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## **How Global is FDI?**

### **Evidence from the Analysis of Theil Indices**

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**Abstract:** It is open to question whether the intensified worldwide competition for FDI has reduced its traditionally strong concentration in a few large and relatively advanced host countries. We calculate and decompose Theil indices to track changes in absolute and relative concentration of FDI during the period 1970-2013. We find that both absolute and relative concentration decreased when excluding offshore financial centers from the overall sample. In addition to the narrowing gap between OECD and non-OECD countries, the concentration across non-OECD countries declined for both the absolute and relative measures. This is also true for major subgroups of non-OECD countries. Finally, recent developments indicate that low-income countries are no longer at the losing end of the competition for FDI.

**Keywords:** Foreign direct investment, concentration, Theil decomposition

**JEL code:** F21

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## **1. Introduction**

Not only the usual suspects such as the OECD (2002), but even prominent globalization critics argue that the case for attracting FDI is compelling: “Such investment brings with it not only resources, but technology, access to markets, and (hopefully) valuable training, an improvement in human capital” (Stiglitz 2000: 1076). Hence, it is hardly surprising that UNCTAD has observed since the early 1990s that the vast majority of policy measures relating to the entry and establishment of foreign investors aim at liberalizing and promoting FDI inflows, rather than restricting and regulating them.<sup>1</sup> The UN Summit on Financing for Development in Monterrey in 2002 concluded that creating the necessary conditions to facilitate FDI inflows is a central challenge for developing countries, particularly the poorest among them (United Nations 2003).

It is open to question, however, whether the intensified worldwide competition for FDI has reduced its traditionally strong concentration in highly developed host countries and a small number of large and relatively advanced emerging economies. On the one hand, Kekic (2009) posits a “distinct shift in the pattern of FDI”, implying that “practice may be catching up to theory” according to which FDI should flow from capital-abundant rich countries to capital-scarce poor countries. According to UNCTAD, 2010 was the first year in which developed countries received less than half of global FDI inflows; “developing economies maintain their lead in 2013” (UNCTAD 2014: xiii). On the other hand, skeptical observers point to a persistently strong concentration of FDI stocks (e.g., Nunnenkamp and Thiele 2013). On both sides of the debate, assessments are typically based on just a few simple indicators such as the share of selected country groups in total FDI, while systematic analyses of changes in the concentration of FDI continue to be lacking.

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<sup>1</sup> For details, see UNCTAD’s Investment Policy Monitor, January 2015: <http://investmentpolicyhub.unctad.org/Upload/Documents/IPM%20No%2013.pdf> (accessed: November 2015). See also Nunnenkamp and Thiele (2013: Figure 6).

We attempt to fill this gap by constructing decomposed Theil indices and tracking the changes in these indices during the period 1970-2013. The additive decomposability of the Theil index allows for deeper insights into the changes of the concentration of FDI inflows for the overall sample of host countries and relevant subgroups. For any (mutually exclusive and exhaustive) set of subgroups of host countries, the total inequality across countries can be meaningfully decomposed into the inequality *within* these subgroups and the inequality *between* these subgroups. In this way, we assess the within-group and between-group components of concentration after splitting the sample into OECD and non-OECD host countries. In subsequent steps, we further refine the analysis by splitting all non-OECD countries into distinct subgroups. This stepwise procedure offers insights as to whether non-OECD countries caught up with OECD countries in terms of attractiveness to FDI, on the role of major subgroups of non-OECD countries for less concentrated FDI patterns, and, specifically, on whether FDI flows to low-income countries tend to converge with those to higher-income non-OECD countries.

The paper is organized as follows. In Section 2, we introduce our methodical approach and our data. We present our empirical results in Section 3. In Section 3, we also present complementary regression analyses in order to assess whether FDI determinants that are widely used in the literature may help explain the changes in FDI concentration as revealed by the decomposition of Theil indices. Section 4 concludes.

## **2. Method and data**

### *Theil index: definition and decomposition*

We measure the concentration of FDI inflows across host countries – or, equivalently, the inequality of host countries in terms of FDI inflows – by means of the Theil index.<sup>2</sup> In a generalized form, the Theil index is defined as:

$$T^I = \sum_{i=1}^I w_i \left( \frac{x_i}{w_i} \right) \ln \left( \frac{x_i}{w_i} \right) = \sum_{i=1}^I x_i \ln \left( \frac{x_i}{w_i} \right), \quad (1)$$

where  $I$  is the number of observations, in our case the number of potential host countries of FDI, and  $\mathbf{I}$  is the set of all potential host countries  $i = 1, \dots, I$ ;  $x_i = X_i / (\sum_{i=1}^I X_i)$  is the share of country  $i$  ( $i \in \mathbf{I}$ ) in FDI inflows to all countries (with  $X_i$  the inflow of FDI to country  $i$ ); and  $w_i$  denotes the relative weight of country  $i$  (with  $\sum_{i=1}^I w_i = 1$ ).

The Theil index is equal to zero (no concentration) if each country's share in total FDI inflows  $x_i$  is equal to its weight  $w_i$ ; it takes its maximal value  $T_{\max}^I = \ln(1/w_a)$ , with  $w_a = \min_i w_i$ , if all FDI inflows are concentrated in the country (or one of the countries) with the smallest weight. The relative weights affect the value of the index, i.e., the level of concentration, in two distinguishable ways: on the one hand they define a benchmark for assessing each country's share in global FDI inflows  $x_i$ , and on the other hand they define the relative importance (weight) attributed to individual countries in summing up country-specific observations into a single index.<sup>3</sup>

The Theil index figures most prominently among the so-called general entropy (GE) class of inequality measures. All GE measures satisfy a number of normative criteria, among which the additive decomposability of the measure is particularly important for our empirical analysis. Additive decomposability implies that, for any mutually exclusive (disjoint) and exhaustive set of subgroups of host countries, the total inequality across countries can be meaningfully decomposed into the inequality *within* these subgroups (within-group

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<sup>2</sup> This section draws on Bickenbach et al. (2015) and Bickenbach and Bode (2008), who provide a detailed discussion of the properties of the Theil index and its decomposition.

<sup>3</sup> As discussed in more detail below, we will use two different definitions of weights throughout our analysis.

component) and the inequality *between* these subgroups (between-group component).<sup>4</sup> More specifically, the within-group component corresponds to a weighted sum of the levels of inequality between the countries *within* each group;<sup>5</sup> and the between-group component corresponds to the level of inequality between the different group averages. The decomposition property of the Theil index thus allows us to trace changes over time in the overall concentration of FDI inflows across countries to changes (differences) in the corresponding concentration within and between different subgroups of countries.

More specifically, with **A**, **B**, and **C** being three disjoint and exhaustive subsets of the set of all potential host countries **I**, the decomposition property of the Theil index (2) implies

$$T^I = TW^{ABC} + TB^{ABC}, \quad (2)$$

where  $TW^{ABC}$  is the within-group component, given by:

$$TW^{ABC} = \sum_{S=A,B,C} \left( \left( \frac{\sum_{i \in S} X_i}{\sum_{i \in I} X_i} \right) \sum_{i \in S} \frac{X_i}{\sum_{i \in S} X_i} \ln \left( \frac{X_i}{\sum_{i \in S} X_i} / \frac{w_i}{\sum_{i \in S} w_i} \right) \right) = \omega_A T^A + \omega_B T^B + \omega_C T^C \quad (3)$$

with  $\omega_S = (\sum_{i \in S} X_i / \sum_{i \in I} X_i)$  the share of subset **S** in FDI inflows of **I** and  $T^S$  the Theil index of concentration of subset **S** (**S** = **A**, **B**, **C**); and where  $TB^{ABC}$  is the between-group component given by:

$$TB^{ABC} = \sum_{S=A,B,C} \frac{\sum_{i \in S} X_i}{\sum_{i \in I} X_i} \ln \left( \frac{1}{\sum_{i \in S} w_i} \frac{\sum_{i \in S} X_i}{\sum_{i \in I} X_i} \right). \quad (4)$$

As  $\omega_A + \omega_B + \omega_C = 1$ , the within-group component,  $TW^{ABC}$ , is a weighted average of the Theil indices of the different subgroups with weights equal to the respective subgroup's share in total FDI inflows (in the following,  $\omega_A T^A$  will be referred to as group **A**'s *contribution* to the within-group component). The between-group component,  $TB^{ABC}$ , is a Theil index itself,

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<sup>4</sup> Other frequently used inequality measures, such as the Gini index or the coefficient of variation (CV) do not have this property.

<sup>5</sup> In the case of the Theil index, the sum of these weights is always equal to one so that the within-group component is actually a weighted average of the group-specific inequality measures.

which results from assigning each country of a specific subgroup of countries the average FDI inflows of the countries of that subgroup. It thus measures the inequality between the subgroups in terms of their countries' average FDI inflows.

Importantly, throughout the following analysis, we calculate two distinct variants of the Theil index corresponding to two different choices of relative weights in the definition of the generalised Theil index of equation (1) above. The first variant, the *absolute Theil index*, treats all countries symmetrically, irrespective of their size. It is given by the special case where the weights in equation (1) are the same for all countries ( $w_i = 1/I$  for all  $i$ ). In this case, the country-specific attractiveness for FDI is given by absolute amounts of FDI inflows and the aggregation of country-specific observations into the absolute Theil index gives equal weights to all countries.<sup>6</sup> The second variant, the (population-weighted) *relative Theil index*, is obtained from equation (1) by setting each country's weight equal to its share in total population,  $w_i = POP_i / \sum_{i=1}^I POP_i$ , where  $POP_i$  is the population of country  $i$ . In contrast to the absolute Theil index, the relative Theil index accounts for the countries' population in two respects: (i) by measuring the country-specific attractiveness for FDI in terms of per-capita inflows of FDI, and (ii) by using the countries' population as weights when aggregating country-specific observations into the relative Theil index.<sup>7</sup> Note that the absolute Theil index is conceptually closer than the relative Theil index to the frequently mentioned high shares of a limited set of host countries in worldwide FDI flows, alluded to in the Introduction. However, the relative Theil index appears to be more appropriate to reveal the attractiveness for FDI of various small countries, which are minor hosts of absolute FDI inflows almost by

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<sup>6</sup> The absolute Theil index is thus given by  $T^I = \sum_{i=1}^I x_i \ln(x_i)$ . It is equal to zero (no concentration or perfect equality) if all countries receive the same amount of FDI inflows. It takes its maximal value  $T_{\max}^I = \ln(I)$  if all FDI goes to just one country.

<sup>7</sup> The (population-weighted) relative Theil index is zero (no concentration or perfect equality) if each country's share in total FDI inflows is equal to its share in total population. It takes its maximal value  $T_{\max}^I = \ln(\sum_i POP_i / POP_a)$  if all FDI goes to the country (denoted by  $a$ ) with the smallest population.

definition.<sup>8</sup> At the same time, the aggregation of country-specific observations with population as weights appears to be better suited to assess the concentration of FDI from a global perspective.

#### *Data source and some aggregate statistics*

We draw on UNCTAD's FDI database for FDI inflows.<sup>9</sup> This source allows us to base the calculation of Theil indices on long time series of FDI inflows during the period 1970-2013. To smooth short-term fluctuations we aggregate annual flows over four-year sub-periods. Hence, our analysis is based on 11 sub-periods from 1970-1973 to 2010-2013.

Our sample covers essentially all host countries of FDI (including those with marginal or at times zero inflows).<sup>10</sup> The sample of 196 hosts of FDI<sup>11</sup> includes 23 OECD countries (as of 1993) and 136 non-OECD countries;<sup>12</sup> 37 offshore financial centers (OFCs) are excluded from non-OECD countries and treated as a distinct subgroup.<sup>13</sup> The broad country coverage mitigates sample selection bias and renders it possible to decompose the Theil indices in several dimensions.

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<sup>8</sup> Conversely, FDI per capita tends to be relatively low for (very) large countries where international transactions generally play a less important role compared with small countries.

<sup>9</sup> The FDI data are available at: <http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx> (accessed: April 2015). Population data used to calculate relative weights are mainly also from UNCTAD. They have been augmented by data from the World Bank's World Development Indicators available at <http://data.worldbank.org/data-catalog/world-development-indicators> (accessed: April 2015) and from the IMF's International Financial Statistics Database (February 2015 Edition).

