alignment to the question at stake, it has to be used with caution for several reasons. First, it is typically defined as including all goods and services, which is why variations in the calculation of Trade/GDP might be appropriate (e.g. focusing solely on trade in goods or excluding exports in primary sectors). Prominent examples are 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).

Second, 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). Although one might argue that this aspect of the Trade/GDP measure is actually a strength – as small economies may depend more strongly on international exchange relations due to a lack of endowments, institutions or technology – it effectively implies a definition of 'openness' in terms of the relative importance of cross-border versus domestic exchange. Against this backdrop, it does not come as a surprise that strong domestic economies, which also happen to be major players in international trade (like the US, Japan, Germany or China), find themselves at the lower end of any country ranking based on Trade/GDP. It is for these reasons that Tang (2011), Squalli and Wilson (2011), Alcalá and Ciccone (2004), Frankel (2000) and Li et al. (2004) not only suggest more specific labels for Trade/GDP, such as *trade dependency ratio*, *trade*

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<sup>2</sup> In the appendix we provide a more complete analysis of countries with regard to the discrepancy between de jure and de facto openness.

*openness index*, *trade share* or *trade ratio*, but also provide alternative indicators which aim to account for the size bias inherent in taking Trade/GDP as a straightforward measure of economic openness (see Table 1). Additional strategies for addressing this size bias include the incorporation of an inverse 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 form of 'net openness' conditional on some country characteristics (Lockwood, 2004; Vujakovic, 2010). Whether such corrective measures are appropriate eventually depends on a given research question and empirical setup. Alternatively, the size bias of Trade/GDP can be addressed by substituting the Trade/GDP variable for one of the alternatives listed above or by adding additional regressors aiming to control for country size.

**Table 2 / De facto trade openness measures**

Name	Components	Scale	Type	Time	Countries	Source
<b>Export share</b>	Exports (X)	% of nominal GDP	Co-Ra	1960-2016	200	World Bank, 2017 (publicly available)
<b>Import share</b>	Imports (M)		Co-Ra			
<b>Trade share</b>	Trade Volume = Exports (X) + Imports (M)		Co-Ra			
<b>Generalised Trade Openness Index</b>	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	1970-2014	145	Tang (2011) (own calculations)
<b>Composite Trade Share</b>	Trade Volume (X+M) in % GDP, adjusted by the World Trade Share (WTS)	arbitrary	Co-Int	1977-2016	187	Squalli and Wilson (2011) (own calculations)
<b>Real trade share</b>	Trade Volume (X+M) in % of GDP at PPP	% of real GDP	Co-Ra	1960-2015	173	Alcala and Ciccone (2004) (own calculations)
<b>Adjusted trade share</b>	Imports divided by GDP, adjusted for the nation's share in world production	arbitrary	Co-Ra	1960-2016	187	Li et al. (2004) (own calculations)
<b>Frankel</b>	Trade volume adjusted for the nation's share of world GDP	arbitrary	Co-Int	2000	23	Frankel (2000) (own calculations)

Note: In the type column 'Co' corresponds to 'continuous', 'Int' corresponds to 'interval', and 'Ra' corresponds to 'Ratio'. These elements are then combined; e.g., the export share is a continuous variable that comes as a ratio (exports in % of GDP); hence, we use the abbreviation Co-Ra.

Finally, the inclusion of Trade/GDP in regression approaches has also been the target of endogeneity concerns (e.g. Frankel and Romer, 1999). 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.

**Table 3 / De jure trade openness measures**

Name	Components	Scale	Type	Time	Countries	Source
<b>Sachs-Warner index</b>	Binary variable based on Sachs and Warner (1995) criterion (see text for more details)	0-1	Di-Bi	1960-2010	118	Sachs and Warner (1995) Extended by Wacziarg and Welch (2008) and Dollar et al. (2016) (publicly available)
<b>IMF Tariff Rates</b> (Tariff_RES)	100 – Average of the effective rate (=tariff revenue/import value) and the average unweighted tariff rates	0-100	Co-Int	1980-2004	44	Jaumotte et al. (2013) based on IMF database (publicly available)
<b>Trade Freedom</b> (HF_trade)	Trade-weighted average tariff rate – Nontariff trade barriers (NTBs)	0-100	Di-Int	1995-2017	186	Miller et al. (2018), Index of Economic Freedom, Heritage Foundation (publicly available)
<b>Freedom to Trade Internationally</b> (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: 2000-2015	159	Gwartney et al. (2017), Economic Freedom of the World: 2017 Annual Report, Fraser Institute (publicly available)
<b>Additional variable with improved coverage</b>						
<b>WITS Tariff Rates</b> (Tariff_WITS)	100 – Mean of Effectively Applied (AHS) and Most-Favoured Nation (MFN) weighted average tariff rates	0-100	Co-Int	1988-2016	168	Based on tariff data from WITS databank (own calculations)

Note: In the type column 'Co' corresponds to 'continuous', 'Di' corresponds to 'discrete', 'Bi' corresponds to 'binary', 'Int' corresponds to 'interval'. These elements are then combined; e.g., the Sachs-Warner-Index is a discrete and binary variable; hence, we use the abbreviation Di-Bi.

