Does Economic Globalisation Affect Income Inequality? A Meta-analysis

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Funding from the Austrian Federal Ministry of Labour, Social Affairs, Health and Consumer Protection is gratefully acknowledged.

The author thanks Robert Stehrer for very helpful comments on an earlier draft.
Abstract

A large volume of econometric literature has studied the impact of economic globalisation on income inequality around the world. However, reported econometric estimates vary substantially which makes it difficult to draw valid conclusions. This paper presents a quantitative summary and analysis of existing estimates regarding the globalisation-inequality relationship. We used a new data set consisting of 1254 observations from 123 peer-reviewed papers. By applying meta-analysis and meta-regression methods, we obtained several main findings. First, globalisation has a (small-to-moderate) positive impact on income inequality considering the total population of estimates. The average effect is robustly different from zero suggesting that globalisation increases income inequality. Second, while the effect of trade globalisation is small, financial globalisation shows a more sizable and significantly stronger inequality-increasing impact. Third, the cumulative evidence rejects theoretical accounts according to which economic globalisation reduces within-country income inequality in developing countries as the meta-analysis establishes an average inequality-increasing impact in both advanced and developing countries. Fourth, education and technology moderate the impact of globalisation on income inequality. Fifth, we tested for various other factors that could cause heterogeneity in the reported estimates including differences in the econometric specifications, the income inequality measures and data set used and publication characteristics.

Keywords: Globalisation, trade openness, financial openness, income inequality, meta-analysis

JEL classification: D31, F6, O15
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One of the most fundamental and robust trends since the 1980s has been the rise in within-country income inequality, which has been observed in both advanced as well as in developing countries (e.g. OECD 2015; Alvaredo et al. 2018). Several explanations have been put forward to explain rising income inequality. One of these explanations concerns economic globalisation: over recent decades, questions about how increasing market integration in the areas of international trade and finance have affected income inequality around the world have been at the centre of social science controversies. Several qualitative reviews show that academic scholars have contributed to a rapidly growing literature (e.g. Burtless 1995; Ravallion 2003; Winters et al. 2004; Anderson 2005; Demirguc-Kunt and Levine 2009; Mills 2009; Nissanke and Thorbecke 2010; Harrison et al. 2011; de Haan and Sturm 2017).

There seems to be a consensus among many analysts and observers that globalisation and income inequality have at least some type of relationship. However, despite a wave of research, the magnitude of the relationship between globalisation and inequality remains unclear. On a theoretical level, large parts of the extant literature concerned with the impact of trade globalisation on income inequality are framed as a test of the well-known Stolper-Samuelson theorem which predicts that increasing international trade integration reduces within-country income inequality in developing countries while it increases inequality in advanced countries (Stolper and Samuelson 1941). On an empirical level, however, the literature has not provided a general conclusion regarding the effect of trade globalisation: while several papers find (partial) empirical support for the Stolper-Samuelson theorem (e.g. Robertson 2004; Chiquiar 2008; Roser and Crespo Cuaresma 2016), others reject it based on econometric hypothesis tests (e.g. Goldberg and Pavcnik 2007; Meschi and Vivarelli 2009; Han et al. 2012). Researchers have also extensively theorised regarding the impact of financial globalisation on income inequality in both advanced and developing countries, however, reported econometric findings point to contradictory conclusions (e.g. Hamori and Hashiguchi 2012; Jaumotte et al. 2013; Asteriou et al. 2014). Furthermore, several scholars have voiced skepticism about the hypothesis that globalisation has had a sizeable impact on income inequality since domestic politics and institutions as well as other factors (such as technology, education or macroeconomic factors) may be seen to be much more important for explaining changes in inequality (e.g. Mahler et al. 1999; Pontusson et al. 2002; Abdullah et al. 2015; Huber et al. 2017). To sum up, the extant literature has not been able to present convincing econometric evidence to resolve conflicting theoretical arguments. Relevant studies often differ markedly based on the structure of the data and the details of the econometric specification. Considering the wide range of estimates reported in the literature, it is therefore quite challenging to undertake generalisations based on traditional literature reviews: in fact, qualitative reviews may lead to problematic conclusions due to ‘casual methodological speculation’ (Stanley 2001, p. 145).

This article contributes to the literature by presenting the first quantitative literature review of the impact of economic globalisation on income inequality. The paper aims to answer two research questions. First, what does the empirical evidence in all peer-reviewed published studies tell us about the effect of globalisation on income inequality? To provide answers to this first research question, we use meta-analysis tools (e.g. Stanley and Doucouliagos 2012) consisting of a comprehensive survey and
quantitative analysis of the relevant econometric estimates on the globalisation-inequality relationship (see section 3). The second research question is: what factors contribute to explaining the variation in the reported results on the globalisation-inequality relationship? To address this second question, we use meta-regression methods (e.g. Schmidt and Hunter 2014) that allow us to test for the impact of various factors that may cause heterogeneity in the reported globalisation-inequality results including the data set, econometric specification, estimation details and publication characteristics (see Section 4).
2. Theoretical background: The globalisation-inequality relationship

This section focuses on two main issues that are of central importance for conducting the quantitative literature review on how globalisation affects income inequality. First, we provide a discussion on how to define and measure the concept of economic globalisation. Second, we present a brief outline of important theoretical arguments on how globalisation may have an effect on income inequality.

2.1. DEFINING AND MEASURING GLOBALISATION

This paper limits the analysis to the economic dimension of globalisation capturing trade and financial openness. Although we focus only on ‘economic globalisation’, for the sake of simplicity we will generally refer to it as ‘globalisation’. Brady et al. (2005) conceptualise economic globalisation as ‘the intensification of international economic exchange and the label for the contemporary era of international economic integration. Thus, [economic] globalisation involves the current economic environment shaping welfare states and the heightening of concrete economic exchanges between countries.’ (Brady et al. 2005, p. 922) The concept of ‘economic globalisation’ used in this paper is much narrower than (overall) ‘globalisation’, as the latter is a multifaceted concept that captures several aspects in the economic, political and social dimensions that go far beyond indicators that are typically used to capture trade openness or capital flows across borders (e.g. Dreher et al. 2008; Scholte 2008).

Narrowing the focus to the economic dimension of globalisation allows us to follow established typologies of economic globalisation indicators. These typologies regularly distinguish different dimensions of international market integration: trade globalisation, financial globalisation and overall economic globalisation, where measures of the latter combine the dimensions of trade and financial globalisation (e.g. Gräbner et al. 2018; Gygli et al. 2019). By far the most prominent trade globalisation indicator is trade openness which is typically measured as the sum of imports and exports in percent of GDP although there are also numerous other trade openness indicators (e.g. de jure measures of trade based on tariff rates). In the dimension of financial globalisation, researchers have used measures such as FDI flows and indices for capital account liberalisation. Furthermore, the KOF index of globalisation has emerged as the most popular overall economic globalisation index (Dreher 2006; Potrafke 2015). Gräbner et al. (2018) provide a comprehensive review of economic globalisation indicators used in previous empirical work. The meta-data coding used in this paper follows the typologies of relevant economic globalisation indicators provided in Gräbner et al. (2018) along the dimensions of trade globalisation, financial globalisation and overall economic globalisation measures. Appendix A1 includes a more detailed classification of the globalisation indicators that we used for the coding in the dimensions of trade and financial globalisation.
2.2. THEORETICAL VIEWS ON HOW GLOBALISATION AFFECTS INCOME INEQUALITY

This section does not provide a comprehensive review of the theoretical literature regarding the links between economic globalisation and income inequality; excellent review papers are abundant (e.g. Burtless 1995; Ravallion 2003; Winters et al. 2004; Anderson 2005; Mills 2009; Demirgüç-Kunt and Levine 2009; Nissanke and Thorbecke 2010; Harrison et al. 2011; de Haan and Sturm 2017). We restrict the exposition to selected theoretical arguments regarding the impact of trade globalisation and financial globalisation on income inequality. In so doing, we focus on those theoretical links that have guided large parts of the literature using econometric hypothesis tests to estimate the effect of globalisation on income inequality in advanced and developing countries. Notably, existing typologies of economic globalisation indicators point out that trade openness and financial openness indeed capture different dimensions of economic globalisation (Gräbner et al. 2018; Gygli et al. 2019). As trade globalisation and financial globalisation may not have the same impact on income inequality (e.g. Feenstra and Hanson 1997; Figini and Görg 2011; Gozgor and Ranjan 2017), we discuss them separately in this section and subsequently also account for different economic globalisation dimensions in the meta-analysis.