<sup>10</sup> Note that FDI inflows can be negative, for example, if profit remittances and repayments of loans received from the parent company exceed new equity inflows. Negative values observed after taking four-year aggregates have been set to zero for the calculation of Theil indices. Alternative treatments of negative values, such as the consolidation with inflows from the nearest four-year interval with sufficiently positive inflows, have little effects on the results presented below. FDI inflows smaller than 0.0001 million dollars were treated as zero inflows.

<sup>11</sup> During the observation period several countries have split up or unified as in the case of Germany. To get a balanced country panel, the successor states of the Union of Socialist Soviet Republics and of the Socialist Federal Republic of Yugoslavia as well as of Czechoslovakia were treated as if they existed throughout the whole observation period. Eritrea and Ethiopia are treated as one entity (observation) throughout the observation period. The same is true for Belgium and Luxembourg (for which separate FDI data would be available only from 2002 onwards).

<sup>12</sup> Throughout the subsequent analysis, we define OECD countries according to OECD membership by the end of 1993.

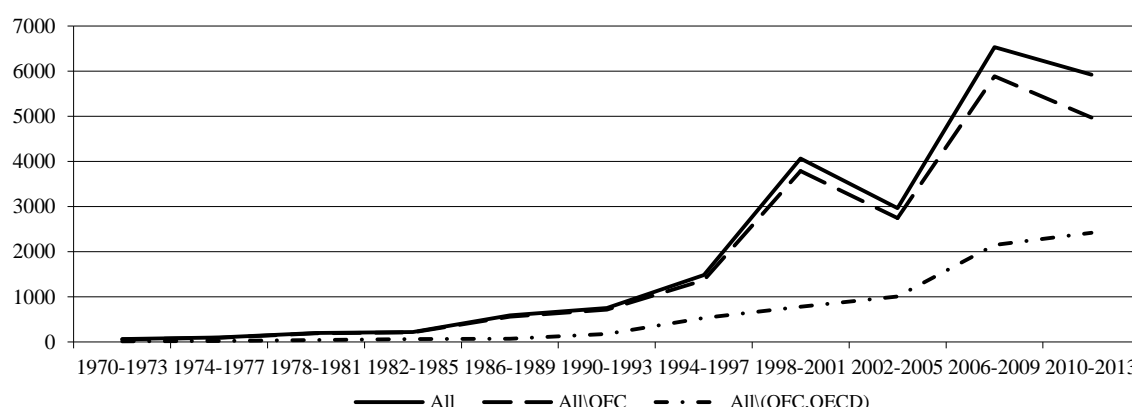
<sup>13</sup> The list of OFCs is mainly taken from the International Monetary Fund (for details, see Zoromé 2007). However, we consider Luxembourg and Switzerland as OECD countries.



Figure 1 displays long-term trends in FDI inflows. Total inflows soared about 100-fold from about 64.2 billion US\$ in 1970-1973 to almost 6.53 trillion US\$ in 2006-2009. However, the boom of worldwide FDI was associated with considerable volatility, even though we smooth annual fluctuations. In particular, the rising trend was sharply interrupted at the turn of the century when the previous wave of mergers and acquisitions (M&As) collapsed. Another decline in overall FDI inflows occurred after the financial meltdown in 2008. FDI inflows to the OECD countries dropped sharply in both incidents, whereas FDI inflows to OFCs and to non-OECD countries (excluding OFCs) continued to rise.

**Fig. 1 Total FDI inflows by country groups**

This figure displays the development of FDI inflows in billion US\$ from 1970-1973 to 2010-2013. The “All” line depicts FDI inflows for the overall sample, i.e., all countries including offshore financial centers. The “All\OFC” line depicts FDI inflows to all countries after excluding offshore financial centers. As can be seen, the exclusion of offshore financial centers has only modest effects on overall trends. The “All\OFC, OECD)” line depicts FDI inflows to non-OECD countries, which account for an increasing share in overall FDI flows in recent years.



Note: FDI inflows to OFC = All – All\OFC; FDI inflows to OECD = All\OFC – All\OFC, OECD); FDI inflows to non-OECD = All\OFC, OECD)

From Figure 1, we also see that the OECD countries’ share in total FDI inflows strongly decreased over time, while that of the other two groups strongly increased over time.<sup>14</sup> While this seems to suggest some convergence in the relative importance of different countries or country groups, a thorough analysis of this issue should go far beyond such aggregate analysis. Not only should it take into account differences in the number of countries

<sup>14</sup> For details on the development of FDI inflows for the different subgroups see Table 3 in the Appendix.

and in the population of the different country groups, but it should also take into account changes in the concentration of FDI inflows *within* the different country groups. The following section will do so by looking at the development of absolute and relative Theil indices of concentration and their decompositions along different country groups and subgroups.

### 3. Results on FDI concentration

#### *Overall concentration: measurement matters*

For a start, we assess the concentration of FDI for our overall sample of 196 host countries. For each 4-year interval we differentiate between two subsets of countries:  $\mathbf{Z}=\{i \mid X_i=0\}$ , i.e., the subset of countries that attracted zero FDI inflows over the given time period; and  $\mathbf{P}=\{i \mid X_i > 0\}$ , i.e., the subset of countries with strictly positive (nonzero) FDI inflows over that period. In this specific case the decomposition of the Theil index of overall concentration (equations (2)-(4)) simplifies to:<sup>15</sup>

$$\mathbf{T}^I = \mathbf{T}\mathbf{W}^{\mathbf{ZP}} + \mathbf{T}\mathbf{B}^{\mathbf{ZP}}, \quad (5)$$

where the within-group component is now simply the concentration within the subgroup  $\mathbf{P}$  of countries with strictly positive inflows

$$\mathbf{T}\mathbf{W}^{\mathbf{ZP}} = \sum_{i \in \mathbf{P}} \frac{X_i}{\sum_{i \in \mathbf{P}} X_i} \ln \left( \frac{X_i}{\sum_{i \in \mathbf{P}} X_i} / \frac{w_i}{\sum_{i \in \mathbf{P}} w_i} \right) = \mathbf{T}^{\mathbf{P}} \quad (6)$$

and the between-group component is simply the logarithm of the inverse of the aggregate weight (in the special case of the absolute Theil index, the share) of countries in the sample that do receive strictly positive FDI inflows

$$\mathbf{T}\mathbf{B}^{\mathbf{ZP}} = \ln \left( \frac{1}{\sum_{i \in \mathbf{P}} w_i} \right). \quad (7)$$

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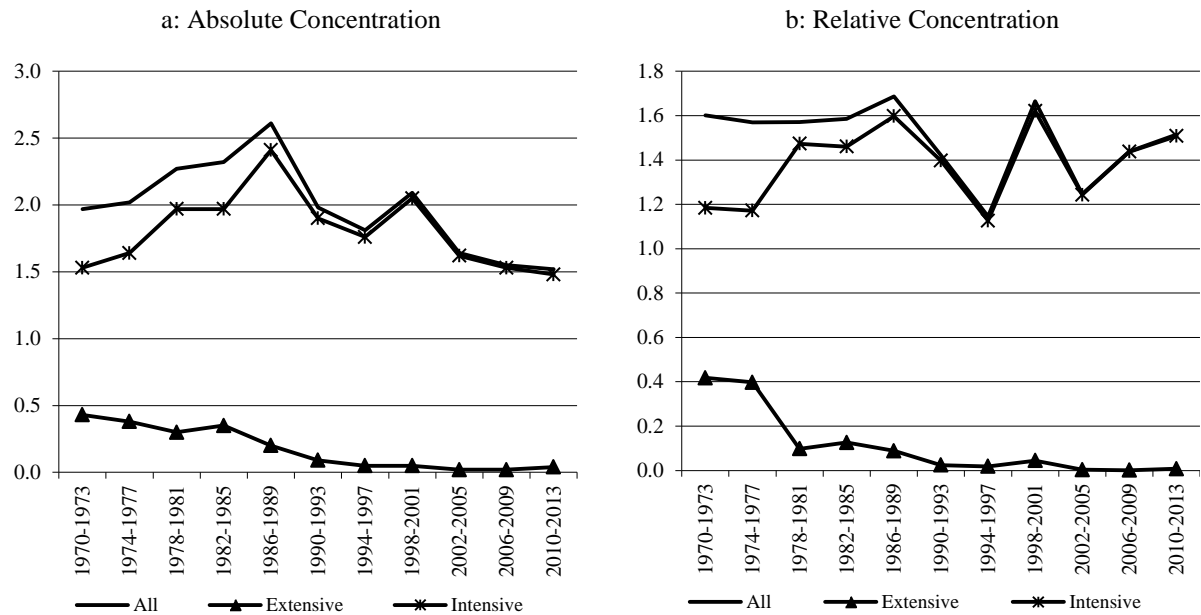
<sup>15</sup> In deriving equations (6) and (7) we make use of the fact that for subset  $\mathbf{P}$  the weight  $\omega_{\mathbf{P}}$  from equation (3) is equal to 1. As  $\ln(x)$  is not defined for  $x = 0$  we substitute  $x \ln(x)$  by  $\lim_{x \rightarrow 0} x \ln(x) = 0$ . For a similar decomposition in the context of trade diversification see Cadot et al. (2013).

In this case, the within-group component of the overall Theil index represents the “intensive margin” of concentration across country group **I** and the between-group component represents the “extensive margin” of concentration.<sup>16</sup> It reveals the importance of the changing number (or weight) of zero FDI observations (i.e., countries in subset **Z** without FDI inflows in the specific time period) for the development of overall concentration (note that  $\sum_{i \in \mathbf{P}} w_i = 1 - \sum_{i \in \mathbf{Z}} w_i$ ).

As discussed before, we consider two alternative measures of concentration. The absolute Theil index which treats all countries symmetrically ( $w_i=1/I$  for all  $i$ ), ignoring their different population size, is shown in the left panel of Figure 2. The relative Theil index which considers differences in population size is shown in the right panel of Figure 2.

**Fig. 2 Concentration of FDI inflows – All countries, including offshore financial centers**

This figure displays the development of absolute concentration (panel a) and relative concentration (panel b) of FDI inflows to all countries, including offshore financial centers, from 1970-1973 to 2010-2013. The “Extensive” lines depict the extensive margin of concentration, the “Intensive” lines the intensive margin of concentration, and the “All” lines the sum of the intensive and extensive margins of concentration. The extensive margin plays a minor and declining role for absolute and relative concentration.



As can be seen, the development of FDI concentration clearly depends on the choice between absolute and relative Theil indices. The absolute Theil index increases during the

<sup>16</sup> A declining number (or weight) of countries with zero FDI inflows is thus referred to as a lower *extensive margin of concentration*. This should not be confused with a lower *extensive margin of FDI*, which generally refers to a rising number of countries with zero FDI inflows in the literature.

1970s and 1980s before trending downwards in the more recent past. Comparing the last sub-period with the first sub-period, the absolute Theil index points to lower overall concentration of FDI inflows (1.5 versus 2.0). In contrast, the relative Theil index stayed almost constant (at around 1.6) during the first half of the observation period and fluctuated considerably thereafter, before returning almost to its starting level in the last sub-period.

While differences between the absolute and relative Theil indices are mainly due to the within-group component (intensive margin), we observe similar trends for the between-group component (extensive margin) in both panels of Figure 2. The extensive margin fell and was close to zero since the early 1990s implying a very low share (absolute concentration) and population-weight (relative concentration) of countries with zero FDI inflows. The strong decline of zero observations and their negligible role for overall concentration in the more recent past can be attributed to the opening-up to FDI of the transition countries in Eastern Europe and Central Asia (see also below).<sup>17</sup> Consequently, the value of the intensive margin of concentration closely resembled the value of overall concentration since the early 1990s.