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 and 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 and Welch, 2008; Dollar et al., 2016), yet it has been strongly criticised for its ambiguous criteria and its dichotomous output dimension, which classifies countries as either 'open' or 'closed' and, hence, does not allow for a more nuanced analysis (Rodriguez and 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 from the IMF, implying that replicating or expanding their dataset is a non-trivial exercise.

Two further alternatives are provided by two partisan think-tanks: the *Trade Freedom Index*, based on the *Economic Freedom Index* of the Heritage Foundation, covers 186 countries from 1995 until 2017, and the *Freedom to Trade Internationally Index*, which is based on the *Economic Freedom of the World Index* by the Fraser Institute. The latter covers the period 1970-2000 in 5-year intervals and contains yearly data over the period 2000-2014 for 159 countries. Both approaches are composite indices that merge several tariff and non-tariff related variables into a final measure (for details see Table 4). Due to the partisan orientation of these two institutions – which promote a free-market agenda – and the opacity of data sources and aggregation methods, neither of the indicators makes a strong case for being considered in serious research on the role of economic openness.

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

**Trade Freedom index**

$$\text{Trade Freedom} = 100 \cdot \frac{\text{Tariff}_{\max} - \text{Tariff}_x}{\text{Tariff}_{\max} - \text{Tariff}_{\min}} - \text{NTB}$$

Variable	Description	Source and further details
Tariff <sub>x</sub>	Weighted average tariff rate in country X	
Tariff <sub>max</sub> , Tariff <sub>min</sub>	Upper and lower bounds for tariff rates;	
NTB	Minimum tariff is zero, the upper bound is set to 50 per cent. Depending on the use of NTBs a penalty is subtracted from the base score.	Miller et al. (2018)

**Freedom to Trade Internationally Index**

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

Tariff dimension		
Variable	Description	Source
$\delta_1$	Revenue from trade taxes	
$\delta_2$	Mean tariff rate	
$\delta_3$	Standard deviation of tariff rates	
<b>Regulatory trade barriers (included since 1995)</b>		
$\delta_4$	Non-tariff trade barriers	
$\delta_5$	Compliance costs of importing and exporting	

Given this unsatisfactory state of affairs 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. The indicator is easy to replicate, and we were able to construct it for a sample of 168 countries over the period 1988-2016. We calculate the index as 100 minus the average of (1) the effectively applied tariff

rates and (2) the weighted average of the most-favoured 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.

## 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<sup>3</sup> and currently contains data for 211 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<sup>4</sup> (see Table 5).

Saadma and Steiner (2016) build on the data provided by Lane and Milesi-Ferretti to create an index for private financial openness (OPEN<sub>pv</sub>), 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 and 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.

Finally, Table 6 collects the most prominent de jure indicators in the financial dimension. Two aspects are of particular importance. First, the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) obtains a prominent role as these reports serve as a key source for deriving de jure indicators regarding trade openness (IMF 2016).<sup>5</sup> Existing de jure indicators can be broken down into three sub-categories: (i) de jure indicators that are based on the AREAER Categorical Table of Restrictions, (ii) de jure indicators that are 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-grain 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.

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<sup>3</sup> 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>

<sup>4</sup> 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.

<sup>5</sup> 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/~e/media/Files/Publications/AREAER/AREAER\\_2016\\_Overview.ashx](https://www.imf.org/~e/media/Files/Publications/AREAER/AREAER_2016_Overview.ashx)



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 during the period 1970–2015.<sup>6</sup> This comparably huge coverage of the Chinn-Ito Index is a major asset partly explaining 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 AREAER, 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.<sup>7</sup>

**Table 5 / De facto financial openness measures**

Name	Components	Scale	Type	Time	Countries	Source
<b>Financial Openness Index (LMF_OPEN)</b>	LMF_OPEN represents the sum of Total Foreign Assets and Total Foreign Liabilities in % GDP	% of GDP	Co-Ra	1970-2015	211	'LMF': Lane and Milesi-Ferretti (2017) (publicly available)
<b>Equity-based Financial Integration (LMF_EQ)</b>	LMF_EQ represents the sum of Portfolio Equity Assets and Liabilities (stocks)	% of GDP	Co-Ra	1970-2015	211	
<b>Private Financial Openness Index (OPEN_pv)</b>	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	190	Saadma and Steiner (2016)
<b>FDI liabilities (LMF)</b> (LMF_in_GDP, LMF_FDI_in)	The inward FDI stock represents the value of foreign investors' equity in and net loans to enterprises resident in the reporting economy.	% of GDP	Co-Ra	1970-2015	202	Lane and Milesi-Ferretti (2017) (publicly available)
<b>FDI liabilities (UNCTAD)</b> (UNC_in_GDP, UNC_FDI_in)		USD	Co-Int			
<b>FDI asset stock (LMF)</b> (LMF_out_GDP, LMF_FDI_out, )	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	1970-2015	202	Lane and Milesi-Ferretti (2017) (publicly available)
<b>FDI asset stock (UNCTAD)</b> (UNC_out_GDP, UNC_FDI_in)		USD	Co-Int			

Note: In the 'type' column: 'Co' corresponds to 'continuous', 'Int' corresponds to 'interval', and 'Ra' corresponds to 'Ratio'. These elements are then combined; e.g., the financial openness index (LMF\_OPEN) is a continuous variable that comes as a ratio (the sum of Total Foreign Assets and Total Foreign Liabilities in % of GDP); hence, we use the abbreviation Co-Ra.