As one of the central results of the standard Heckscher-Ohlin trade model, the Stolper-Samuelson theorem predicts that economic globalisation will narrow income disparities within developing countries (Stolper and Samuelson 1941). Trade openness will benefit a country’s relatively abundant production factor because trade specialisation typically favours sectors that are intensive in the abundant factor. Compared with the rest of the world, developing countries typically have a comparative advantage in the relatively abundant factor of unskilled labour. Therefore, according to the Stolper-Samuelson theorem, international trade will increase demand for unskilled workers in developing countries which will push up their real wages and lead to a decrease in within-country income inequality. For advanced countries, the prediction is the opposite, as trade openness will increase income inequality by raising the real return to abundant skilled labour and by lowering the real rate of return to relatively scarce unskilled labour. Notably, the assumptions on which these theoretical predictions are based can only be described as very restrictive; several authors have extended the theorem beyond the assumptions on which it was originally based (e.g. Deardorff and Stern 1994; Beaulieu et al. 2011). Discussions in the literature regarding the impact of globalisation have certainly been much broader; for example, offshoring has been built into Heckscher-Ohler-Samuelson-type models (e.g. Arndt and Kierzkowski 2001) and such additional assumptions can lead to different model predictions. Nevertheless, the predictions of the original Stolper-Samuelson theorem have provided important guidance for setting up hypothesis tests in large parts of the econometric globalisation-inequality literature for advanced and developing countries (e.g. Milanovic 2005; Goldberg and Pavcnik 2007; Bigsten and Munshi 2014).

Moving from the dimension of trade globalisation to that of financial globalisation, a standard theoretical view is that increased financial openness can be expected to improve the allocation of funds. The protection of the domestic financial system can lead to credit constraints for households with relatively low incomes and unleashing these constraints will disproportionately benefit the incomes of poorer households (e.g. Aghion and Bolton 1997). In this view, the attraction of foreign capital allows countries to consume more than they produce and to invest more than they save which will boost economic growth, raise the incomes of the poor and reduce income inequality, especially in developing countries (e.g. Nafziger 1997; Beck et al. 2007). However, other theoretical accounts emphasise that the distributional effect of financial openness may depend on the level of economic development. At earlier
development stages, only households higher up the income distribution level are able to access and benefit from financial openness. At higher levels of economic development, many households access financial markets so that financial openness directly helps larger parts of society (Greenwood and Jovanovic 1990). Furthermore, it has been pointed out that the quality of political institutions may condition the impact of increased financial openness on income inequality (Rajan and Zingales 2003; Delis et al. 2014). The theoretical predictions regarding the effect of financial globalisation on income inequality are, therefore, not clear-cut; however, the standard view has mostly emphasised the potential of financial openness for a reduction in inequality: by routinely referring to the prediction that increased financial openness will support economic development and lift incomes of poorer households, international institutions pushed for capital account liberalisation in large parts of the developing world (e.g. Chang 2002; Rodrik 2007).

A different strand of literature is sceptical about theoretical claims that globalisation strongly affects income inequality – no matter in which direction. This skepticism mostly rests on theoretical arguments according to which other factors are more important determinants of income inequality. A comprehensive survey would be beyond the scope of this paper but additional explanatory factors for explaining income inequality that feature prominently in the literature include education (e.g. Abdullah et al. 2015), skill-biased technological change (e.g. Card and diNardo 2002), the structure of the political system (e.g. Reuveny and Li 2003), labour market institutions (e.g. Checchi and Garcia-Penalosa 2008), government spending (e.g. Rudra 2004) and macroeconomic factors (e.g. Li and Zou 2002).

Numerous papers have tried to test theories of how globalisation affects income inequality – with inconclusive results (e.g. Mills 2009; Harrison et al. 2011; de Haan and Sturm 2017). So far, academic research has not made the effort of systematically synthesising and exploring all the peer-reviewed published estimates on the globalisation-inequality relationship. This paper aims to close this gap in the literature by using meta-analysis and meta-regression methods. Meta-analysis is about identifying and calculating the effect size of globalisation on income inequality while meta-regression aims to uncover sources of heterogeneity in the reported globalisation-inequality estimates (e.g. Stanley and Doucouliagos 2012; Schmidt and Hunter 2014). One part of the value added of this paper is that applying the relevant methods allows us to explore whether there is a genuine effect consistent with standard theoretical predictions of how globalisation affects income inequality or whether there is indeed evidence for an inconclusive relationship. The other part of the value added involves new insights into the sources of heterogeneity in the published globalisation-inequality results, as we are able to provide (partial) answers to the question as to why the reported estimates are characterised by substantial variation.
3. Meta-analysis: Data and summary results

This section addresses the research question: what does the existing evidence tell us about the average effect of globalisation on income inequality? By providing a meta-analysis, we shed new light on the debate about whether the globalisation-inequality relationship is negative, positive or inconclusive. Section 3.1 discusses our data set in the context of the literature search and data collection process. Section 3.2 presents summary statistics which allow us to provide an overview of the research record on the impact of globalisation on income inequality.

3.1. META-ANALYSIS DATA

The systematic search and review of the literature for this paper began by tracking down all the relevant academic papers on the relationship between globalisation and income inequality. By doing so, we included papers from a variety of fields, most prominently economics, sociology and political science. To search for papers, we first used (i) Google Scholar, (ii) the EconLit database and (iii) the Scopus database. We used the following keywords in the search process: ‘globalisation + income inequality’; ‘openness + income inequality’ (we also substituted ‘income inequality’ with ‘income distribution’). Furthermore, we followed up on references cited in empirical studies and reviews of this literature by screening the reference lists. The criteria for inclusion are as follows:

a) Income inequality as the dependent variable and globalisation as an explanatory variable: As a condition for being included in our data set, papers used a measure of income inequality as the dependent variable and at least one measure of economic globalisation as an explanatory variable. In other words, studies had to report results from some variant of the following generic econometric model (note that we ignore subscripts for the purpose of simplification):

\[ \text{INEQ} = \alpha + \beta_1 \text{ECONGLOBAL} + \beta_x Z_x + \varepsilon \]  

(1)

where INEQ is a measure of income inequality (see Section 4 on how we distinguish between different inequality measures), ECONGLOBAL is a measure of economic globalisation, Z is a vector of other explanatory variables, and \( \varepsilon \) is the error term. For example, papers that used globalisation measures that do not exclusively consider the dimension of economic globalisation but a hybrid measure with political and/or social dimensions had to be excluded (e.g. Huang et al. 2016). Likewise, we did not include studies that focussed on the impact of globalisation on regional inequality (e.g. Ma 2006) or other non-relevant inequality measures as the dependent variable.

b) Reported econometric estimates: Only those empirical studies that presented regression results were considered. This restriction excluded numerous papers that reported descriptive statistics only (e.g. Robertson 2000).