#### *OFCs: minor impact on overall concentration*

In the next step of our analysis, we assess the role of OFCs for the development of overall concentration portrayed above. A priori it is hard to tell whether OFCs should be expected to have an important impact on overall concentration. As for their effect on the absolute Theil index, OFCs, on the one hand, account for almost 20 percent of countries in our sample (37 of the 196) giving them a relatively high weight. On the other hand, FDI inflows *per country* were not much different for the OFCs than for the group of all countries (Table 3 in Appendix A1) suggesting that their effect on the absolute Theil index for overall concentration may

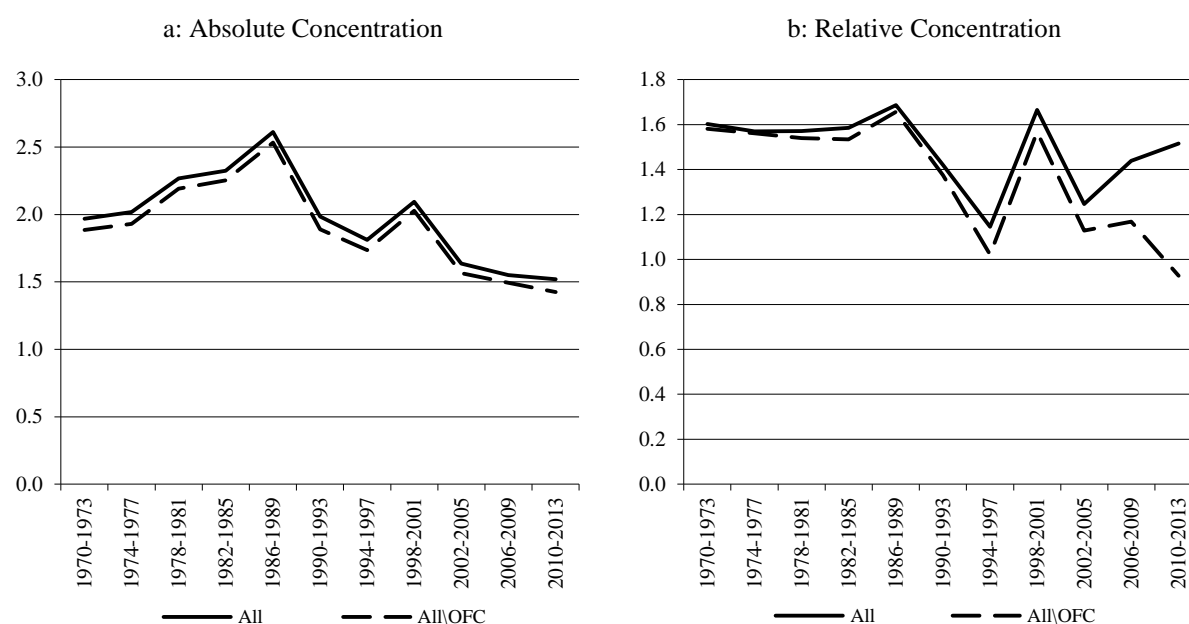
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<sup>17</sup> The pronounced decline of the extensive margin in 1978-1981 for the relative measure in the right panel of Figure 2 was associated with China's opening-up to FDI. Note that the Chinese case illustrates one of the main differences between the absolute and the relative measures of concentration. For the absolute measure, China counts as just one out of 196 countries. For the relative measure, China represents a heavyweight with almost 20% of total population. In the right panel of Figure 2 China's opening-up to FDI thus led to a strong decrease in the extensive margin (20% of world population now receive FDI), but also to a notable increase in the intensive margin (20% of world population received still quite low per-capita inflows).

actually be small. For the relative Theil index, by contrast, the aggregate weight of the OFCs is very low (in the last sub-period all OFCs together accounted for only about 0.5 percent of the aggregate population of all countries in the sample), whereas their *per-capita* inflows of FDI were exceptionally high (Table 3). Moreover, increased per-capita inflows resulted in a widening gap compared to other host countries, notably in the last sub-period when FDI flows to OFCs strongly increased while overall FDI flows strongly decreased (Table 3).

**Fig. 3 Concentration of FDI inflows – All countries and all countries excluding OFCs**

This figure displays the development of absolute concentration (panel a) and relative concentration (panel b) of FDI inflows to from 1970-1973 to 2010-2013. The “All” lines depict concentration for the overall sample of countries, including offshore financial centers; the “All\OFC” lines depict concentration for all countries after excluding offshore financial centers. The exclusion of offshore financial centers has noticeable effects only on relative concentration in recent years.



Indeed, Figure 3 shows that OFCs have just a marginal effect on the level and development of overall concentration as measured by the absolute Theil index. The curves for the overall sample of 196 countries, including the 37 OFCs, and for the reduced sample after excluding the OFCs closely resemble each other in the left panel of Figure 3. This also holds for the comparison of the relative Theil indices for the full and the reduced country samples from the beginning of our observation period until the early 2000s. However, the two curves

in the right panel deviate considerably during the two last sub-periods (2006-2013). Specifically, the relative Theil index appears to be trending downwards at least since its temporary peak around the turn of the century (and possibly even since the early 1990s) when excluding the OFCs.<sup>18</sup> Importantly, this implies that the recent development of relative concentration becomes much more similar to the recent development of absolute concentration once the sample is reduced by excluding OFCs. After excluding OFCs, both the absolute and the relative measure of concentration clearly decreased at least since the beginning of the century and were substantially lower at the end of our period of observation than at its beginning.

#### *OECD vs. non-OECD countries: convergence from the top*

The subsequent steps of our analysis are based on the reduced sample after excluding OFCs (the corresponding set of countries is denoted by  $\mathbf{I}\backslash\mathbf{F}$ ).<sup>19</sup> In this sub-section, we decompose the (absolute and relative) Theil indices for the 159 remaining sample countries according to OECD membership as of 1993.<sup>20</sup> The distinction between traditional OECD countries and the typically less advanced other host countries is clearly relevant to assess whether FDI has increasingly become global. It is well known that traditional OECD countries absorbed large shares of worldwide FDI in the past. It is also widely reported, as mentioned in the Introduction, that FDI flows have shifted toward non-OECD hosts recently (see also Figure

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<sup>18</sup> The difference between the relative Theil indices in panel b of Figure 3 can be attributed to two OFC-related developments in the last sub-periods: First, when decomposing the overall index between OFCs and all other countries in our sample, the between-group component increased considerably (not shown). This is due to the above noted widening gap in terms of per-capita FDI inflows in favor of OFCs. Second, concentration strongly increased within the subgroup of OFCs, which together with the OFC's increasing share of total FDI inflows, implies that the OFCs' contribution to the within component of overall concentration increased as well. These two factors are no longer pushing overall relative concentration upwards once OFCs are excluded.

<sup>19</sup> We prefer excluding OFCs from our further analysis since their – limited – effects on overall concentration do not offer relevant insights on whether FDI has become more global in the sense of increasingly involving host countries across the developing world. Mostly, OFCs serve only as stop-over destinations rather than final destinations of FDI and it is generally unknown where FDI flows channeled through OFCs are ultimately used for investment.

<sup>20</sup> The large and heterogeneous group of non-OECD countries will be further decomposed in the next sub-sections.

1).<sup>21</sup> The following analysis will show that this shift can indeed explain a substantial part of the decline in overall concentration documented in the preceding sub-section. It will also show, however, that there were other important factors at work as well.

As indicated above, total inequality across countries can be meaningfully decomposed into the inequality *within* subgroups (here: OECD and non-OECD countries, indexed **O** and **N**, respectively) and the inequality *between* these subgroups. Specifically, applying equations (2)-(4), the Theil index for the sample without OFC countries,  $T^{\mathbf{I}\mathbf{F}}$ , can be additively decomposed into a within-group component,  $TW^{\mathbf{ON}}$ , and a between-group component,  $TB^{\mathbf{ON}}$  to give:

$$T^{\mathbf{I}\mathbf{F}} = TW^{\mathbf{ON}} + TB^{\mathbf{ON}} = \omega_{\mathbf{O}}T^{\mathbf{O}} + \omega_{\mathbf{N}}T^{\mathbf{N}} + TB^{\mathbf{ON}}, \quad (8)$$

where the full set of all countries, **I**, and the number of countries in that set,  $I=\#\mathbf{I}=196$ , have to be replaced by the reduced set of countries  $\mathbf{I}\mathbf{F}$  and the corresponding number of countries  $\#(\mathbf{I}\mathbf{F})=159$  in equations (1)-(4) as well as in the definition of weights. Note that after these renormalizations, we again have  $\omega_{\mathbf{O}} + \omega_{\mathbf{N}} = 1$ , so that the within-group component  $TW^{\mathbf{ON}}$  is the weighted average of the Theil indices,  $T^{\mathbf{O}}$  and  $T^{\mathbf{N}}$ , for the two subgroups **O** and **N**.

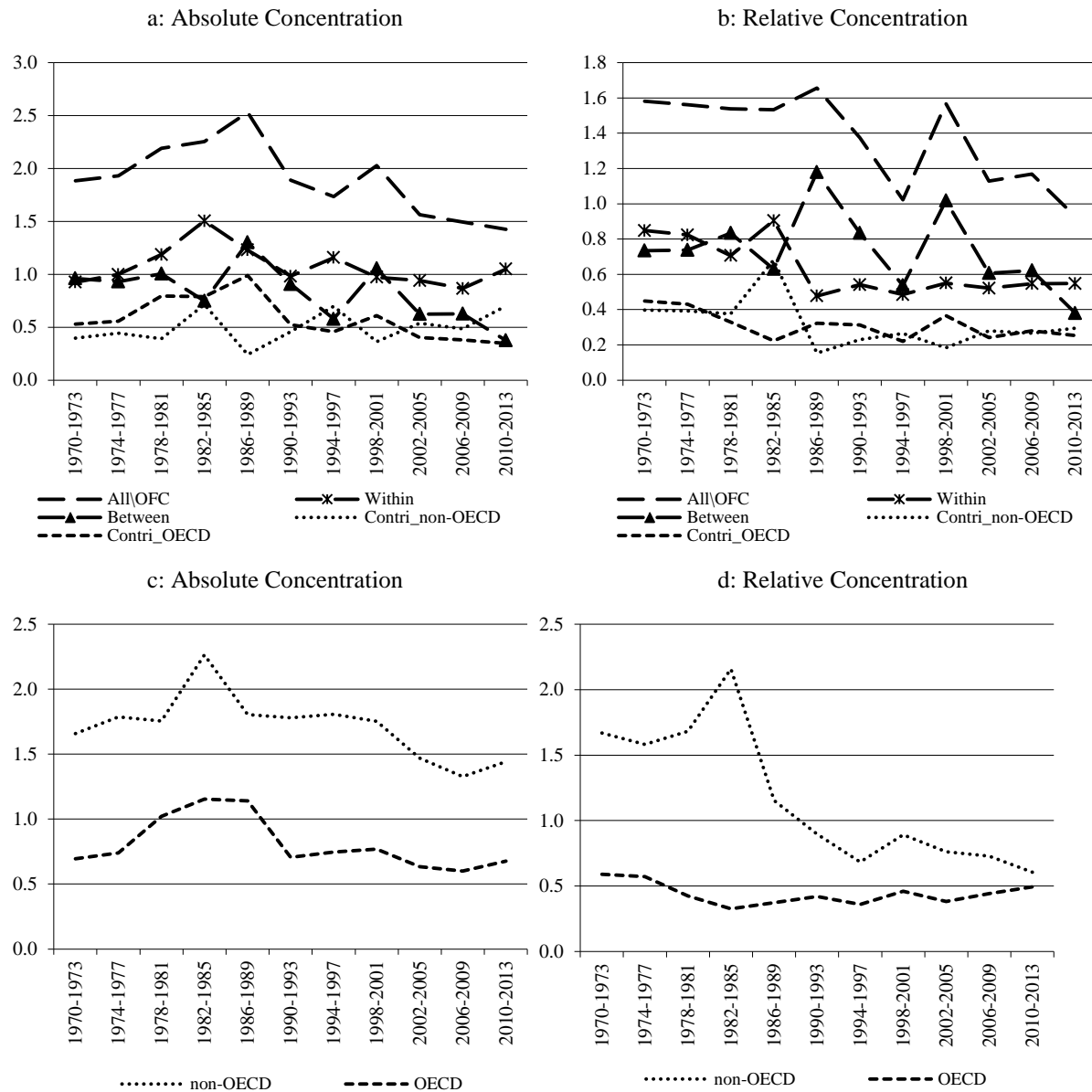
Figure 4 reveals how the different components contributed to the development of overall concentration across the remaining 159 sample countries of  $\mathbf{I}\mathbf{F}$ . Comparing the development of overall concentration,  $T^{\mathbf{I}\mathbf{F}}$ , with that of its between- and within-group components,  $TB^{\mathbf{ON}}$  and  $TW^{\mathbf{ON}}$ , we see that at least from the late 1980s onwards, the development of the overall concentration has been driven mainly by its between-group component. This holds for both the absolute (panel a) and the relative (panel b) Theil index: the timing of peaks (and lows) of the overall index and its between-group component coincides and both curves appear to be trending downwards.