<sup>6</sup> Note that the covered time period is shorter for some countries due to data availability.

<sup>7</sup> The Chinn-Ito-Index has been criticised for measuring the *extensity* more so than the *intensity* of capital controls. In response, Chinn and 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.

**Table 6 / Classification of financial de jure measures**

Name	Components	Scale	Type	Time	Countries	Source
<b>Chinn-Ito-Index</b> (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	1970-2015	182	Chinn and Ito (2006) update in 2015, (publicly available)
<b>Financial Current Account</b> (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	1950-2004	94	Quinn and Toyoda (2008) (publicly available)
<b>Capital Account Liberalisation</b> (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	1950-2004	94	Quinn and Toyoda (2008) (publicly available)
<b>Capital Account Restrictions</b> (KA_Index)	Text-based AREAER* measure Similar than CAPITAL and FIN_CURRENT but includes finer-grain sub-categories and information about different types of restrictions, asset categories, direction of flows and residency of agents.	0-1	Di	1995-2005	91	Schindler (2009) (publicly available)
<b>Financial Current and Capital Account (FOI)</b>	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	1965-2004	187	Brune (2006) (not available)
<b>Investment Freedom</b> (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	1995-2017	186	Miller et al. (2018) (publicly available)
<b>Equity market liberalisation indicator</b>	Non-AREAER* measure This binary liberalisation 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)
<b>FDI regulatory restrictiveness index</b> (FDI_Restrictions)	Non-AREAER* measure Based on four types of restrictions on FDI: - Foreign equity limitations - Discriminatory screening mechanisms - Restrictions on the employment of foreigners - Other operational restrictions	0-1	Co	1997, 2003, 2006, 2010-2016	62	Kalinova et al. (2010), update 2018 (publicly available)

Note: In the type column: 'Co' corresponds to 'continuous', 'Di' corresponds to 'discrete', 'Bi' corresponds to 'binary'.

### 2.3. HYBRID AND COMBINED MEASURES FOR ECONOMIC OPENNESS

While there exist a series of different indicators for assessing the intensity of globalisation in general (see Gygli et al., 2018, Table 2, for an overview), indices that focus specifically on *economic* globalisation (as distinguished from e.g. social, political or cultural aspects of globalisation) are comparably rare. To derive such more specific measures of economic globalisation requires researchers first isolate the relevant economic dimensions and then identify suitable variables for measuring these dimensions. Among those globalisation indicators, that could serve as a starting point for assessing the economic dimension of globalisation – such as the DHL Connectedness index (Ghemawat and Altman, 2016), the New Globalisation index (Vujakovic, 2010), or the Maastricht Globalisation index (Figge and Martens, 2014) – the KOF Globalisation index (Dreher, 2006; Gygli et al., 2018) occupies an exceptional position in terms of coverage, conceptual clarity and transparency. The index is supplied by the Swiss Economic 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 globalisation index (Gygli et al., 2018). 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.

**Table 7 / The KOF economic globalisation index as an example for a hybrid measure**

Name	Components <sup>8</sup>	Scale	Type	Time	Countries	Source
<b>KOF trade de facto</b>	Trade in goods (40.9%)	0-100	Co-Int	1970-2015	221	Gygli et al. (2018), publicly available
	Trade in services (45%)					
	Trade partner diversification (14.1%)					
<b>KOF finance de facto</b>	Foreign direct investment (27.5%)					
	Portfolio investment (13.3%)					
	International debt (27.2%)					
	International reserves (2.4%)					
<b>KOF de facto</b>	International income payments (29.6%)					
	KOF trade de facto (50%)					
<b>KOF trade de jure</b>	KOF finance de facto (50%)					
	Trade regulations (32.5%)					
	Trade taxes (34.5%)					
<b>KOF finance de jure</b>	Tariffs (33%)					
	Investment restrictions (21.7%)					
<b>KOF de jure</b>	Capital account openness (78.3%)					
	KOF trade de jure (50%)					
<b>KOF econ</b>	KOF finance de jure (50%)					
	KOF de facto (50%)					
	KOF de jure (50%)					

Note: In the type column: 'Co-Int' corresponds to 'continuous-interval', since the KOF variables represent a continuous index variable bounded between 0 and 100.

<sup>8</sup> For more details see: [https://www.ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/Globalization/2018/Variables\\_2018.pdf](https://www.ethz.ch/content/dam/ethz/special-interest/dual/kof-dam/documents/Globalization/2018/Variables_2018.pdf) (accessed 20 July 2018).