\footnote{We also used the American English version (‘Globalization’) in the search process.}
c) *Published in peer-reviewed journals:* We excluded other works on the globalisation-inequality nexus (e.g. working papers, book chapters, etc.). First, peer-reviewed journal publications can be considered to have passed a certain ‘quality’ check by referees. Second, it is challenging to track down all potentially relevant book chapters and other non-peer-reviewed documents that touch upon the globalisation-inequality relationship. Therefore, the restriction on peer-reviewed journal papers contributed to ensuring that the coding process remained transparent and manageable.

d) *Offered relevant statistics:* In order to be included, a paper had to fulfill certain reporting standards: the requirement was that the paper must have offered statistics (e.g. correlation coefficients and standard errors or t-statistics) from which standardised measures of the impact of globalisation on inequality could be calculated.

e) *English language and publication date:* Finally, the considered papers had to be written in English and published prior to February 2019.

123 papers met these criteria, and they reported a total of 1254 comparable estimates which were included in the meta-analysis data set. In the accompanying Appendix A1, we provide a table listing all the 123 studies that were included. The estimates that were compiled from these studies are the total population of the published peer-reviewed econometric estimates on the impact of globalisation on income inequality.\(^2\)

### 3.2. SUMMARY STATISTICS

To illustrate the magnitude of the effect of globalisation on income inequality, we calculate the average effect based on all the compiled estimates from the published globalisation-inequality literature; furthermore, we construct 95% confidence intervals around the calculated average (e.g. Schmidt and Hunter 2014). The partial correlation is used to standardise the effect size across studies, which allows the estimates to be made comparable. In our case, partial correlations measure the impact of globalisation on income inequality while holding other factors constant and they can be directly calculated from the regression results reported in the relevant papers. There are two big advantages of the partial correlation coefficient: first, partial correlation coefficients can be meaningfully compared across papers because they are based on a unitless measure bounded between -1 and 1. Second, they can be calculated for a much larger set of estimates than other measures of effect size. The partial correlation coefficient can be calculated based on this formula:

\[
r = \frac{t}{\sqrt{t^2 + df}}
\]

where \(t\) is the t-statistic of the relevant regression coefficient and \(df\) denotes the degrees of freedom of this t-statistic (Stanley and Doucouliagos 2012, p. 25). It is common practice to weight the partial correlations by a ‘quality’ indicator which we will do here by using the precision of the estimate (calculated as the inverse of the corresponding standard error).\(^3\) By including all globalisation-inequality

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\(^2\) A list of papers that were excluded from the meta-analysis because they did not meet at least one of the criteria for inclusion is available in Appendix A2.

\(^3\) The standard error of the partial correlation coefficient (ser) is given by: \(ser = \sqrt{\frac{1-r^2}{df}}\), where \(r\) is the partial correlation coefficient and \(df\) denotes the degrees of freedom.
studies that were published in peer-reviewed journals and by using precision-weights, the average
globalisation-inequality estimate derived from the meta-analysis is arguably the best estimate of the
existing econometric literature on the effect of globalisation on income inequality.

Formally, the weighted average partial correlation is given by:

\[ w_r = \sum \frac{|P_i r_{ij}|}{\sum P_i} \] (3)

where \( r \) is the partial correlation coefficient as in Equation (2) from the \( i^{th} \) regression estimate of the \( j^{th} \) study, and \( P \) is the associated precision, i.e. the inverse of the variances. We use the weighted partial
correlation coefficient to answer two questions. First, is the average impact of globalisation on income
inequality positive, negative or inconclusive? Second, is the effect small or large? According to the
guidelines derived by Doucouliagos (2011), a partial correlation can be considered to be small if its
absolute value is less than 0.07 while 0.17 is considered to be moderate and 0.33 is large.

Table 1 / Published globalisation-inequality effects (123 studies, 1254 estimates)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Excluding top and bottom 10%</th>
<th>Trade Globalisation</th>
<th>Financial Globalisation</th>
<th>Overall Economic Globalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All estimates</td>
<td>1254</td>
<td>1005</td>
<td>732</td>
<td>473</td>
</tr>
<tr>
<td>Averages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>0.089</td>
<td>0.074</td>
<td>0.041</td>
<td>0.136</td>
</tr>
<tr>
<td>Unweighted average</td>
<td>0.083</td>
<td>0.067</td>
<td>0.046</td>
<td>0.140</td>
</tr>
<tr>
<td>Precision-weighted average</td>
<td>0.074</td>
<td>0.061</td>
<td>0.045</td>
<td>0.123</td>
</tr>
<tr>
<td>Weighted average (RE)</td>
<td>0.086</td>
<td>0.067</td>
<td>0.048</td>
<td>0.141</td>
</tr>
<tr>
<td>Weighted average (FE)</td>
<td>0.079</td>
<td>0.036</td>
<td>0.078</td>
<td>0.114</td>
</tr>
<tr>
<td>Weighted average (HS)</td>
<td>0.079</td>
<td>0.067</td>
<td>0.043</td>
<td>0.137</td>
</tr>
<tr>
<td>Intervals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95% Confidence Interval (RE)</td>
<td>+0.072</td>
<td>+0.058</td>
<td>+0.031</td>
<td>+0.120</td>
</tr>
<tr>
<td>95% Confidence Interval (HS)</td>
<td>+0.085</td>
<td>+0.075</td>
<td>+0.051</td>
<td>+0.154</td>
</tr>
</tbody>
</table>

Notes: RE - Random Effects; FE - Fixed effects; HS - Hunter-Schmidt (2014). We used the inverse of the variances as
precision-weights.

Table 1 shows summary results for the meta-analysis data by reporting the median, unweighted and
precision-weighted average of globalisation-inequality partial correlations. Furthermore, we report results
from estimating a Random Effects Model and Fixed Effects Model.\(^4\) We also included two sets of
confidence intervals. Column (1) of Table 1 reports the results for the whole set of estimates \( n=1254 \).
The results show that, on average, the impact of economic globalisation on income inequality is positive,
i.e. globalisation increases income inequality. Based on the guideline in Doucouliagos (2011), a partial
correlation should be considered to be small if its absolute value is less than 0.07. The precision-
weighted average of the globalisation-inequality effect is 0.074 and the estimates based on the fixed

\(^4\) In Table 1, both the random effects models and the fixed effects models were specified without moderator variables,
where the latter will be introduced in Section 4.
effects and random effects models only deviate slightly. Considering the total population of estimates, we therefore find evidence for a small-to-moderate positive impact of globalisation on income inequality. Notably, the possibility of a negative average partial correlation is ruled out by the reported 95% confidence intervals. The meta-analysis results in Table 1, therefore, allow us to reject the hypothesis that economic globalisation reduces income inequality, which would have required us to find negative average partial correlation coefficients.

As a first sensitivity check, Column (2) of Table 1 repeats the summary meta-analysis after removing the 10% of the smallest and highest partial correlation estimates. The results in Column (2) are not smaller, but in substance similar to those in Column (1), which suggests that outliers on the high and low end of the distribution of partial correlation coefficients do not markedly affect the results. Noticeably, the confidence intervals still clearly reject a negative average effect of globalisation on income inequality. Column (3) looks at only those estimates that have used a trade globalisation variable as the relevant regressor. We find that the precision-weighted mean average partial correlation of trade globalisation (0.045) is substantially smaller than in Column (1), which included all estimates. Column (4) considers only those estimates that use a financial globalisation variable as the regressor. Notably, the precision-weighted average for financial globalisation estimates of 0.123 in Column (4) is more than two and a half times larger than in Column (3). Finally, Column (5) includes estimates based on overall economic globalisation measures. Here, we again find a small-to-moderate positive weighted partial correlation (0.124). Overall, the summary statistics point to the preliminary result that when we look at subsets of our estimates, we find evidence that the magnitude of the impact of trade globalisation on income inequality is markedly smaller than the impact of globalisation measures that include the financial dimension. The meta-regression analysis in Section 4 will conduct additional hypothesis tests on this meta-analysis finding.