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<sup>21</sup> At the beginning of our observation period, the 23 OECD members accounted for more than 75 percent of FDI inflows to all 159 remaining sample countries. In the last sub-period 2010-2013, the 136 non-OECD countries have increased their share to almost 50% (Table 3).

**Fig. 4 Concentration of FDI inflows – All countries after excluding OFCs, decomposition between OECD and non-OECD countries**

This figure displays the development of absolute concentration (panels a and c) and relative concentration (panels b and d) of FDI inflows to all countries except offshore financial centers from 1970-1973 to 2010-2013. Panels a and b show the decomposition between OECD countries and non-OECD countries. The “Between” lines depict the between-group component of concentration, and the “Within” lines the within-group component of concentration. The within-group component is the sum of the contributions of the OECD countries (“Contri\_OECD” lines) and the non-OECD countries (“Contri\_non-OECD” lines), i.e., the weighted average of the Theil indices of the two subgroups. The “All\OFC” lines depict overall concentration for all countries except offshore financial centers, i.e., the sum of the between- and within-group components. Panels c and d depict the concentration across the OECD countries (“OECD” lines) and across the non-OECD countries (“non-OECD” lines).



The strong peaks in the between-group component,  $TB^{ON}$ , observed for the 1986-1989 and 1998-2001 sub-periods correspond to particularly strong increases and high shares of FDI flows to the OECD countries, implying large differences between OECD and non-OECD



countries in both per-country inflows (absolute measure) and per-capita inflows (relative measure). Similarly, the drops in the between-group component after the 1998-2001 and 2006-2009 sub-periods can be attributed to declining amounts and shares of FDI flows to the OECD countries in the recessions following the dot-com meltdown and terror attacks of 2001 and the financial crisis of 2008. While these peaks and lows were all largely due to strong changes in the level of FDI inflows to the OECD countries, the strong decline of the between-group component in the early and mid-1990s was largely due to a particularly strong increase (by more than 600 percent) in FDI inflows to the non-OECD countries.

Turning to the within-group component we observe that for the absolute Theil index, the within-group component was the main source of the increase of FDI concentration during the 1970s and early 1980s; but contributed to the decline of overall absolute concentration thereafter. The increase in within-group concentration,  $TW^{ON}$ , over the first four sub-periods was fueled by a temporary increase in the absolute concentration of FDI inflows within both country groups,  $T^O$  and  $T^N$ , which both peaked in the first half of the 1980s (panel c of Figure 4). Overall, the within-group component of the absolute Theil index was slightly higher in the last sub-period than in the first one. This is even though the absolute concentration of FDI inflows decreased slightly within both subgroups.

For the relative Theil index, by contrast, the within-group component was lower at the end of the observation period than at its beginning. That decline was almost exclusively due to a strong decline during the second half of the 1980s, which, in turn, was exclusively due to a very strong decrease in the relative concentration of FDI inflows across the non-OECD countries,  $T^N$ , during that period (panel d of Figure 4). More generally, relative concentration across the non-OECD countries increased until the mid-1980s but very strongly decreased thereafter, particularly between the mid-1980s and the mid-1990s.<sup>22</sup> By contrast, the relative

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<sup>22</sup> While the relative concentration of inflows across the non-OECD countries,  $T^N$ , continued to strongly decrease throughout most of the 1990s, the effect of that decrease on the within-group component of the overall relative Theil index,  $T^{NF}$ , was overcompensated after the end of the 1990s by the increasing share of inflows to non-

concentration of FDI inflows across the OECD countries,  $T^O$ , changed comparatively little over time. It decreased from the beginning of the observation period until the mid-1980s and slightly increased thereafter – still staying below its starting level, however.

Taken together, Figure 4 points to a kind of ‘convergence from the top’. For both the absolute and the relative measure the between-group component tended to decrease over time, reflecting a narrowing gap between OECD-countries and non-OECD countries in FDI inflows per country (absolute measure) as well as per-capita (relative measure). At the same time, the concentration across OECD countries remained largely constant (or even decreased slightly) between the beginning and the end of the observation period, suggesting that the narrowing gap between OECD and non-OECD countries was not simply due to an increasing inequality within the group of OECD countries.

Despite this convergence, differences in FDI inflows between OECD countries and non-OECD countries, both per country and per capita, were still pretty large even at the end of our observation period.<sup>23</sup> And even though the OECD’s share,  $\omega_O$ , in total FDI inflows appeared to be trending downwards, it fluctuated heavily. Given the large volatility of  $\omega_O$  it cannot be taken for granted that the decline of that share, and the convergence from the top more generally, will prove to be a longer-term, or even permanent phenomenon. This is even more so as the strong decline of the OECD countries’ share in FDI inflows since the turn of the millennium (from almost 80% in 1998-2001 to slightly more than 50% in 2010-2013) seems to be due mostly to a specific weakness of the OECD countries in the recessions of the early 2000s and after the financial meltdown of 2008, rather than to a particularly strong growth of FDI inflows to the non-OECD countries. It may therefore prove premature to

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OECD countries,  $\omega_N$ . As the concentration of FDI inflows across the non-OECD countries was higher than that across the OECD countries, any increase in  $\omega_N$ , *ceteris paribus*, increased the within-group component of overall concentration.

<sup>23</sup> Both per-country inflows and per-capita inflows to the OECD were still more than six times higher than those to the non-OECD in the last sub-period, 2010-2013 (Table 3).

conclude that globalized FDI patterns necessarily allow non-OECD countries to close the traditional gap in attractiveness to FDI.

The results from a complementary regression analysis fit into this picture. As described in more detail in Appendix A2, we regress our FDI variables, in absolute and per-capita terms, on a set of FDI determinants that are widely considered in the relevant literature (e.g., Busse et al. 2010). Importantly, we interact these variables with a dummy variable set to one for non-OECD host countries,  $N$ , included in the reduced sample  $I \setminus F$  after excluding OFCs. Statistically significant coefficients on the interaction terms indicate that the impact of FDI determinants differs between FDI flows to OECD countries and FDI flows to non-OECD countries. Such differences could help explain the reduction in the between-group component that has been driving the observed ‘convergence from the top.’

The regression results are reported in Table 1 where FDI in absolute terms ( $\ln FDI$ ) represents the dependent variable in the upper panel, and FDI in per-capita terms ( $\ln FDI_{pc}$ ) represents the dependent variable in the lower panel. Independent of the definition of the dependent variable, the basic estimation in column (1) with country fixed effects included, but still without the interaction terms, produces plausible and fairly conventional results. In particular the standard determinants of horizontal or market-oriented FDI ( $\ln GDP$  and  $Growth$ ) enter significantly positive, and the standard determinants of vertical or cost-oriented FDI are also as expected – significantly negative for  $\ln GDP_{pc}$  and positive for openness to trade ( $Open$ ).<sup>24</sup>

More interestingly in the present context, the significant interaction terms in column (2) suggest that the above noted determinants are driving FDI primarily in non-OECD countries. Specifically, the observed reduction in the between-group component of overall concentration may be attributed to the relatively strong impact of rising GDP, higher growth

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<sup>24</sup> More surprisingly, the host country’s endowment with natural resources proves to be negative, though only at the ten percent level. The significantly positive effect of the (accumulated) number of bilateral investment treaties ( $BITs$ ) is in line with some previous studies. It should be noted, however, that endogeneity tends to be an issue even though we include country fixed effects.

and an increasing number of BITs in non-OECD countries. It should be noted, however, that the relevant interaction terms are no longer significant at conventional levels (with the exception of *BITs*) once we account for time dummies in columns (3) and (4) of Table 1. The sensibility of the results on the interaction terms to the inclusion of time dummies underscores our earlier argument that temporary factors could be at work so that the observed convergence from the top may not necessarily be a longer-term, or even permanent phenomenon.

**Table 1 Regression results on FDI determinants: Comparing OECD countries with non-OECD countries**

This table reports fixed-effects regression results on the impact of standard FDI determinants on FDI flows to OECD host countries, **O**, compared to non-OECD host countries, **N**. The coefficients on the interactions of the FDI determinants with the dummy variable *DumN*, set to one for non-OECD countries, reveals whether FDI determinants have a stronger impact on FDI flows to non-OECD countries. This is typically not the case in the fully specified model. Country fixed effects, time dummies and standards errors are not shown for the sake of brevity. \*\*\*, \*\*, \* if significant at the one, five, and ten percent level, respectively.

Variables:	(1)	(2)	(3)	(4)
	Dependent variable: FDI in million US\$, <i>lnFDI</i>			
<i>ln GDP</i>	4.285***	1.036	-1.467	-1.467
<i>Growth</i>	0.069***	-0.043	0.018	0.018
<i>ln GDPpc</i>	-3.099***	3.644	3.301	3.301
<i>Open</i>	0.007**	-0.004	0.002	0.002
<i>NatRes</i>	-0.013	-0.020	-0.015	-0.015
<i>Infl</i>	0.000	-0.002	0.007	0.007
<i>Polcon</i>	0.021	0.114	0.110	0.110
<i>BITs</i>	0.025***	0.009	-0.008	-0.008*
<i>DumN *ln GDP</i>		3.289*	2.257	2.257
<i>DumN *Growth</i>		0.128*	0.055	0.055
<i>DumN *ln GDPpc</i>		-7.249***	-3.821	-3.821
<i>DumN *Open</i>		0.011	0.001	0.001
<i>DumN *NatRes</i>		0.005	0.010	0.010
<i>DumN *Infl</i>		0.003	-0.007	-0.007
<i>DumN *Polcon</i>		-0.090	-0.150	-0.150
<i>DumN *BITs</i>		0.020*	0.018*	0.018**
Constant	-14.490***	-17.311***	-1.558	-1.558
Time dummies	No	No	Yes	Yes
R <sup>2</sup> within	0.500	0.515	0.554	0.554
R <sup>2</sup>	0.810	0.816	0.830	0.830
F	96.55***	50.71***	37.45***	88.05***
#obs	916	916	916	916
#group	137	137	137	137
robust SE	No	No	No	Yes
	Dependent variable: FDI per capita in thousand US\$, <i>lnFDIpc</i>			
<i>ln GDP</i>	3.305***	0.066	-2.424	-2.424
<i>Growth</i>	0.069***	-0.044	0.017	0.017
<i>ln GDPpc</i>	-2.121***	4.609*	4.261	4.261
<i>Open</i>	0.007**	-0.004	0.002	0.002
<i>NatRes</i>	-0.013	-0.021	-0.016	-0.016
<i>Infl</i>	0.000	-0.002	0.007	0.007
<i>Polcon</i>	0.020	0.116	0.111	0.111
<i>BITs</i>	0.025***	0.009	-0.008	-0.008*
<i>DumN *ln GDP</i>		3.275*	2.245	2.245
<i>DumN *Growth</i>		0.128*	0.056	0.056
<i>DumN *ln GDPpc</i>		-7.236***	-3.813	-3.813
<i>DumN *Open</i>		0.011	0.001	0.001
<i>DumN *NatRes</i>		0.006	0.010	0.010
<i>DumN *Infl</i>		0.003	-0.007	-0.007
<i>DumN *Polcon</i>		-0.093	-0.153	-0.153*
<i>DumN *BITs</i>		0.020*	0.019*	0.019**
Constant	-21.453***	-24.245***	-8.563**	-8.563*
Time dummies	No	No	Yes	Yes
R <sup>2</sup> within	0.428	0.445	0.489	0.489
R <sup>2</sup>	0.755	0.762	0.781	0.781
F	72.19***	38.28***	28.90***	72.86***
#obs	916	916	916	916
#group	137	137	137	137
robust SE	No	No	No	Yes

*Three non-OECD subgroups: decreasing concentration at least since the 1980s*

When stressing the “central challenge” to mobilize FDI as a major source of financing sustained economic growth (United Nations 2003), the UN Summit on Financing for Development in Monterrey in 2002 was not only concerned about developing countries as a whole lagging behind OECD countries in terms of attractiveness for FDI. In addition, the Monterrey Consensus explicitly referred to specific subgroups such as economies in transition and low-income countries, for which it might be particularly difficult to lure FDI inflows. Indeed, the reduced concentration across the set of all OECD and non-OECD countries (upper panels of Figure 4) as well as across the non-OECD countries (lower panels of Figure 4) may obscure that specific subgroups of non-OECD countries did not benefit from booming FDI during our period of observation.