## 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. This is motivated by recent findings according to which 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). And indeed, we observe some substantial differences in de facto trade openness when considering technological capabilities. Specifically, we find that the export share of high complexity countries started to decouple from the moderate and low complexity countries in the early 1980s.<sup>9</sup> While some convergence is observable in the late 1980s and the 1990s, from 2000 onwards the export share disparities have again increased substantially. This finding suggests that countries which tend to benefit more from trade also tend to record higher de facto openness to trade.

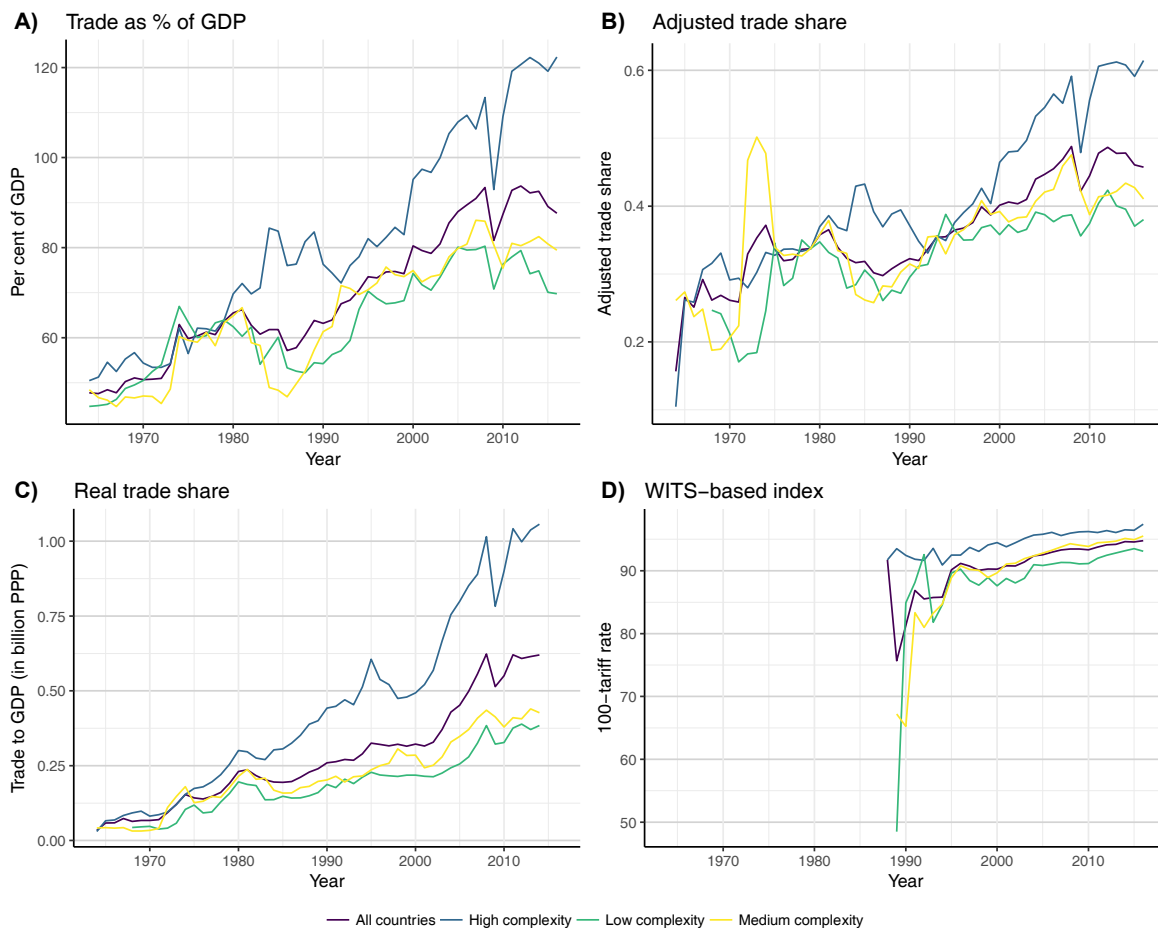
With regard to the de jure openness to trade, the differences among country groups are less pronounced and convergent since the late 1980s (Figure 1, panel D). The latter observation suggests that countries of moderate and low complexity have opened their trade policy regimes in the past decades and so all countries exhibit very high degrees of openness. Several factors have been discussed in the literature to explain this change in de jure 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).