Figure 1 / Kernel density estimates of the distribution of partial correlations

Figure 1 shows the distribution of globalisation-inequality partial correlations in our meta-analysis data set. It can be seen that a range of estimates is reported, including positive, negative and close-to-zero
partial correlations with the vast majority of estimates within the interval of -0.3 and 0.4. The minimum partial correlation coefficient is -0.82 and the maximum is 0.94; the standard deviation is 0.25. While the unweighted mean (0.07) and median (0.09) are positive and of small-to-moderate magnitudes, Figure 1 reveals that there is clearly considerable dispersion in the results. Additionally, we conducted Cochran’s Q-Test (e.g. Cooper and Hedges 1994), which provides clear evidence that there is excess heterogeneity in the results beyond what could be expected by measured random sampling (p<0.0001).
4. Meta-regression analysis

This section addresses the question: what factors explain the heterogeneity in the reported results on the globalisation-inequality nexus? The last section presented estimates according to which the reported results on the globalisation-inequality relationship show more variation than could be expected by measured sampling error. Hence, we continue by identifying likely sources of heterogeneity.

In line with standard techniques for meta-regression analysis (e.g. Stanley and Doucouliagos 2012), we make the assumption that the \( r_{ij} \) estimate of the globalisation-inequality partial correlation coefficient from study \( j \), denoted \( r_{ij} \), is influenced by a vector of variables \( (Z_{ki}) \) consisting of characteristics that capture differences in the underlying impact of globalisation on income inequality. \( \varepsilon_{ij} \) represents the stochastic error term. The meta-regression model can thus be written as follows:

\[
r_{ij} = \beta_0 + \sum \beta_k Z_{ki} + \varepsilon_{ij}
\]  

(4)

Notably, we estimate this model by Weighted Least Squares (WLS), using the inverse of the variances of the partial correlation coefficient for (optimal) precision weighting (\( \cdot \)). Stanley and Doucouliagos (2017) showed that the WLS estimator is preferable to other standard estimators that can be used for meta-regression: ‘in practical applications, an unrestricted WLS meta-regression is likely to give practically equivalent or superior estimates to fixed-effects, random-effects, and mixed-effects meta-regression approaches.’ (Stanley and Doucouliagos 2017, p. 19) WLS is preferred to OLS since the estimates do not have equal standard errors, and because it is important to assign more weight to those estimates that are more precise, since the information provided by more precise estimates can be said to be more valuable. However, we will also provide robustness checks based on applying different estimators.

We include the following groups of ‘moderator’ variables in the \( Z \) vector:

Measures of the dependent variable (income inequality): Recall that the dependent variable in the meta-analysis is a measure of income inequality (see Equation 1). We account for differences in the dependent variable by distinguishing estimates that use the Gini index, top income shares, bottom income shares, income share ratios, the Theil index, relative wages of different skill groups (HighLowSkilled) and other inequality measures. The interpretation of the estimates obtained from using different inequality measures may differ. For example, when a study uses the Gini coefficient, a positive coefficient of the globalisation variable indicates an increase in inequality. However, when the estimate is based on the bottom income share, the interpretation of a positive estimate would be the other way around: an increase in globalisation increases the bottom income share and, thus, reduces inequality. We deal with this potential confusion in the interpretation of estimates by transforming the partial correlations and their corresponding t-statistics of the bottom income shares by multiplying them with (-1). This transformation makes all estimates comparable (no matter which income inequality measure they use) and allows for the general interpretation that a positive partial correlation coefficient indicates a positive relationship between globalisation and income inequality.
**Measures of economic globalisation:** As explained in Section 2, numerous indicators have been used to capture different aspects of globalisation. We follow the accepted typologies of economic globalisation indicators described in Gräbner et al. (2018) distinguishing between trade globalisation (most prominently: trade to GDP and de jure measures such as tariff rates), financial globalisation (e.g. FDI flows to GDP and indices for capital account liberalisation) and overall economic globalisation indices (most prominently: the KOF economic globalisation index), where the latter combines both the trade and financial dimensions. A more detailed account on how we coded the economic globalisation indicators can be found in Appendix A1. Our meta-regression analysis tests whether these alternative measures of globalisation have an impact on the reported results.

**Country composition:** As we have seen in Section 2.2, theoretical arguments on how economic globalisation affects income inequality generally emphasise that the impact might be felt differently in advanced and developing countries. In particular, the Stolper-Samuelson theorem predicts that trade openness will decrease within-country income inequality in developing countries but increase inequality in advanced countries (see Section 2.2). If the level of development played a role, the globalisation-inequality relationship would be influenced by the underlying country sample. We thus control for whether an estimate is based on a country sample of advanced countries, developing countries or a mix of advanced and developing countries. To distinguish between these three groups, we make use of the IMF’s country classification (IMF 2018).

**Data characteristics:** We also explore whether the type of data used has an impact on the reported results. Hence, we consider whether a study used cross-sectional data instead of panel data. Additionally, we include a dummy variable, which we set to one if only data from the 1990s onwards are used. The reason for including this variable named ‘DataHyperGlobalisation’ is that authors such as Rodrik (2011) argue that there was something special about the period of hyper-globalisation starting in the 1990s.

**Estimator details:** We also check whether it makes a difference for the reported results if estimates control for unobserved country heterogeneity by using country fixed effects. About 38% of the estimates use econometric methods other than OLS (e.g. GMM, Random Effects). With our meta-regression model, we can also explore whether these estimator differences have a significant impact once we control for other potential sources of heterogeneity as well.

**Publication characteristics:** We account for various dimensions of the publication process: differences between development journals and other types of journals; whether a study’s primary focus is the globalisation-inequality relationship as opposed to including globalisation merely as an additional control variable; and whether the author(s) of a study have received comments or feedback from other authors publishing in the literature on the globalisation-inequality relationship.\(^5\)

\(^5\) The information on the variables ‘Primary’ and ‘CrossAuthor’ was collected based on the footnotes and acknowledgment sections in the relevant studies.
## Table 2 / Variables used in the meta-regression analysis