Hence, we proceed by assessing changes in concentration for the sub-sample of 136 non-OECD countries. This section distinguishes three subgroups of non-OECD countries: ten G20 members among the non-OECD countries,<sup>25</sup> 28 transition countries in Eastern Europe and Central Asia,<sup>26</sup> and all other non-OECD countries (which are further differentiated by income status in a later section). While non-OECD G20 members stand out with regard to their size and strategic importance (for foreign investors and governments), the transition countries entered the competition for FDI only after the regime change at the beginning of the 1990s. Assessing changes in concentration within and between these subgroups can thus be expected to offer more specific insights.

Denoting the subsets of the G20 members, the transition countries and the other non-OECD countries by **G**, **T** and **R**, respectively, we can once again apply equations (2)-(4) to decompose the (absolute and relative) Theil index of concentration of FDI inflows to the non-OECD countries,  $T^N$ , into the corresponding within-group and between-group components:

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<sup>25</sup> Argentina, Brazil, China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa, and South Korea.

<sup>26</sup> Albania, Armenia, Azerbaijan, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Rep., Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

$$T^N = TW^{GTR} + TB^{GTR} = \omega_G T^G + \omega_T T^T + \omega_R T^R + TB^{GTR}, \quad (9)$$

where  $\mathbf{I}$  and  $I$  have now to be replaced by  $\mathbf{N}$  and  $N=\#N=136$  in equations (1)-(4). The results of this decomposition are displayed in Figure 5.

In the light of the UN's above noted concerns, one might suspect that overall concentration for the remaining non-OECD sample is driven mainly by the between-group components of the Theil indices. However, Figure 5 shows that this conjecture is only partially confirmed for the absolute Theil index (panel a), and is not confirmed at all for the relative Theil index (panel b).

The peak in overall absolute concentration in the first half of the 1980s as well as its increase in the most recent sub-period coincided with corresponding changes in the between-group component, i.e., (temporary) increases in the inequality of FDI inflows per country between the three country groups.<sup>27</sup> Throughout the period of observation, the between-group component of absolute concentration appears to be relatively high, reflecting the fact that (average) FDI inflows *per-country* are very much higher for the G20 countries than for two other country groups.<sup>28</sup> In marked contrast, the between-group component of the relative Theil index was close to zero throughout the observation period (panel b).

The strikingly different role of the between-group components for the absolute and relative Theil indices is mainly because the G20 members represent just 10 countries in the large sample of 136 non-OECD countries, whereas they account for almost 60 percent of the population living in all non-OECD countries. As a consequence, FDI inflows per country are very much higher for the group of G20 members than those for the other two groups, while

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<sup>27</sup> A more detailed look at the development of per-country FDI inflows for the different country groups (Table 3) reveals that the causes for the different peaks in the between-group component were quite different from each other. The strong peak in the mid-1980s was due to a strong increase in inflows to the G20 members that was accompanied by stagnating FDI inflows to the other country groups. By contrast, the increase of the between-group component in the 1990s was mainly caused by weak growth of FDI inflows to the other non-OECD countries; and its increase in the last period was mainly caused by a decrease of FDI inflows to the transition countries.

<sup>28</sup> This is particularly true since the mid-1990s when per-country inflows to the G20 have been between 18 and 23 times higher than those to other non-OECD countries, and between 8 and 15 times higher than those to the transition countries (Table 3).

FDI inflows per capita are of a similar level as those of the other groups. Most surprisingly perhaps, the large and heterogeneous group of (98) other non-OECD countries, **R**, were almost as successful as the G20 members in terms of attracting per-capita FDI inflows. And per-capita inflows to the transition countries were even substantially higher than those to the G20 member countries, arguably rebutting the fears expressed by the Monterrey Consensus (see above) at least partially.<sup>29</sup>

Importantly, the decompositions of both the absolute and the relative Theil index reveal the major role of the within-group component for declining overall concentration of FDI flows to non-OECD countries. In panel a, it can be seen that the decreasing trend of the absolute measure of overall concentration of FDI inflows across the non-OECD countries ( $T^N$ ) during most of the 1990s and 2000s was mainly due to the continuous decrease of the within-group component during that time. The development of absolute concentration within the different country groups (panel c) shows that all three subgroups contributed to this decline. For all subgroups the absolute concentration of FDI inflows decreased since the early 1980s at the latest.

While it was only in the early-2000s that the level of overall absolute concentration fell below its level observed in the 1970s, the decline in relative concentration started earlier and was fairly steep from the early 1980s to the mid-1990s (upper panels of Figure 5). The size and the development over time of the relative concentration measure across all non-OECD countries was almost identical to that of its within-group component, which in turn was largely determined by the contribution of G20 members (panels b and d). Specifically, the strong peak of overall concentration in 1982-1985 corresponds to both a strong increase in the share of G20 members in total FDI inflows and a strong peak in the relative concentration of inflows across the G20 members. And the strong decrease in relative overall concentration

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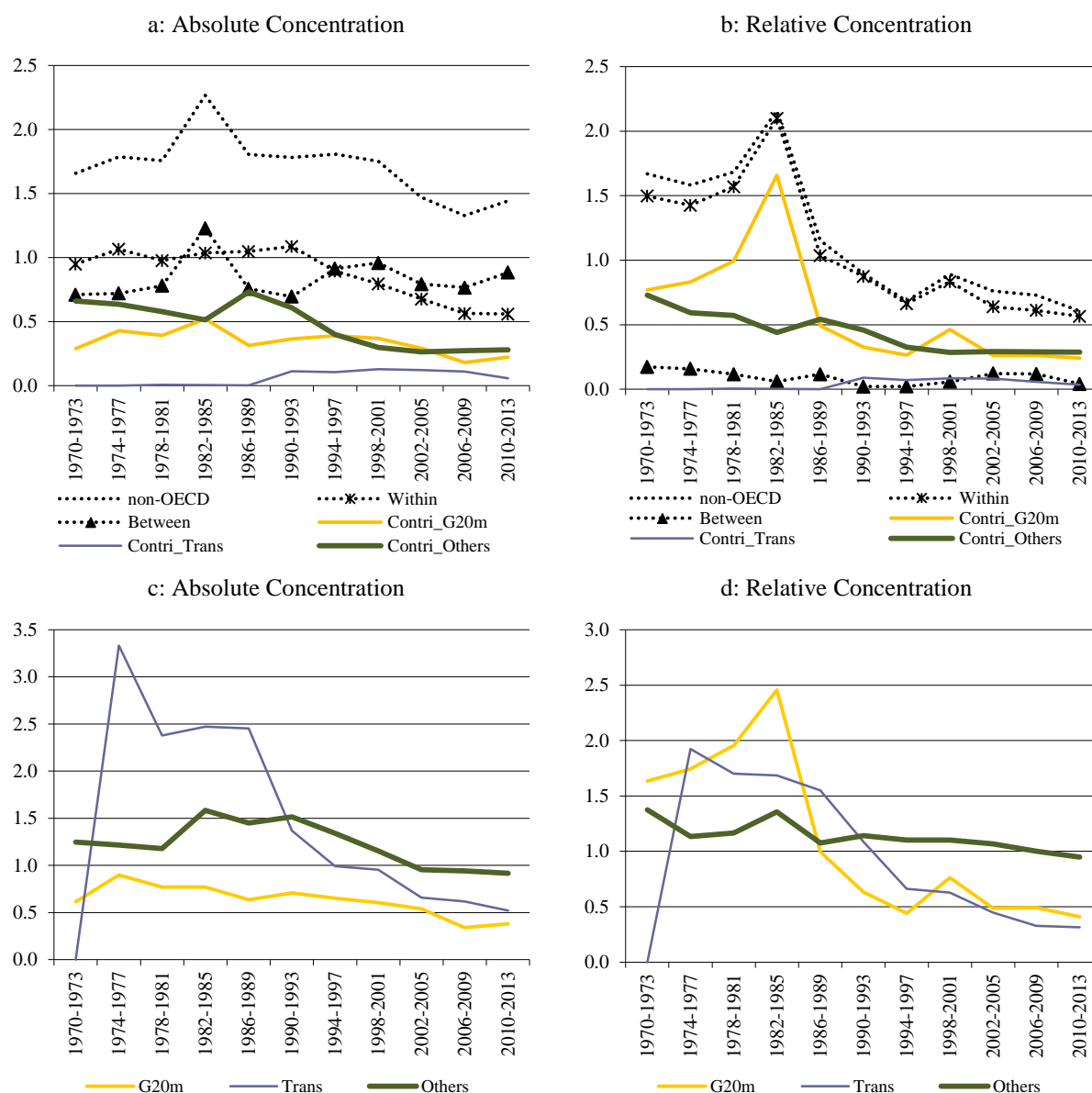
<sup>29</sup> In the last sub-period 2010-2013, the transition countries received about 1000 US\$ per capita compared to about 400 US\$ per capita for the G20 member countries and 330 US\$ for other non-OECD countries.



since the mid-1980s largely reflects the strong decrease in relative concentration across G20 members.

**Fig. 5 Concentration of FDI inflows - Non-OECD countries, decomposition between G20 member countries, Transition countries and Others**

This figure displays the development of absolute concentration (panels a and c) and relative concentration (panels b and d) of FDI inflows to non-OECD countries from 1970-1973 to 2010-2013. Panels a and b show the decomposition of non-OECD countries between G20 member countries, transition countries and other non-OECD countries. The “Between” lines depict the between-group component of concentration, and the “Within” lines the within-group component of concentration. The within-group component is the sum of the contributions of the G20 member countries (“Contri\_G20m” lines), the transition countries (“Contri\_Trans” lines) and the other non-OECD countries (“Contri\_Others” lines), i.e., the weighted average of the Theil indices of the three subgroups. The “non-OECD” lines depict overall concentration for the non-OECD countries, i.e., the sum of the between- and within-group components. Panels c and d depict the concentration across the G20 member countries (“G20m” lines), the transition countries (“Trans” lines) and the other non-OECD countries (“Others” lines).



The lower panels of Figure 5 reveal that the concentration across non-OECD countries declined, for all three subgroups and for both the absolute and relative measures, when comparing the beginning and the end of our period of observation.<sup>30</sup> Yet, there are notable differences across country groups. For the group of G20 members, concentration strongly depends on measurement: inequality across G20 members in terms of per-capita inflows (relative concentration) has been much larger (at the beginning of the observation period) and has declined much stronger than inequality in terms of per-country inflows (absolute concentration). For the transition countries, both absolute and relative concentration declined sharply, notably during the first years after the regime change in 1990.<sup>31</sup> For the other non-OECD countries, which will be analyzed in more detail in a later section, the decline in concentration was less pronounced and of similar magnitude for the absolute and relative measures.

#### *Regional analysis: non-OECD Asia matters as a heavyweight*

In this section, we complement the analysis of the previous section by looking at the concentration of FDI inflows to non-OECD countries across and within four geographical regions: the non-OECD countries of South and East Asia and the Pacific (SEAP), Latin America and the Caribbean (LAC), the Middle East and Northern Africa (MENA) and Sub-Saharan Africa (SSA).<sup>32</sup>

Denoting the set of non-OECD countries excluding the countries of Eastern Europe and Central Asia (EECA) by  $\mathbf{N}\backslash\mathbf{C}$  and the other regional subsets by  $\mathbf{E}$ ,  $\mathbf{A}$ ,  $\mathbf{M}$  and  $\mathbf{S}$ ,

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<sup>30</sup> This neglects the zero concentration for transition countries in the first sub-period which is economically meaningless, however, since there were no FDI inflows to any country in this group at that time.

<sup>31</sup> Because of the low but increasing weight,  $\omega_T$ , of transition countries during most of the observation period, the strong decline in concentration across transition countries had little effect on their contribution to the within-group component, however.

<sup>32</sup> We exclude non-OECD countries of Eastern and Central Asia (EECA) since this group largely resembles the group of transition countries already analyzed in the previous sub-section (plus Russia).

respectively, we can once again apply equations (2)-(4) to decompose the (absolute and relative) Theil index of concentration of FDI inflows,  $T^{N\backslash C}$ , into the corresponding within-group and between-group components:

$$T^{N\backslash C} = TW^{EAMS} + TB^{EAMS} = \omega_E T^E + \omega_A T^A + \omega_M T^M + \omega_S T^S + TB^{EAMS}, \quad (10)$$

where  $I$  and  $I=\#I$  have now to be replaced by  $N\backslash C$  and  $\#(N\backslash C)=107$  in equations (1)-(4).