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<sup>9</sup> The classification into complexity groups and basic information on the data is 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

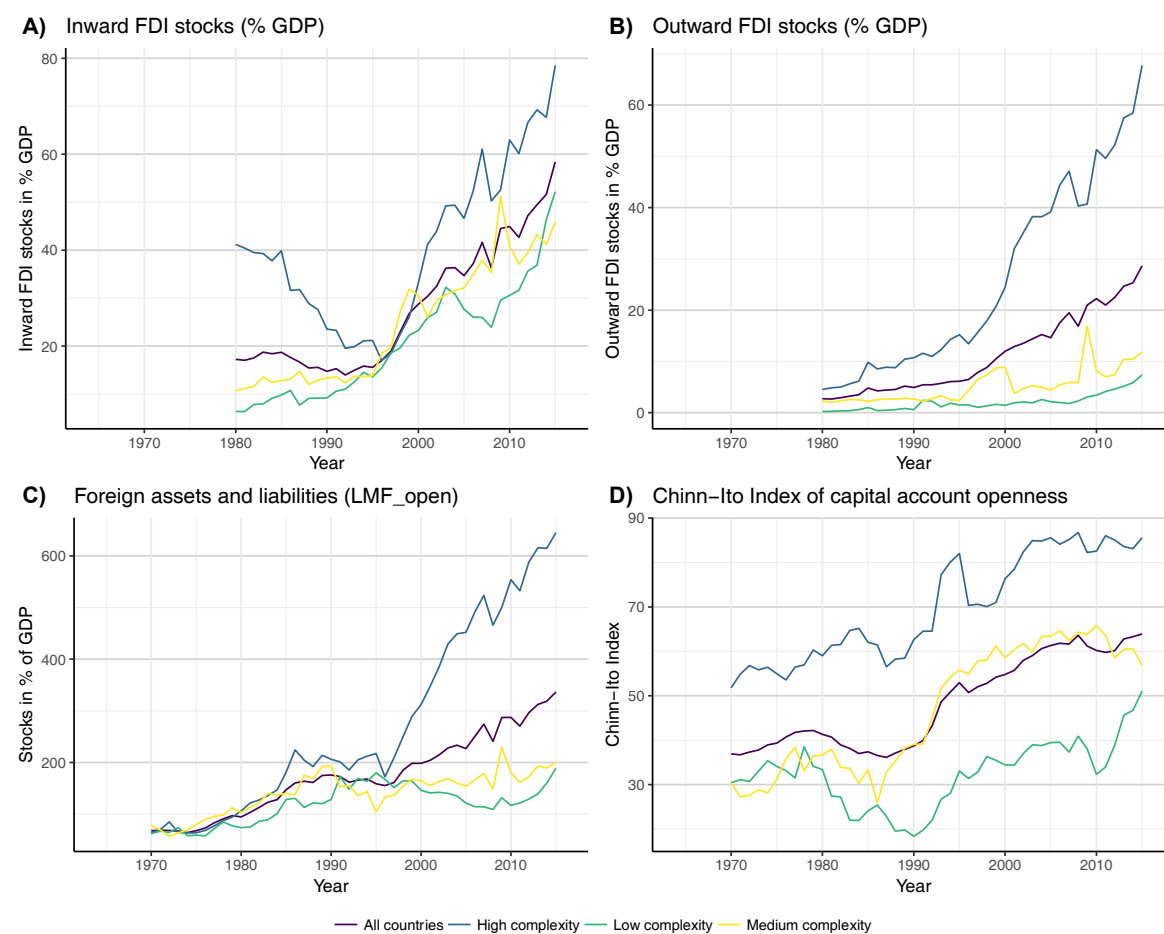
Measures of financial openness show similar trends as those of trade openness (see Figure 2, panels A-D). De facto measures of the high complexity group started to decouple from the other groups between 1995 and 2000, that is, after the foundation of the WTO in 1994. Since then, the gap between the former and the latter two groups has enlarged substantially, which implies that the integration of financial markets among high complexity countries has proceeded faster than in the rest of the world.

Furthermore, a comparison of in- and outflows of FDIs (panels A and B in Figure 2), indicates that a large part of FDI in medium- and low complexity countries, where inflows are much greater than outflows, stems from the high complexity country group. With regard to the high complexity countries we find that, on average, larger countries play a relatively greater role in terms of outflows than inflows and vice versa. Finally, we observe that the financial crisis of 2007-2008 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.

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 up until 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 the relevant time-span, indicates that financial openness in medium complexity countries has decreased, while it has sharply 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)

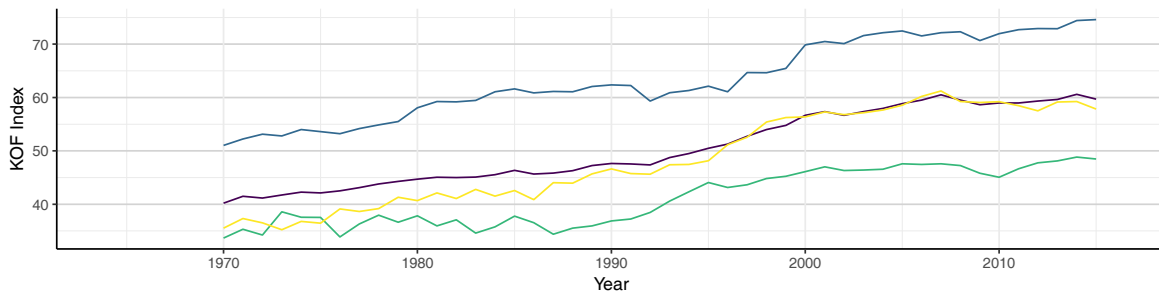


The KOF index provides a more complete view of the increase of economic openness in the previous decades. As can be seen from Figure 3, the index captures the overall trend of increasing openness (plot A) and the somehow different dynamics in the de facto and de jure dimension (plots B and C). In the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