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Variable description</th>
<th>Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PartialCorrelation</strong></td>
<td>Partial correlation of the impact of economic globalisation on income inequality (dependent variable in the MRA)</td>
<td>0.083</td>
<td>0.249</td>
</tr>
<tr>
<td><strong>Income inequality measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gini (used as the base)</td>
<td>BD=1: Gini index of income as dependent variable</td>
<td>0.707</td>
<td>0.455</td>
</tr>
<tr>
<td>TopIncomeShare</td>
<td>BD=1: Income share of the top quintile</td>
<td>0.103</td>
<td>0.304</td>
</tr>
<tr>
<td>BottomIncomeShare</td>
<td>BD=1: Income share of the bottom quintile</td>
<td>0.038</td>
<td>0.192</td>
</tr>
<tr>
<td>IncomeShareRatio</td>
<td>BD=1: Income ratio between top and bottom incomes</td>
<td>0.060</td>
<td>0.237</td>
</tr>
<tr>
<td>Theil</td>
<td>BD=1: Theil index</td>
<td>0.023</td>
<td>0.150</td>
</tr>
<tr>
<td>HighLowSkilled</td>
<td>BD=1: Relative wages (based on different skill levels)</td>
<td>0.013</td>
<td>0.112</td>
</tr>
<tr>
<td>OtherIneqVar</td>
<td>BD=1: Other income inequality measure used (e.g. Atkinson index or income share of quintiles other than top and bottom)</td>
<td>0.056</td>
<td>0.230</td>
</tr>
<tr>
<td><strong>Economic globalisation measures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TradeGlobalisation (base)</td>
<td>BD=1: Trade globalisation variable as relevant regressor</td>
<td>0.584</td>
<td>0.493</td>
</tr>
<tr>
<td>FinancialGlobalisation</td>
<td>BD=1: Financial globalisation variable as relevant regressor</td>
<td>0.377</td>
<td>0.485</td>
</tr>
<tr>
<td>OverallEconGlobalisation</td>
<td>BD=1: Overall economic globalisation variable as relevant regressor</td>
<td>0.039</td>
<td>0.194</td>
</tr>
<tr>
<td><strong>Country composition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AdvancedCountries (base)</td>
<td>BD=1: only advanced countries included in the data</td>
<td>0.207</td>
<td>0.406</td>
</tr>
<tr>
<td>DevelopingCountries</td>
<td>BD=1: only developing countries included in the data</td>
<td>0.368</td>
<td>0.483</td>
</tr>
<tr>
<td>MixofCountries</td>
<td>BD=1: mix of advanced and developing countries included in the data</td>
<td>0.424</td>
<td>0.494</td>
</tr>
<tr>
<td><strong>Data characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CrossSection</td>
<td>BD=1: Cross sectional data used</td>
<td>0.123</td>
<td>0.328</td>
</tr>
<tr>
<td>DataHyperGlobalisation</td>
<td>BD=1: only data from 1990s onwards used</td>
<td>0.207</td>
<td>0.405</td>
</tr>
<tr>
<td><strong>Estimator details</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CountryFixedEffects</td>
<td>BD=1: Country dummies included</td>
<td>0.552</td>
<td>0.498</td>
</tr>
<tr>
<td>NonOLS</td>
<td>BD=1: Non-OLS estimator used (e.g. GMM, Random Effects)</td>
<td>0.379</td>
<td>0.485</td>
</tr>
<tr>
<td><strong>Publication characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>StandardError</td>
<td>Standard error of partial correlation</td>
<td>0.106</td>
<td>0.057</td>
</tr>
<tr>
<td>NormalizedImpactFactor</td>
<td>Journal impact factor normalised to range between 0 and 1</td>
<td>0.245</td>
<td>0.215</td>
</tr>
<tr>
<td>DevelopmentJournal</td>
<td>BD=1: Study published in an economics journal</td>
<td>0.164</td>
<td>0.371</td>
</tr>
<tr>
<td>Primary</td>
<td>BD=1: Link globalisation-inequality is of primary interest</td>
<td>0.640</td>
<td>0.480</td>
</tr>
<tr>
<td>CrossAuthor</td>
<td>BD=1: Author declares receiving feedback from other authors who have published relevant peer-reviewed paper</td>
<td>0.154</td>
<td>0.361</td>
</tr>
<tr>
<td>Prior</td>
<td>BD=1: Author has published previously in this area</td>
<td>0.081</td>
<td>0.272</td>
</tr>
<tr>
<td><strong>Macroeconomic, political and institutional control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>BD=1: Technology proxy included as control</td>
<td>0.108</td>
<td>0.310</td>
</tr>
<tr>
<td>GDPgrowth</td>
<td>BD=1: GDP growth included as control</td>
<td>0.140</td>
<td>0.347</td>
</tr>
<tr>
<td>Unemployment</td>
<td>BD=1: Unemployment included as control</td>
<td>0.049</td>
<td>0.217</td>
</tr>
<tr>
<td>IncomeLevel</td>
<td>BD=1: GDP per capita included as control</td>
<td>0.535</td>
<td>0.499</td>
</tr>
<tr>
<td>Population</td>
<td>BD=1: Population variable (e.g. population growth) included</td>
<td>0.182</td>
<td>0.386</td>
</tr>
<tr>
<td>Education</td>
<td>BD=1: Education variable (e.g. schooling) included</td>
<td>0.465</td>
<td>0.499</td>
</tr>
<tr>
<td>TradeUnion</td>
<td>BD=1: Trade union variable included as control</td>
<td>0.116</td>
<td>0.320</td>
</tr>
<tr>
<td>SocialSpending</td>
<td>BD=1: Government spending on social protection included</td>
<td>0.030</td>
<td>0.169</td>
</tr>
<tr>
<td>Democracy</td>
<td>BD=1: Democracy variable (e.g. democracy index) included</td>
<td>0.159</td>
<td>0.366</td>
</tr>
<tr>
<td>Partisan politics</td>
<td>BD=1: Partisan politics (e.g. government ideology) included</td>
<td>0.069</td>
<td>0.254</td>
</tr>
</tbody>
</table>

Notes: BD means binary dummy, which takes the value of 1 if the condition is fulfilled and zero otherwise.
Macroeconomic, political and institutional control variables: Finally, we consider whether the inclusion of potentially relevant control variables in primary studies has an impact on the reported partial correlation coefficient between globalisation and income inequality. It has been argued that rising income inequality can be traced back to skill-biased technologies, based on the notion that technological change is inherently skill-biased, so that the observed increases in inequality are due to exogenous technology shocks (e.g. Berman et al. 1998; Card and DiNardo 2002). Therefore, we check whether the impact of globalisation on income inequality is moderated by the inclusion of technology variables in the relevant econometric models. Macroeconomic factors, represented by the growth rate of GDP and the unemployment rate, may serve as significant moderators and we account for whether they were included in the estimations. The level of economic development could also influence the partial correlation, hence we check whether studies control for the income level (proxied by GDP per capita). Demographic change could also be relevant; hence, we test whether it matters if population variables are included in the regressions. Since numerous studies point out that the education system and education policies affect income inequality (e.g. Abdullah et al. 2015), we consider whether education variables are controlled for. The political science and sociology literature emphasises the importance of considering the institutional power of labour in the context of the determination of income inequality (e.g. Wallerstein 1999). We thus also check whether trade union density or the degree of collective bargaining is controlled for. Another important factor in the determination of disposable income inequality concerns how much the government is spending, especially on social protection (e.g. Rodrik 1998; Rudra 2004). We therefore consider whether variables on government spending are included in the relevant regressions. Furthermore, democracy is potentially a relevant factor in determining inequality because democracies provide more space for their citizens to establish trade unions and other political organisations. Democratic systems allow citizens to vote in elections (independent of their position in the income distribution) which may lead to political decisions that bring about a more equal income distribution (Gradstein and Milanovic 2004). We thus consider whether democracy variables were included in the primary studies. Finally, the political science literature has emphasised that it is relevant which parties are part of the government since their ideological leanings may lead to quite different responses to economic globalisation (e.g. Pontusson et al. 2002; Dorn and Schinke 2018). We thus also check whether the inclusion of controls for partisan politics moderates the impact of globalisation on income inequality.

We tried to be comprehensive in the coding of potential sources of heterogeneity. Some variables, however, had to be excluded entirely from the meta-regression analysis because they appeared only in a very small number of estimates. Details on the moderator variables included in the Z vector can be obtained from Table 2 which also presents summary statistics.