The results of this decomposition are displayed in Figure 6. The development of the overall relative concentration of FDI inflows to the non-OECD countries excluding the countries of EECA in panel b of Figure 6 is very similar to that in Figure 5 with EECA included. For the absolute concentration, by contrast, excluding EECA countries has a substantial effect on the development of concentration at least for the 1990s. The absolute concentration of FDI inflows across non-OECD countries remained largely constant during the 1990s when including EECA (Figure 5, panel a) but increased during that period when excluding them (Figure 6, panel a).<sup>33</sup> As a consequence the absolute concentration of FDI inflows to non-OECD countries excluding EECA was actually slightly higher at the end of our observation period than at its beginning (Figure 6, panel a).<sup>34</sup>

Looking at the individual components of the absolute and relative concentration of FDI inflows across the non-OECD countries for the four regions, we find that both the within-group and the between-group component contributed to the general trends of an initially increasing and subsequently decreasing overall concentration (Figure 6 panels a, b).<sup>35</sup> For the *absolute* measures both the within-group and the between-group component tended to

<sup>33</sup> FDI inflows to the transition countries of EECA increased from essentially zero before the start of the transition (i.e., up to 1986-1989) to about 15 percent of all FDI inflows to non-OECD (non-OFC) countries in period 1998-2001.

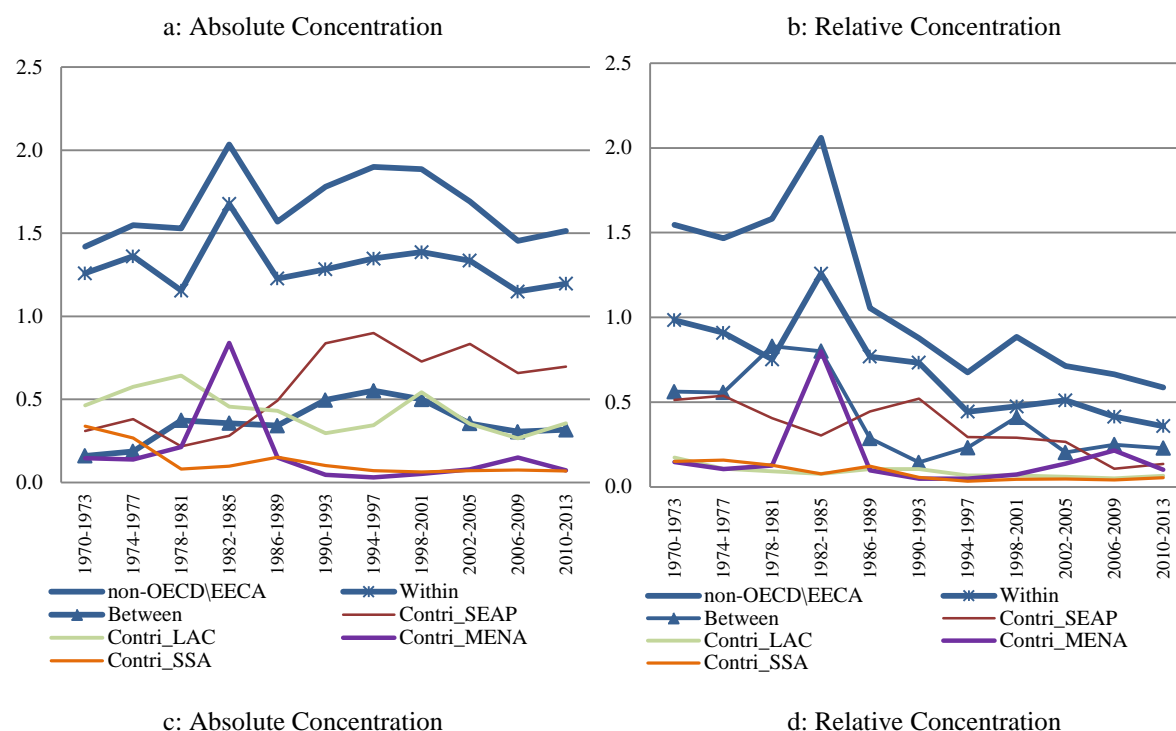
<sup>34</sup> The main reason for why the exclusion of the EECA countries has a much larger effect on the absolute than on the relative concentration measure is the fact that the weight of the EECA countries is much higher for the first than for the second measure. Together the EECA countries account for about 21% of all non-OECD countries but for only about 6.9% of the non-OECD countries' aggregate population.

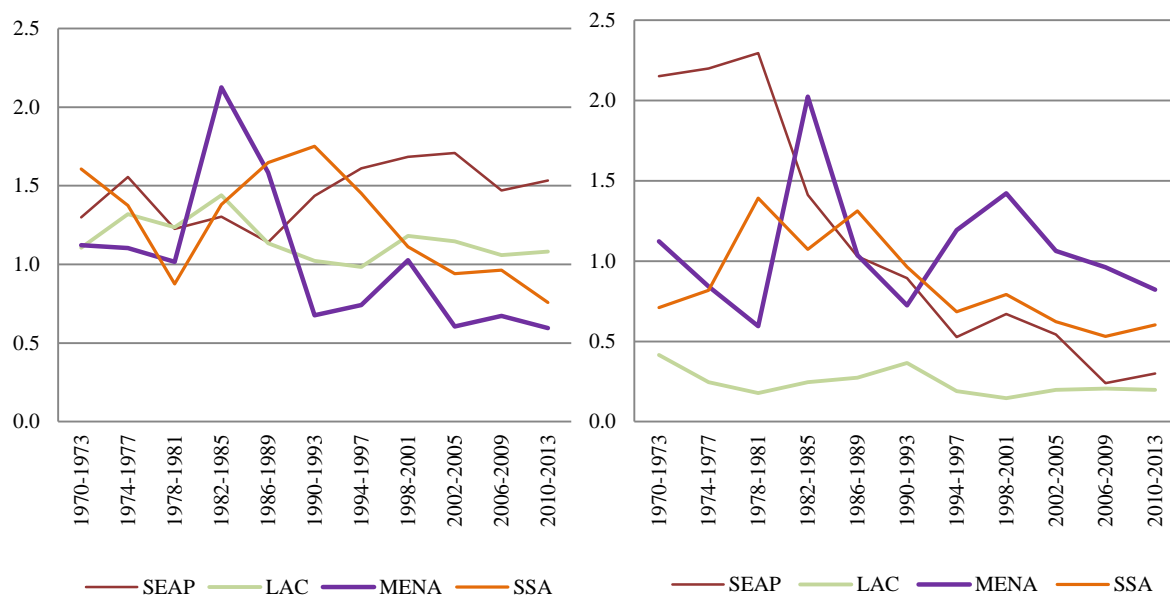
<sup>35</sup> The strong peak in (absolute and relative) FDI concentration observed for the 1982-1985 period resulted from a corresponding peak in the within-group component of concentration only. More specifically it resulted from a strong temporary increase in the contribution of the MENA region to the within-group component, which was due in turn to both a strong temporary increase in the concentration of FDI inflows across the MENA countries (Figure 6 panel d) as well as a strong increase in the share of FDI inflows going to the MENA countries.

increase between the beginning of the observation period and the mid-/end-1990s (though the increase was much stronger for the between-group component) and both components tended to decline thereafter. For the *relative* measure both components increased between the beginning of the 1970s and the mid-1980s and strongly declined thereafter. For both components the decline was strongest for the second half of the 1980s and the first half of the 1990s.

**Fig. 6 Concentration of FDI inflows - Non-OECD countries excluding transition countries and Russia, decomposition between four regions**

This figure displays the development of absolute concentration (panels a and c) and relative concentration (panels b and d) of FDI inflows to non-OECD countries of four regions from 1970-1973 to 2010-2013. Panels a and b show the decomposition of non-OECD countries between countries from the four regions. The “Between” lines depict the between-group component of concentration, and the “Within” lines the within-group component of concentration. The within-group component is the sum of the contributions of the countries from South and East Asia and the Pacific (“Contri\_SEAP” lines), Latin America and the Caribbean (“Contri\_LAC” lines), the Middle East and Northern Africa (“Contri\_MENA” lines) and Sub-Saharan Africa (“Contri\_SSA” lines), i.e., the weighted average of the Theil indices of the four subgroups. The “non-OECD\EECA” lines depict overall concentration for the non-OECD countries of the four regions, i.e., the sum of the between- and within-group components. Panels c and d depict the concentration across the countries of South and East Asia and the Pacific (“SEAP” lines), of Latin America and the Caribbean (“LAC” lines), of the Middle East and Northern Africa (“MENA” lines) and of Sub-Saharan Africa (“SSA” lines).





The stark difference in the development of the between-group component of the absolute and the relative measure during the second half of the 1980s and early 1990s was mainly a consequence of the strong increase of the share of FDI inflows going to the South and East Asia & Pacific (SEAP) region and the very high population (share) of the region.<sup>36</sup> The region contains only 24 of the 107 countries of the four regions but accounted for about 70% of the total population of the four regions in the early 1990s. Consequently, the strong increase in the share of FDI inflows to the region increased FDI per country in the region above that in the other three regions thus increasing the absolute between-group component. In contrast, FDI per capita remained below the corresponding levels in each of the other regions except Sub-Saharan Africa (see Table 3) thus decreasing the relative between component.

Looking at the concentration within the four regions and their contributions to overall concentration, we find that overall concentration was most strongly affected by the contribution of SEAP. For the absolute measure, the contribution of the SEAP countries to the within-group component (and thus to overall concentration) strongly increased between the

<sup>36</sup> The share of FDI inflows to the SEAP region in total FDI inflows to the four regions increased from around 20% during the 1970s and the first half of the 1980s to about 43% in the late 1980s and about 58% in the early 1990s, before it decreased to about 45% at the end of the observation period (see Table 3).

early 1980s and the mid-1990s, whereas it tended to decrease (moderately) both before and after that period (panel a). For the relative measure, the strong increase in the region's contribution was restricted to the period between the mid-1980s and the early 1990s. Before and after that period the region's contribution to the within-group component of the relative measure decreased very strongly (panel b). The temporary increase in the region's contribution to the relative measure resulted exclusively from a very strong increase in the region's share in overall FDI inflows;<sup>37</sup> relative concentration across the SEAP countries strongly decreased during that period (panel d). This is in strong contrast to the *absolute* concentration across the SEAP countries which increased throughout the 1990s and the first half of the 2000s (panel c). The strong difference between the development of absolute and relative concentration across SEAP countries is a consequence of the very large differences in the population sizes of the region's countries.<sup>38</sup>

For the three other country groups, both the absolute and the relative concentration of FDI inflows across the countries of the group have been lower at the end of the observation period than at its beginning (panel c and d). Still, the development of concentration over time has been quite different for the different country groups. The development of concentration across the countries of the MENA group has been quite volatile, with two temporary peaks in the first half of the 1980s (1982-1985) and at the turn of the century (1998-2001).

In contrast, the concentration of FDI inflows to the countries of Latin America and the Caribbean changed relatively little over time (panel c and d). While both absolute and relative concentration across the countries of the group have been (slightly) lower at the end of the observation period than at its beginning, there have been both periods of increasing as well as periods of decreasing concentration. Throughout the observation period *relative* concentration

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<sup>37</sup> See previous footnote.

<sup>38</sup> FDI inflows to China, for example, may be high compared to the inflows to other countries in absolute terms, but still be comparatively low in per capita terms. An increase in the relative share of FDI inflows to China may thus increase absolute concentration but decrease relative concentration across SEAP countries.

within the group has been rather low and generally much lower than that of the other regional country groups.

For the countries of Sub-Saharan Africa (SSA) the absolute and relative concentration of FDI inflows tended to increase until the early 1990s and late 1980s, respectively, but strongly decreased thereafter. Due to the relatively low share of FDI inflows to that country group this decline had hardly any effect on the contribution of the SSA group to the within component of the overall Theil index, however.<sup>39</sup> Between sub-period 1998-2001 and the end of the observation period, FDI inflows to SSA increased faster than FDI inflows to almost any other group of countries analyzed so far.<sup>40</sup> As many of the countries of SSA belong to the poorest countries in the world this suggests that often raised concerns that the poorest countries may be excluded from the increase in FDI may not be founded at least for the more recent past. This issue is further investigated in the next sub-section.