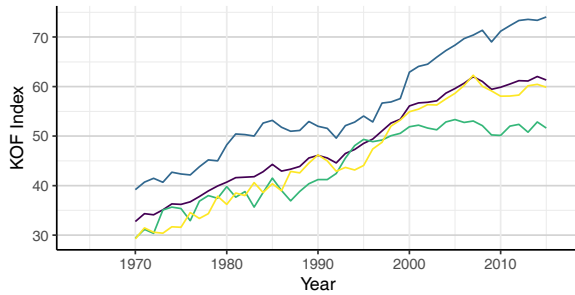
openness. De facto openness, on the other hand, is rising steadily over time, which, again, suggests that de facto developments are not primarily driven by de jure (policy) changes.

**Figure 3 / The KOF globalisation index as a hybrid measure**

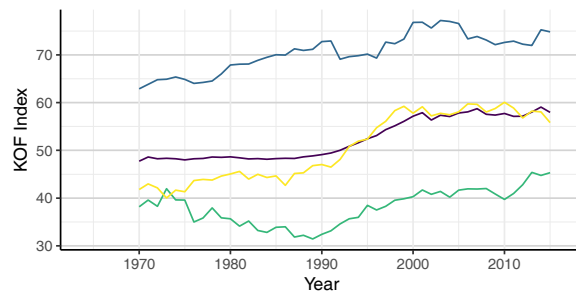
**A) KOF Econ Globalization Index – complete version**



**B) KOF Econ Globalization Index – de facto**



**C) KOF Econ Globalization Index – de jure**



— All countries — High complexity — Low complexity — Medium complexity

## 4. Do different measures of openness measure the same? A correlation analysis

Having introduced the most prominent indicators for economic openness and after 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 the 32 indices of economic openness presented so far. 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.<sup>10</sup> 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 us to clarify 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 of 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 and discuss 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.

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 versus 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 their de facto counterparts, while the correlation between de facto and de jure in both dimensions (trade and finance) is weaker. 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 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.

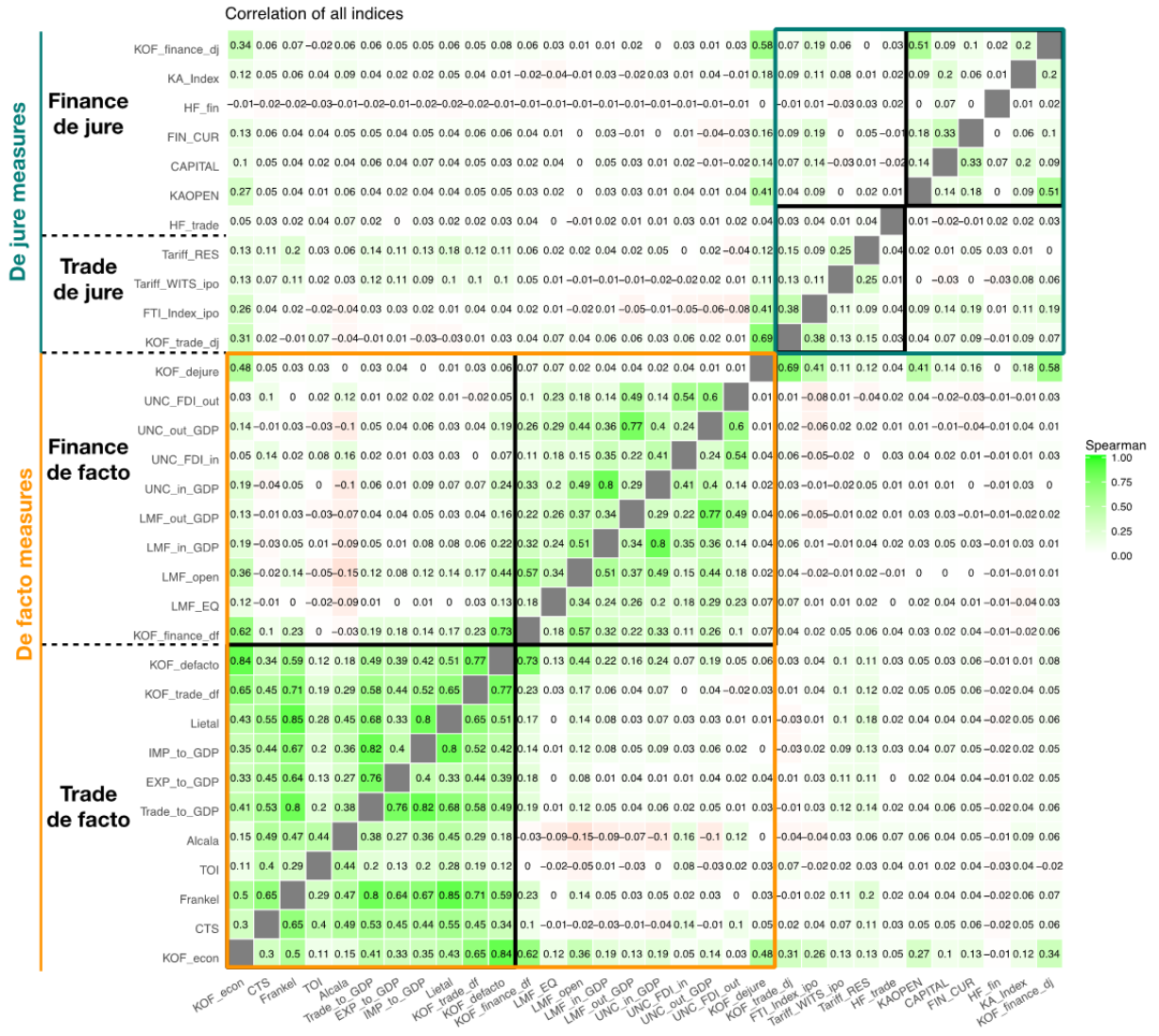
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<sup>10</sup> Unit roots tests for the individual time series are provided in the appendix. The Sachs-Warner as an index is excluded from this analysis.