4.1. MULTIVARIATE META-REGRESSION RESULTS

A few preliminary remarks are in order regarding the interpretation of the coefficients in the multivariate meta-regression models presented below. The models always omit one category (as the reference category) from each group of mutually exclusive and jointly exhaustive dummy variables (income inequality measures, economic globalisation measures and country composition). This is necessary because otherwise we would not be able to estimate the models due to perfect multicollinearity. This implies, however, that the intercept \( \beta_0 \) cannot be interpreted as the ‘true’ effect of globalisation on income inequality because it depends on the choice of the reference groups. Other reference
specifications would give different estimates of the intercept $\beta_0$. Our reference specification is an estimate of the impact of trade globalisation on the Gini index based on data from advanced countries only. Note that the choice of the omitted dummies in no way influences any of the other estimated coefficients but it shifts the reference value of the intercept $\beta_0$. Hence, the coefficients of the moderator variables from each group of mutually exclusive and jointly exhaustive dummy variables allow us to make predictions regarding the impact of economic globalisation on income inequality in a given setting as compared to an alternative setting. For example, the estimated average partial correlation of DevelopingCountries compared to AdvancedCountries (which is the reference category) can be predicted by adding up the values of the intercept $\beta_0$ and of the DevelopingCountries coefficient.

Note also that we use a general-to-specific estimation approach which is also the suggestion in prominent guidelines to meta-analysis (e.g. Stanley and Doucouliagos 2012, p. 105). In particular, we remove the variable that had the largest p-value in the model with all the coded moderators included, (see Table 2 for the full list of moderator variables), and repeat this step until the p-values of all variables are smaller than 0.1. The advantage of this general-to-specific approach is ‘that model construction proceeds from a very general model in a more structured, ordered and (statistically valid) fashion, and in this way avoids the worst of data mining.’ (Charemza and Deadman 1997, p. 78) One additional complication for the meta-regression analysis regarding the effect of globalisation on inequality arises because of the presence of multiple estimates per study. It is probably too restrictive to assume that pairs of partial correlation coefficients and standard errors are independent within studies. We account for potential within-study dependency by clustering the standard errors at the study level.

Table 3 shows the general-to-specific results from the multivariate meta-regression analysis. The results are based on using WLS with the inverse of the variances as optimal precision weights. We start by examining the results in Column (1). The first notable finding is that estimates based on using the Theil index report markedly smaller estimates than those using the Gini index (which is the reference group). This first finding from the meta-regression suggests that the choice of the income inequality measure may be relevant.

The second main finding is that the dimension of economic globalisation moderates the impact of globalisation on income inequality. In particular, we find that FinancialGlobalisation has a highly significant and positive coefficient. Compared to estimates that use TradeGlobalisation, estimates that use FinancialGlobalisation report a significantly stronger (i.e. more positive) relationship between globalisation and income inequality. Our meta-regression model in Column (1) of Table 3 predicts a moderate positive impact of financial globalisation on income inequality of +0.16 (obtained by adding the FinancialGlobalisation coefficient to the intercept). Notably, these findings from the multivariate meta-regression model are in line with the meta-analysis results reported in Table 1.

There are several additional findings from the results in Column (1) of Table 3 that deserve to be highlighted. First, several publication characteristics are significant moderator variables: when the

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7 Note that we did not exclude dummy variables from groups of variables (see the groups ‘Income inequality measures’, ‘Economic globalization measures’ and ‘Country composition’ in Table 2) even if they were statistically insignificant. The reason is that by excluding variables from these groups, the interpretation of the respective coefficients in comparison to the omitted reference category would not work properly anymore.

8 Regression results based on including all the coded moderator variables are available upon request.
globalisation-inequality nexus is the primary issue, when authors have received feedback from other authors publishing in the relevant literature and when authors have published previously in the globalisation-inequality area, the reported results tend to be smaller. Second, two regressors regularly used in empirical applications significantly moderate the impact of globalisation on income inequality: technology and education. In other words, the specification of the econometric model is important when it comes to selecting regressors that could potentially explain income inequality. Our findings suggest that the impact of globalisation on income inequality is significantly moderated by including technology and education variables in the regressions. Finally, it is noteworthy what we do not find evidence for: according to the meta-regression results, the composition of the country group is not a significant moderator variable. In other words: our findings reject the argument that globalisation contributes to reducing income inequality in developing countries as the results for developing countries also point to small-to-moderate positive effects of globalisation on income inequality (just as in the advanced country group).

Table 3 / Multivariate regression results (general-to-specific models)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>PartialCorr (1)</th>
<th>PartialCorr (2)</th>
<th>PartialCorr (3)</th>
<th>Fisher’s z (4)</th>
<th>Robust, statistically significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimator</td>
<td>WLS</td>
<td>Random Effects</td>
<td>Robust regression</td>
<td>WLS</td>
<td>(5)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.062**</td>
<td>0.038</td>
<td>0.017</td>
<td>0.066*</td>
<td>no</td>
</tr>
<tr>
<td>TopIncomeShare</td>
<td>0.012</td>
<td>0.003</td>
<td>0.029</td>
<td>0.009</td>
<td>no</td>
</tr>
<tr>
<td>BottomIncomeShare</td>
<td>-0.039</td>
<td>-0.049</td>
<td>-0.060</td>
<td>-0.045</td>
<td>no</td>
</tr>
<tr>
<td>Theil</td>
<td>-0.118***</td>
<td>-0.110*</td>
<td>-0.105**</td>
<td>-0.126***</td>
<td>yes</td>
</tr>
<tr>
<td>IncomeShareRatio</td>
<td>-0.021</td>
<td>-0.019</td>
<td>-0.036</td>
<td>-0.023</td>
<td>no</td>
</tr>
<tr>
<td>HighLowSkilled</td>
<td>-0.035</td>
<td>-0.016</td>
<td>-0.028</td>
<td>-0.045</td>
<td>no</td>
</tr>
<tr>
<td>OtherIneqVar</td>
<td>0.073</td>
<td>0.088</td>
<td>0.103</td>
<td>0.095</td>
<td>no</td>
</tr>
<tr>
<td>FinancialGlobalisation</td>
<td>0.095**</td>
<td>0.100**</td>
<td>0.112**</td>
<td>0.102**</td>
<td>yes</td>
</tr>
<tr>
<td>OverallEconomicGlobalisation</td>
<td>0.081</td>
<td>0.067</td>
<td>0.033</td>
<td>0.081</td>
<td>no</td>
</tr>
<tr>
<td>MixofCountries</td>
<td>-0.017</td>
<td>0.054*</td>
<td>0.081**</td>
<td>0.019</td>
<td>no</td>
</tr>
<tr>
<td>DevelopingCountriesOnly</td>
<td>0.017</td>
<td>0.054*</td>
<td>0.032</td>
<td>0.032</td>
<td>no</td>
</tr>
<tr>
<td>Primary</td>
<td>-0.032</td>
<td>-0.031</td>
<td>-0.031</td>
<td>-0.031</td>
<td>no</td>
</tr>
<tr>
<td>Crossauthor</td>
<td>-0.052</td>
<td>-0.064*</td>
<td>-0.071**</td>
<td>-0.060*</td>
<td>yes</td>
</tr>
<tr>
<td>Prior</td>
<td>-0.049*</td>
<td>-0.053</td>
<td>-0.036</td>
<td>-0.060*</td>
<td>no</td>
</tr>
<tr>
<td>Technology</td>
<td>-0.051*</td>
<td>-0.070**</td>
<td>-0.091***</td>
<td>-0.055*</td>
<td>yes</td>
</tr>
<tr>
<td>Education</td>
<td>0.042*</td>
<td>0.046*</td>
<td>0.053*</td>
<td>0.045*</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1.254</td>
<td>1.254</td>
<td>1.254</td>
<td>1.254</td>
<td>no</td>
</tr>
<tr>
<td>R squared</td>
<td>0.107</td>
<td>0.136</td>
<td>0.105</td>
<td>0.095</td>
<td>no</td>
</tr>
</tbody>
</table>