#### *Low-income countries: finally converging?*

In this section, we focus on the widespread concern that mainly poor countries could be at the losing end of the worldwide competition for FDI inflows (e.g., United Nations 2003). To do so we further reduce the set of countries by also excluding the (nine remaining) G20 members from our sample, thus restricting our further analysis to the group of the 98 non-OECD countries, **R**, that are neither transition nor G20 member countries. Within that group we now distinguish low- and higher-income countries, and calculate the between- and within-group components of the (absolute and relative) Theil index in line with the general equations

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<sup>39</sup> Despite the decrease in concentration, the contribution of SSA to the within component actually slightly increased after the late 1990s (relative concentration) or the turn of the century (absolute concentration). This is due to the fact that the share of FDI inflows that went to the SSA region (strongly) increased from about 5 percent in 1994-1997 to more than 9 percent in the last sub-period (2010-2013).

More generally, due to large changes in the shares of the different regions in total FDI inflows (which serve as weights in adding up within group concentrations to the within-group component) the trends in the absolute and relative *concentration* of FDI inflows within the different regional groups are only partly reflected in the country-groups *contributions* to the within-group component of concentration.

<sup>40</sup> Only FDI inflows to the MENA group of countries increased even faster during that period (see Table 3).

above. With  $\mathbf{L}$  representing the low-income group and  $\mathbf{H}$  representing the higher-income group<sup>41</sup> we thus get:

$$\mathbf{T}^{\mathbf{R}} = \mathbf{T}\mathbf{W}^{\mathbf{LH}} + \mathbf{T}\mathbf{B}^{\mathbf{LH}} = \omega_{\mathbf{L}}\mathbf{T}^{\mathbf{L}} + \omega_{\mathbf{H}}\mathbf{T}^{\mathbf{H}} + \mathbf{T}\mathbf{B}^{\mathbf{LH}}, \quad (11)$$

where  $\mathbf{I}$  and  $I$  have now to be replaced by  $\mathbf{R}$  and  $R = \#\mathbf{R} = 98$ .

From Figure 7 it can be seen again that both the absolute and the relative concentration across the 98 other non-OECD countries decreased over time. For both measures the development of overall concentration was largely determined by the development of the within-group component,  $\mathbf{T}\mathbf{W}^{\mathbf{LH}}$ , which, in turn, closely resembles the development of concentration across the higher-income countries,  $\mathbf{T}^{\mathbf{H}}$ .<sup>42</sup> However, in line with the main subject of this sub-section, the following analysis focuses on the development over time of the differences in FDI inflows between low- and higher-income countries summarized by the between-group component,  $\mathbf{T}\mathbf{B}^{\mathbf{LH}}$ , and of the concentration of FDI inflows across the low-income countries,  $\mathbf{T}^{\mathbf{L}}$ .

The upper panels of Figure 7 indicate that the level of the between-group component is higher for the relative than for the absolute measure: the gap in FDI inflows between the higher-income countries and the low-income countries is larger for per-capita inflows than for per-country inflows, which simply reflects the fact that the population of low-income countries is larger on average than that of the higher-income countries. More importantly, the development over time of the absolute and the relative between-group components resemble each other quite closely. For both measures, we observe three distinct sub-periods: the between-group components and thus the gap between FDI inflows to the higher-income countries and those to the low-income countries (i) increased during the 1970s, (ii) changed

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<sup>41</sup> More precisely, group  $\mathbf{L}$  comprises 46 countries with low per-capita income according to the World Bank's income classification for the year 2005 (or the closest year for which data are available). Group  $\mathbf{H}$  comprises 52 countries which the World Bank classifies as lower-middle, upper-middle and high income countries. 1.4 billion people were living in  $\mathbf{L}$  countries at the end of our period of observation, while 840 million people were living in  $\mathbf{H}$  countries.

<sup>42</sup> The decline in overall absolute concentration in the 1970s was exclusively due to decreasing concentration across low-income countries, however.

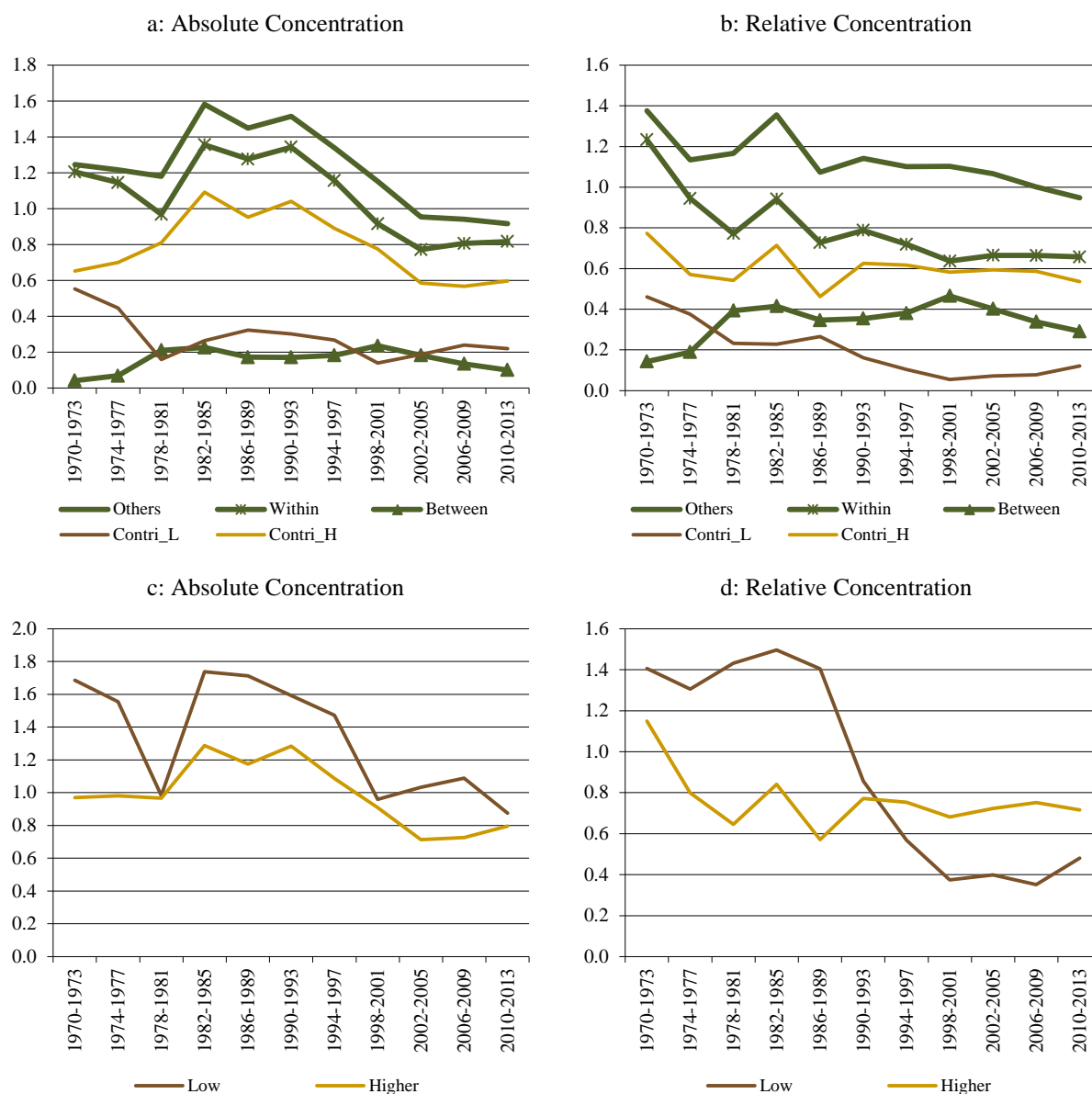


only little during the 1980s and 1990s, and (iii) declined in the new millennium. Concerns that the low-income countries could be at the losing end of the increased competition for FDI inflows might be justified by the fact that the between-group component was still higher in the last sub-period (2010-2013) than in the first sub-period (1970-1973). When considering the more recent past, however, FDI inflows to the low-income countries did not only grow faster (both per-country and per-capita) than those to the higher-income countries (as reflected in the decline of the between-group components in Figure 6); they even grew much faster than the inflows to any other country group analyzed in this paper with the only exception of the MENA countries (see last row of Table 3).

It thus seems that the low-income countries may finally have started to catch up to the other countries in terms of FDI inflows. Moreover, the lower panels of Figure 7 suggest that this recent development involved more than just a few low-income countries. In the longer run, both absolute and relative concentration strongly decreased across the 46 low-income countries (in particular since the mid-1980s). Focusing on the recent past when FDI inflows to the low-income countries have grown faster than those to the other country groups, absolute concentration slightly decreased, whereas relative concentration slightly increased (in the last sub-period). In other words, the recent catch-up of the low-income countries has not been accompanied by an increase, at least not by a strong increase, in the inequality of FDI inflows across the low-income countries. It seems that the catch-up process has not been limited to a few low-income countries only.

**Fig. 7 Concentration of FDI inflows - Other non-OECD countries, decomposition between low-income countries and higher-income countries**

This figure displays the development of absolute concentration (panels a and c) and relative concentration (panels b and d) of FDI inflows to other non-OECD countries, excluding G20 members and transition countries, from 1970-1973 to 2010-2013. Panels a and b show the decomposition of other non-OECD countries between low-income countries and higher-income countries. The “Between” lines depict the between-group component of concentration, and the “Within” lines the within-group component of concentration. The within-group component is the sum of the contributions of the low-income subgroup (“Contri\_L” lines) and the higher-income subgroup (“Contri\_H” lines), i.e., the weighted average of the Theil indices of the two subgroups. The “Others” lines depict overall concentration for other non-OECD countries, i.e., the sum of the between- and within-group components. Panels c and d depict the concentration across the countries of the low-income subgroup (“Low” lines) and across those of the higher-income subgroup (“Higher” lines)



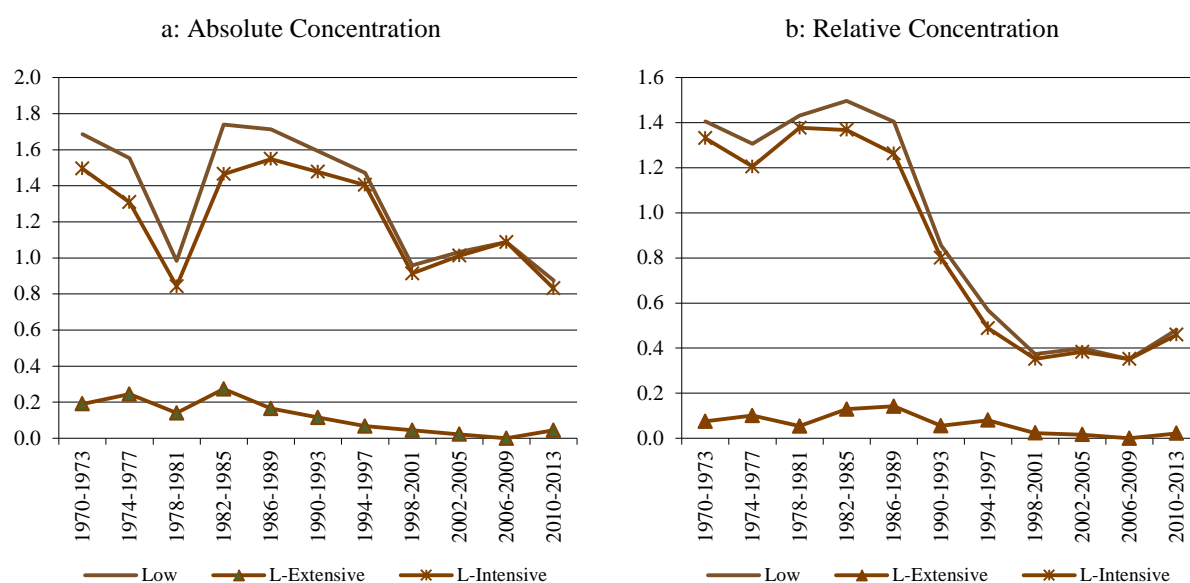
This last point is corroborated when decomposing the (absolute and relative) concentration of FDI inflows across the 46 low-income countries,  $T^L$ , into its “intensive margin” and its “extensive margin” of concentration (Figure 8).<sup>43</sup> For both the absolute and the relative measure, the extensive margin of concentration has been decreasing since the mid-1980s and has been very low in the recent past. This implies that the number of countries

<sup>43</sup> This decomposition resembles the procedure described for the overall sample at the beginning of this section (equations (5) to (7)). For the sake of brevity, we provide only a summary of results here.

that received zero FDI inflows (in a given four-year period) as well as their share in total FDI have been very small in recent years.<sup>44</sup>

**Fig. 8 Concentration of FDI inflows across low-income countries**

This figure displays the development of absolute concentration (panel a) and relative concentration (panel b) of FDI inflows to low-income countries from 1970-1973 to 2010-2013. The “L-Extensive” lines depict the extensive margin of concentration, the “L-Intensive” lines the intensive margin of concentration, and the “Low” lines the sum of the intensive and extensive margins of concentration.