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



Summing up, 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 144 countries over the time period 1960-2014. There is a large literature on the determinants of economic growth (e.g. Barro, 1991; Barro and 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; Menyah et al., 2014). While this literature has produced mixed results regarding the link between openness and growth (e.g. Edwards, 1993; Rodriguez and Rodrik, 2001; Bekaert et al., 2005; Bussiere and Fratzscher, 2008), 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; Aribas Fernández et al., 2007; Quinn et al., 2011). Against this background, we apply the trade and financial openness indicators analysed 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.

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

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

where  $GDPg_{i,t}$  represents the growth rate of Gross Domestic product at PPP 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 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:<sup>11</sup>

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

<sup>11</sup> Notably, we use annual data (and not 5-year averages as in equation (1)) to estimate the first difference specification in equation (2).

The results on the sign and statistical significance of the estimated coefficients are summarised in Table 8<sup>12</sup>. Despite the obvious remark that our specifications may contain misspecifications, most notably due to endogeneity issues, the outcomes reveal interesting patterns, both within and between the various dimensions of openness. Within the cluster of de facto trade openness measures, and for the case of 5-year averages in levels, the real trade share suggests a negative relationship between openness and growth. The remaining indicators, on the other hand, suggest a positive relationship, with Trade/GDP and the TOI indicator (Tang 2011) being significant at the 5% level. The picture is more ambiguous when we consider the first-difference estimations based on annual data: in this case, both the TOI and the real trade share are highly significant and suggest a negative relationship, while the remaining three indicators are positively correlated with growth, and trade to GDP is moderately significant. 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 emphasises our point that the choice of the indicator is important and requires both a case-based theoretical justification as well as thorough robustness checks.

**Table 8 / The results from estimating equations (1) and (2) with different measures for economic openness**

Dependent variable: GDP per capita growth						Controls
		Direction of relationship		Significance		
		5-year averages	FD yearly	5-year-averages	FD yearly	
Trade de facto	Trade to GDP	+	+	**	**	log(human capital), population growth, inflation, log(investment share)  <i>For 5-year estimations additionally:</i>  log(initial GDP),
	Real trade share	-	-	0	***	
	Adjusted trade share	+	+	0	0	
	Composite trade share	+	+	0	0	
	Generalised Trade Openness Index	+	-	**	***	
	KOF de facto	+	-	0	***	
Trade de jure	KOF_de jure	+	+	0	*	
	Tariff_WITS	-	-	0	*	
	FTI_Index	+	+	***	0	
	HF_trade	+	-	0	0	
Financial de facto	LMF_open	-	-	**	***	
	LMF_EQ	+	-	*	**	
	FDI inflows (% of GDP)	+	-	**	***	
	FDI outflows (% of GDP)	+	-	0	0	
Finan. de jure	KAOPEN	+	+	0	0	
	HF_fin	-	-	0	0	
	CAPITAL	+	+	0	***	

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 (heteroscedasticity-robust) standard errors. 'FD yearly' denotes First Differences based on annual observations.

<sup>12</sup> More detailed results regarding coefficients, standard errors and test statistics can be obtained from the appendix.

The results within the cluster of trade de jure measures are also mixed: in case of the five-year averages, three of the indicators (KOF\_dejure, HF\_trade and the FTI index) are positively correlated with growth and the latter variable even shows a statistical significance. However, the estimate for Tariff\_WITS has a negative sign and is significant at the 10% level. The result for the FD-specification is similar, although HF\_trade now switches sign but remains insignificant, the KOF de jure index turns significant at the 10% level, and the FTI index ceases to be significant.

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\_EQ, FDI inflows, FDI outflows), with two of them being significant at the 5 and 10% level, while the LMF openness indicator (LMF\_open) suggests a negative relationship, significant at the 5% level. 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% level.