Note: WLS - Weighted Least Squares (inverse of the variances used as weights). Standard errors (in parentheses) are clustered at the study level to deal with potential within-study interdependence: *p<0.1; **p<0.05; ***p<0.01.
In Columns (2)-(4) of Table 3, we test the robustness of the meta-regression results reported in Column (1). We do so by applying different estimators and by using a transformation of the dependent variable. More specifically, the random effects model in Column (2) introduces an additional between-study variance term to cover differences in the globalisation-inequality estimates that go beyond sampling error and those differences captured by the moderator variables (e.g. Schmidt and Hunter 2014). The robust regression estimator applied in Column (3) gives little weight to observations with large absolute residuals and, hence, is less fragile to the influence of outlier observations. Finally, Column (4) uses Fisher’s z-transformed partial correlation coefficients to account for the potential problem that the distribution of the partial correlations is not normal when its values are close to -1 and +1. The results in Columns (2)-(4) show that our baseline results remain largely unaffected when we introduce these robustness checks. The size of some of the coefficients and their standard errors are subject to (slight) variations. However, there are three cases in which a variable whose coefficient was estimated to be significant in Column (1) turns out not to be significant in all the three additional models: the coefficients of OverallEconomicGlobalisation, Primary and Prior lose their significance when we apply Robust Regression and Random Effects, respectively. Besides that, the results in Columns (2)-(4) of Table 3 indicate robustness.

4.2. PUBLICATION SELECTION BIAS

We continue by assessing whether the econometric literature on the globalisation-inequality relationship is contaminated by publication selection bias which could be a severe problem for economic interpretation and statistical inference (e.g. DeLong and Lang 1992). Publication selection refers to a process in which results are chosen for their statistical significance (e.g. Brodeur et al. 2016; Andrews and Kasy 2019). The tendency of journal editors to publish only those results that show statistical significance, the researchers’ willingness to take the presence of a statistically significant effect based on accepted theory and the general predisposition for treating statistically significant results more favourably than ‘insignificant’ evidence may lead to a distorted picture of the underlying empirical relationship (Card and Krueger 1995, p. 239). Here, we use established tests for detecting publication selection bias which are based on looking at the relationship between the estimated partial correlation and its standard error. If there were no publication bias, the partial correlation and its standard error would not show any systematic relationship. However, if the publication of results were biased, we would find a statistically significant relationship.

It has been argued that the ‘simplest and most commonly used method to detect publication selection is an informal examination of a funnel plot’ (Sutton et al. 2000, p. 1574). The funnel plot represents a scatter diagram consisting of all the econometric estimates of the globalisation-inequality relationship and the precision of these estimates which are calculated as the inverse of the standard errors of the partial correlation coefficients (see Figure 2). The most precise estimates on the globalisation-inequality nexus are at the top and they will be least affected by publication selection bias as their high precision makes it rather unlikely that they are statistically insignificant. In the absence of publication bias, the funnel plot should be symmetric which would imply that the most precise estimates are close to the true effect while low-precision estimates are characterised by wide dispersion. As a consequence, in the case of non-existent public selection bias the scatter plot should be shaped like an inverted ‘funnel’ (e.g. Sutton et al. 2000; Irsova and Havranek 2013). The visual inspection of Figure 2 suggests that there is indeed symmetry in the sense that negative, positive and close-to-zero estimates are reported in the
econometric literature on the globalisation-inequality relationship, although the right portion of the funnel might be a little heavier than the left portion. A visual inspection of the distribution of the reported estimates suggests that publication selection bias (in the form of suppressing insignificant results) is unlikely to be an important problem for the globalisation-inequality literature.

Figure 2 / Funnel plot regarding publication selection bias

Notes: The figure plots point estimates of the partial correlations against the inverse of the corresponding standard error. In essence, the funnel plot is supposed to visualise publication bias. The intuition is that in the absence of publication bias, low-precision estimates should be widely dispersed. We also conduct formal tests for publication selection bias.

Nevertheless, visual inspection of a funnel plot has to be seen as largely subjective. Therefore, we continue by using the Funnel-Asymmetry Precision-Effect test (FAT PET), which allows us to formally assess the presence of publication selection bias. In doing so, we run the following model:

\[ r_{ij} = \beta_0 + \sum \beta_k Z_k + \beta_1 SE_i + \epsilon_{ij} \] (5)

Equation (5) is basically the same as the baseline meta-regression model in Equation (4); the only difference is that we have included the standard error of the partial correlation coefficient (SE) as an additional control variable. We again estimate the model by using WLS (Stanley and Doucouliagos 2017). If we specify Equation (5) without the Z vector, we get the basic FAT-PET. By including the moderator variables in vector Z, we estimate the augmented FAT-PET. In either case, the relevant question is if \( \beta_1 = 0 \), because in this case we could conclude that there is no evidence for publication selection bias (Stanley 2008).

Table 4 displays the results from the models that we ran to test for publication selection bias. If we perform the basic FAT PET, which does not include any moderator variables (Column 1), we do not find evidence for publication selection bias as there is no statistically significant relationship between the partial correlation coefficient and its standard error. However, the constant remains positive and statistically significant, i.e. the precision-effect of globalisation on inequality is positive even after accounting for potential publication selection. Column (2) then includes the moderator variables as additional regressors to explain heterogeneity in the reported globalisation-inequality estimates which
can be seen as a test on publication bias and a genuine effect beyond publication selection within our most comprehensive meta-regression specification (e.g. Doucouliagos and Stanley 2009). The coefficient of StandardError is smaller than in Column (1), but it remains statistically insignificant. Furthermore, we analyse whether the picture changes when we also control for the Journal Impact Factor since publication bias could differ based on the ‘quality’ of the journal. However, the result that the standard error does not display a statistically significant parameter also holds when we control for the Journal Impact Factor. Overall, the findings from the augmented FAT PET indicate an absence of publication selection in the literature on the globalisation-inequality relationship which strengthens the previous finding of an average positive relationship between globalisation and income inequality from the meta-analysis because the economic interpretations and statistical inferences we drew are unlikely to be biased.

Table 4 / Results: Testing for publication selection bias

<table>
<thead>
<tr>
<th>Dependent variable: Partial Correlation</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.058***</td>
<td>0.061**</td>
<td>0.055*</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.029)</td>
<td>(0.030)</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.262</td>
<td>0.023</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.269)</td>
<td>(0.280)</td>
<td>(0.285)</td>
</tr>
<tr>
<td>Normalised Impact Factor</td>
<td>0.030</td>
<td>0.030</td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>(0.057)</td>
<td>(0.057)</td>
<td>(0.057)</td>
</tr>
<tr>
<td>Additional moderators included</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>1,254</td>
<td>1,254</td>
<td>1,254</td>
</tr>
</tbody>
</table>

Notes: Columns (1)-(3) are estimated by WLS. Standard errors (in parentheses) are clustered at the study level. None of the variables shown in the table is statistically significant. However, Columns (2)-(3) include a set of additional moderator variables (the same as in Column (2) of table 3). The full results are available upon request.

9 Note that while the coefficient of the constant in Column (1) of Table 4 can be interpreted as the estimate of the ‘true precision-effect’ after correcting for publication selection bias, this interpretation is not valid for the coefficients of the constants in Columns (2) and (3). The reason is that the models with additional moderator variables always omit one category (as the reference category) from each group of mutually exclusive and jointly exhaustive dummy variables (e.g. income inequality measures or economic globalisation measures). The details are explained in Section 4.2.

10 The Journal Impact Factor was normalised to a range between 0 and 1.

11 We confirm these results by running an additional robustness check using Fishers z-transformed instead of the partial correlation coefficient as the dependent variable (see Appendix A1).
5. Conclusions

Based on a large pool of independent estimations (e.g. Reuveny and Li 2003; Jaumotte et al. 2013; de Haan and Sturm 2017) and qualitative reviews (e.g. Anderson 2005; Goldberg and Pavcnik 2007; Harrison et al. 2011), previous literature has been unable to establish conclusively whether globalisation has a positive, negative or zero effect on income inequality. By using meta-analysis and meta-regression methods, this paper has provided the first quantitative review of the peer-reviewed econometric literature regarding the impact of economic globalisation on income inequality around the world.

The meta-analysis and meta-regression results presented in this paper suggest several main findings. First, we find that, on average, globalisation has a (small-to-moderate) positive effect on income inequality if we look at the total population of all estimates in peer-reviewed published papers. We find that this average effect is robustly different from zero (based on using 95% confidence intervals). Second, there is evidence that trade globalisation affected income inequality to a smaller extent than financial globalisation. We find that the overall effect of trade globalisation is relatively small (but positive); financial globalisation, however, shows a stronger impact on income inequality, i.e. on average the financial dimension of economic globalisation clearly pushed income inequality upwards. Third, we do not find econometric evidence that globalisation has contributed to pushing down income inequality in developing countries. In contrast, the results show that the inequality-increasing effect was similar to the impact found for advanced countries. This finding is clearly at odds with theoretical accounts according to which economic globalisation should be expected to reduce within-country income inequality in developing countries. Fourth, we find that technology and education moderate the impact of globalisation on income inequality. This finding indicates that researchers who are working on specifying econometric models for estimating the impact of globalisation on income inequality should especially focus on using proper variables that capture technological change and education.

Our meta-regression results consider various other factors that could cause heterogeneity in the reported estimates including differences in the econometric specification, the income inequality measure and data set used and publication characteristics. The tests on publication selection bias did not uncover evidence that the econometric estimates reported in the literature are significantly influenced by publication selection bias. Given the insignificance of publication selection tests, it is unlikely that our findings regarding the impact of globalisation on income inequality are biased by publication selection.

Although we find that economic globalisation is relevant and significant when it comes to explaining the evolution of income inequality around the world, other factors (such as technology, education, labour market institutions and specificities of the welfare state) certainly also affect income inequality. Future research could use meta-analysis and meta-regression tools to come up with valid statistical inference about the direct impact of factors other than economic globalisation on income inequality. Finally, this paper has focussed on income inequality as the dependent variable. Various theories suggest that globalisation may directly affect all sorts of other policy-relevant phenomena (e.g. economic growth and tax structures). Extensions of, and adaptions to, the meta-analysis approach proposed in this paper are arguably useful for addressing various other research questions regarding the effects of globalisation.
References


This appendix to the paper ‘Does economic globalization affect income inequality? A meta-analysis’ presents three additional aspects. First, we explain how we distinguished different dimensions of economic globalization (trade globalization, financial globalization and overall economic globalization), which was essential for the coding of globalization indicators in the meta-analysis. Second, we list all peer-reviewed econometric studies that were included in the meta-analysis based on the criteria of inclusion discussed in the paper. Third, we present additional results from the robustness checks of the meta-regression analysis. Fourth, we report the full tables from the publication selection bias tests (including moderator variables).

1. DISTINGUISHING TRADE GLOBALISATION, FINANCIAL GLOBALISATION AND OVERALL ECONOMIC GLOBALISATION

The coding of the economic globalization indicators was based on the classification provided in Gräbner et al. (2018). We distinguish trade globalization indicators, financial globalization indicators, and overall economic globalization indicators.

Existing measures of economic globalization can be grouped in two ways: first, according to the type of globalization – ‘trade’ or ‘financial’ – they aim to measure, and, second, according to the sources utilized in composing the globalization measure. These sources are either aggregate economic statistics (de-facto measures) or assessments of the institutional foundations of economic globalization, i.e. the legally established barriers to trade and financial transactions (de-jure measures).

In addition, overall economic globalization 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 globalization (see Table 1). ‘Hybrid’ measures aim to incorporate information on both, real and financial aspects.

### Appendix Table A1 / Types of economic globalization indicators

<table>
<thead>
<tr>
<th>Evaluation of economic globalization with regard to real flows (goods and services)</th>
<th>Evaluation of economic globalization with regard to financial flows</th>
<th>Overall economic globalization measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation of outcomes: De-facto measures of economic globalisation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De facto measures of trade globalization, for example: total imports or total exports (relative to GDP)</td>
<td>De facto measures of financial globalization, for example: FDI inward/outward or foreign financial assets/liabilities</td>
<td></td>
</tr>
<tr>
<td>Hybrid measures for de-facto globalisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Evaluation of legal framework: De-jure measures of economic globalisation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>De jure measures of trade globalization, for example: tariff rates or non-tariff trade barriers</td>
<td>De jure measures of financial globalization, for example: FDI restrictions or capital account restrictions</td>
<td></td>
</tr>
<tr>
<td>Hybrid measures for de-jure globalisation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

For a more detailed exposition of the trade globalisation, financial globalisation and overall economic globalisation indicators used in the empirical literature, see Gräbner et al. (2018).

**Reference**

2. STUDIES INCLUDED IN THE META-ANALYSIS

Appendix Table A 2 / Published papers included in the meta-analysis (n=123)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Authors</th>
<th>Year</th>
<th>Authors</th>
<th>Year</th>
</tr>
</thead>
</table>

Notes: Studies published in peer-reviewed journals prior to October 2018 were included. Criteria of inclusion are described in the text.
REFERENCES (THE STUDIES INCLUDED IN THE META-ANALYSIS)


Mahler, V. (2004): Economic globalization, domestic politics, and income inequality in the developed countries, Comparative Political Studies, 37(9), 1025-1053.


Appendix A2

List of references for studies that were screened in the search process but were excluded from the meta-analysis because they did not meet at least one of the criteria for inclusion explained in the main text (see section 3.1):


IMF (2007): Globalization and Inequality, World Economic Outlook October 2007, 135-170


Williamson, J. (1999): Real wages, inequality and globalization in Latin America before 1940, Revista de Historia Economica, 17(S1), 101-142.


Esquivel, G.; Cruces, G. (2011): The Dynamics of Income Inequality in Mexico since NAFTA, Economia, 12(1), 155-188.


Yu, G. (2010): The U-shape influence of trade openness on income inequality: A theoretical and empirical research based on panel co-integration, International Economics and Trade Research


Chong, A. (2004): Inequality, democracy, and persistence: Is there a political Kuznets curve?, Economics & Politics, 16(2), 189-212.


Acosta, P.; Montes-Roja, G. (2008): Trade reform and inequality: The case of Mexico and Argentina in the 1990s, World Economy


Fluckiger, Y.; Ramirez, J.; Deutsch, J.; Silber, J. (2002): Inequality of income and openness to foreign trade, Schweizerische Zeitschrift für Soziologie, 28(2), 241-265.


Milanovic, B. (1999): Explaining the increase in inequality during transition, Economics of Transition, 7(2), 299-343.


IMPRESSUM

Herausgeber, Verleger, Eigentümer und Hersteller:
Verein „Wiener Institut für Internationale Wirtschaftsvergleiche‘ (wiiw),
Wien 6, Rahlgasse 3

ZVR-Zahl: 329995655

Postanschrift: A 1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50
Internet Homepage: www.wiiw.ac.at

Nachdruck nur auszugsweise und mit genauer Quellenangabe gestattet.