Finally, we also observe ambiguous patterns for the financial de jure measures with KAOPEN and CAPITEL being positively, and HF\_fin being negatively associated with growth, for both the estimations based on first differences and five-year averages. All of these relationships remain insignificant, with CAPITAL in the FD case being the exception: it is significant at the 1% level.

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 including measures for different types of economic openness (all measured in logs):

$$GDPg_{i,t} = \alpha KOF_{defacto} + \beta KOF_{dejure} + \gamma KAOPEN + \eta LMF_{open} + \delta Z_{i,t} + FE_i + \epsilon_{i,t} \quad (3)$$

as well as a first difference specification:

$$\Delta GDPg_{i,t} = \Delta KOF_{defacto} \alpha + \Delta KOF_{dejure} \beta + \Delta KAOPEN \gamma + \Delta LMF_{open} \eta + \Delta Z_{i,t} \delta + \epsilon_{i,t} \quad (4)$$

The results on the determinants of GDP per capita growth obtained from estimating equations (3) and (4) 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): if we do not include de facto measures for financial openness, the estimate for the KOF de facto indicator has a negative sign; but once LMF\_open is included in the model, the estimate switches its sign and, for the FD specification, becomes highly significant. If we use FDI inflows instead of LMF\_open, KOF\_defacto remains insignificant, but switches its sign in the FD case. KAOPEN and KOF\_dejure remain insignificant in all specifications, but consistently show a positive association with growth. LMF\_open is always highly significant and negatively associated with growth; in case of FDI inflows, sign and significance depend on the estimation technique: for the FD case we estimate a significantly negative relationship with growth (at the 5% level), for the five-year averages case, the relationship is, however, positive and insignificant.

While we do not claim that we provide a fully-fledged estimation framework or to provide a definite answer on the relationship between economic openness and growth – 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. The results indicate that operationalising economic openness for econometric research is not a straightforward task. Rather, explicit theoretical justifications are necessary to make an informed choice about the relevant dimensions as well as the available indicators within these dimensions: we find that differences in how openness indicators correlate with economic growth are due to the theory-ladenness of observation (Hanson, 1958), i.e. the methodological approach underlying the construction of different openness indicators makes 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.

**Table 9 / Results based on estimating equations (2) and (3)**

	Full specification					
	Dependent variable: GDP per capita growth					
	(1) 5-year averages	(2) FD	(3) 5-year averages	(4) FD	(5) 5-year averages	(6) FD
log(KOF_dejure)	1.212 (1.306)	1.871 (2.398)	1.126 (1.514)	2.618 (2.456)	1.504 (1.338)	1.657 (2.204)
log(KOF_defacto)	-0.675 (0.737)	-1.245 (1.901)	-1.433 (0.956)	0.099 (2.296)	0.839 (0.729)	7.318*** (1.641)
log(KAOPEN)	0.201 (0.255)	0.458 (0.285)	0.094 (0.284)	0.505 (0.314)	0.292 (0.246)	0.386 (0.245)
log(UNC_in_GDP)			0.436 (0.286)	-2.196*** (0.733)		
log(LMF_open)					-1.259*** (0.306)	-8.399*** (0.894)
log(initial_GDP_pc)	-2.180*** (0.514)		-2.385*** (0.588)		-2.218*** (0.508)	
log(hc)	4.734*** (1.755)	-0.207 (5.630)	8.534*** (2.105)	13.724** (6.239)	6.363*** (1.784)	4.404 (10.411)
pop_growth	-0.457** (0.190)	-0.600* (0.323)	-0.311 (0.202)	-0.454 (0.296)	-0.446** (0.178)	-0.634** (0.313)
inflation	-0.002*** (0.0003)	0.001 (0.0005)	-0.002*** (0.0003)	0.001 (0.0005)	-0.001*** (0.0003)	0.001*** (0.0002)
log(inv_share)	1.746*** (0.602)	0.005 (1.587)	1.155 (0.725)	-0.516 (1.741)	1.179** (0.572)	-0.177 (0.684)
Observations	1,105	4,797	934	3,929	1,074	4,670
R <sup>2</sup>	0.091	0.004	0.110	0.010	0.115	0.023
F Statistic	11.946*** (df = 8; 960)	3.266*** (df = 6; 4790)	10.859*** (df = 9; 788)	5.591*** (df = 7; 3921)	13.407*** (df = 9; 928)	15.614*** (df = 7; 4662)

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Models (1), (3) and (5) build upon 5-year averages (equation 3), models (2), (4) and (6) on yearly data and FD estimation (equation 4). Statistical inference based on clustered (heteroscedasticity-robust) standard errors.

## 6. Conclusions

This paper has reviewed existing measurements and empirical practices concerning 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 a comprehensive set of openness indicators from the existing literature – the data set is published together with this article – and have categorised 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.

We have used this data set to analyse the correlation across indicators, both in levels and in first differences. We find that indicators that belong to the same category of openness measures 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 entails 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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