Finally, we show the results from a complementary regression analysis in Table 2 – with FDI in absolute terms ( $\ln FDI$ ) as the dependent variable in the upper panel, and FDI in per-capita terms ( $\ln FDI_{pc}$ ) in the lower panel. Following the approach introduced before and described in more detail in Appendix A2, we compare the impact of the set of standard FDI determinants on FDI flows to low-income countries and FDI flows to higher-income countries. Here, we interact these variables with a dummy variable set to one for low-income countries.

The basic results in column (1), before including the interaction terms, underscore our previous regression results for all non-OECD countries in Table 1. Again, the standard

<sup>44</sup> In the second last sub-period (2006-09) all countries received strictly positive FDI inflows, and in the last sub-period only two out of 46 low-income countries representing slightly more than 2% of the low-income country group's total population received zero FDI inflows.

determinants of horizontal or market-oriented FDI (*lnGDP* and *Growth*) prove to be significantly positive, and the standard determinants of vertical or cost-oriented FDI prove to be significantly negative for *lnGDPpc* and positive for openness to trade (*Open*). Strikingly, almost all interaction terms included in the extended specifications shown in columns (2)-(4) of Table 2 do not reach statistical significance at conventional levels.<sup>45</sup> In other words, we find the impact of the determinants under consideration to be essentially the same when distinguishing FDI flows to low-income countries and FDI flows to higher-income countries. Importantly, this does not contradict the view that low-income countries may have started to catch up with the more attractive higher-income countries. Actually, given the regression results, we would expect such a catch-up in terms of FDI inflows, if low-income countries achieved higher growth of local markets and per-capita incomes.

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<sup>45</sup> The interaction with *Infl* provides an exception, suggesting that higher inflation discourages FDI in low-income countries.

**Table 2 Regression results on FDI determinants: Comparing low-income with higher-income countries among other non-OECD countries**

This table reports fixed-effects regression results on the impact of standard FDI determinants on FDI flows to low-income host countries, **L**, compared to higher-income host countries, **H**. The coefficients on the interactions of the FDI determinants with the dummy variable *DumL*, set to one for low-income countries, reveals whether FDI determinants have a stronger impact on FDI flows to low-income countries. This is typically not the case in the fully specified model. Country fixed effects, time dummies and standards errors are not shown for the sake of brevity. \*\*\*, \*\*, \* if significant at the one, five, and ten percent level, respectively.

Variables:	(1)	(2)	(3)	(4)
	Dependent variable: FDI in million US\$, <i>lnFDI</i>			
<i>ln GDP</i>	3.979***	4.171***	-0.393	-0.393
<i>Growth</i>	0.074***	0.098***	0.069**	0.069
<i>ln GDPpc</i>	-3.035***	-3.259***	0.272	0.272
<i>Open</i>	0.011***	0.009*	0.008	0.008
<i>NatRes</i>	-0.028*	-0.028	-0.018	-0.018
<i>Infl</i>	0.000	0.000	0.000	0.000
<i>Polcon</i>	0.037	0.044	-0.007	-0.007
<i>BITs</i>	0.029***	0.028**	0.013	0.013
<i>DumL *ln GDP</i>		-0.150	0.333	0.333
<i>DumL *Growth</i>		-0.062	-0.031	-0.031
<i>DumL *ln GDPpc</i>		0.313	0.488	0.488
<i>DumL *Open</i>		0.005	0.002	0.002
<i>DumL *NatRes</i>		0.002	-0.009	-0.009
<i>DumL *Infl</i>		-0.003	-0.005	-0.005*
<i>DumL *Polcon</i>		-0.027	-0.044	-0.044
<i>DumL *BITs</i>		-0.012	-0.017	-0.017
Constant	-10.772***	-11.197***	2.143	2.143
Time dummies	No	No	Yes	Yes
R <sup>2</sup> within	0.503	0.505	0.563	0.563
R <sup>2</sup>	0.750	0.752	0.781	0.781
F	59.92***	29.76***	23.57***	38.44***
#obs	564	564	564	564
#group	82	82	82	82
robust SE	No	No	No	Yes
	Dependent variable: FDI per capita in thousand US\$, <i>lnFDIpc</i>			
<i>ln GDP</i>	2.987***	3.177***	-1.365	-1.365
<i>Growth</i>	0.074***	0.097***	0.068**	0.068
<i>ln GDPpc</i>	-2.044***	-2.253***	1.262	1.262
<i>Open</i>	0.011***	0.009*	0.008	0.008
<i>NatRes</i>	-0.028*	-0.028	-0.018	-0.018
<i>Infl</i>	0.000	0.000	0.000	0.000
<i>Polcon</i>	0.036	0.044	-0.008	-0.008
<i>BITs</i>	0.029**	0.028**	0.013	0.013
<i>DumL *ln GDP</i>		-0.149	0.335	0.335
<i>DumL *Growth</i>		-0.062	-0.031	-0.031
<i>DumL *ln GDPpc</i>		0.280	0.454	0.454
<i>DumL *Open</i>		0.005	0.002	0.002
<i>DumL *NatRes</i>		0.003	-0.009	-0.009
<i>DumL *Infl</i>		-0.003	-0.005	-0.005*
<i>DumL *Polcon</i>		-0.028	-0.045	-0.045
<i>DumL *BITs</i>		-0.011	-0.016	-0.016
Constant	-17.723***	-18.152***	-4.881	-4.881
Time dummies	No	No	Yes	Yes
R <sup>2</sup> within	0.415	0.418	0.486	0.486
R <sup>2</sup>	0.690	0.692	0.728	0.728
F	41.99***	20.9***	17.25***	27.34***
#obs	564	564	564	564
#group	82	82	82	82
robust SE	No	No	No	Yes

Altogether the evidence in this sub-section suggests that concerns about the low-income countries being at the losing end of worldwide competition for FDI may have been justified for the 1970s and possibly for the 1980s and 1990s but probably no longer for the more recent past. Since the turn of the millennium, the growth in FDI inflows to the low-income countries has been much higher both per-country and per-capita than that to the overall sample or to almost all other country groups. In addition, there was no polarization within the group of low-income countries during that period. It remains to be seen, however, whether this positive development will continue into the future.

#### **4. Conclusion**

This paper addressed the question of whether the intensified worldwide competition for FDI has reduced its traditionally strong concentration in a few large and relatively advanced host countries. We calculated and decomposed Theil indices to track changes in concentration of FDI during the period 1970-2013. We calculated absolute Theil indices where all countries are treated symmetrically, irrespective of their size, as well as population-weighted relative Theil indices. Starting with a large overall sample of 196 host countries, we subsequently considered distinct sub-samples by (i) excluding offshore financial centers (OFCs), (ii) distinguishing OECD and non-OECD countries, (iii) differentiating between subgroups and regions of non-OECD countries, and (iv) focusing on low-income countries.

The extensive margin of concentration across the overall sample proved to be very low since the early 1990s, implying that very few countries did not receive any FDI inflows. Once OFCs are excluded from the sample, both the absolute and relative measures of concentration clearly decreased in the recent past and were substantially lower at the end of the observation period than at its beginning. A large part of the decline in overall concentration has been due to the narrowing gap between OECD and non-OECD countries (in terms of FDI inflows per-country and per-capita). It may prove premature, however, to conclude that non-OECD

countries will be able to further close the traditional gap in attractiveness to FDI. In the past, the observed ‘convergence from the top’ was at least as much the result of temporary external shocks affecting primarily OECD countries, such as the financial meltdown in 2008, as it was the result of strong and sustained growth of FDI to non-OECD countries.

Focusing on three subgroups of non-OECD countries, the transition countries, the non-OECD members of the G20 and the other non-OECD countries, we find that the between-group component of the relative Theil index was close to zero throughout the period of observation. Strikingly, non-OECD G20 members proved to be less attractive in terms of per-capita inflows of FDI than the subgroup of transition countries, and hardly more attractive than the large and heterogeneous subgroup of other non-OECD countries. The absolute and relative measures of concentration both reveal the important role of the within-group component for the declining overall concentration of FDI in non-OECD countries. The concentration across non-OECD countries declined for all three subgroups when comparing the beginning and the end of the observation period.

Decomposing the concentration of FDI inflows across non-OECD countries by regions reveals that relative concentration has decreased both between the four regions considered as aggregates as well as across the countries of each of the regions. By contrast, absolute concentration between the four regions as well as across the countries of the South and East Asia and the Pacific (SEAP) region have increased over the observation period. The reason for the opposing trends lies in the very large population share of the SEAP region as a whole and of individual countries such as China and India in particular. Above average absolute FDI inflows to these countries are still low in per capita terms.

Finally, recent developments indicate that low-income countries are no longer at the losing end of the competition for FDI inflows. Rather, this group may finally have started to catch up to more advanced host countries in terms of attractiveness. Importantly, the strong growth of FDI inflows to the low-income countries after the turn of the millennium has not

been accompanied by considerably higher inequality of FDI inflows across the low-income countries. Concerns that just a few of them have benefited from recent trends thus appear to be unjustified. If sustained, these trends might reduce fears, as expressed in the Monterrey Consensus of 2002, that globalized FDI hardly involves poor host countries.

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## Appendix A1: FDI inflows for different country groups

**Table 3 Total FDI inflows (in billion US\$) and FDI inflows per capita (in US\$) for different country groups**

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
country group	All <b>I</b>		OFC <b>F</b>		OECD <b>O</b>		Non-OECD <b>N</b>		G20 members <b>G</b>		Transition <b>T</b>		Other <b>R</b>	
# countries	196		37		23		136		10		28		98	
	FDI		FDI		FDI		FDI		FDI		FDI		FDI	
	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.
1: 1970-1973	64.20	16.92	2.73	161.48	46.82	62.29	14.65	4.84	6.89	3.60	0.00	0.00	7.76	8.72
2: 1974-1977	102.33	24.97	3.95	217.18	73.95	95.06	24.44	7.40	11.66	5.59	0.01	0.05	12.77	12.98
3: 1978-1981	204.31	46.44	10.16	517.83	150.81	188.27	43.35	12.11	22.01	9.81	0.12	0.49	21.22	19.45
4: 1982-1985	223.85	47.39	11.39	540.58	145.42	176.57	67.04	17.28	45.22	18.73	0.10	0.39	21.72	17.92
5: 1986-1989	591.29	116.41	28.87	1285.54	487.15	575.62	75.27	17.88	37.17	14.27	0.07	0.27	38.03	28.27
6: 1990-1993	754.30	138.70	38.62	1605.81	531.96	611.17	183.73	40.43	94.78	33.95	15.14	56.89	73.80	49.68
7: 1994-1997	1480.90	256.77	106.56	4099.82	842.37	940.52	531.97	109.78	316.88	107.39	56.99	214.18	158.10	97.06
8: 1998-2001	4063.12	668.67	272.43	9715.31	3006.74	3267.32	783.95	152.87	475.68	154.00	105.46	398.81	202.81	114.26
9: 2002-2005	2967.69	464.93	219.88	7286.25	1739.81	1837.88	1008.01	186.45	545.03	169.27	185.73	705.02	277.24	144.18
10: 2006-2009	6529.79	974.82	643.53	19942.03	3735.07	3835.84	2151.19	377.90	1146.42	342.37	382.51	1445.79	622.25	299.24
11: 2010-2013	5923.69	843.70	952.17	27651.17	2550.72	2554.51	2420.81	404.27	1417.41	407.56	266.76	994.74	736.63	328.53
Sum 1970-2013	229055	3599.7	2290.3	73023	13310.8	14145.15	7304.4	1331.2	4119.2	1266.5	1012.9	3816.6	2172.3	1120.3
Growth in %														
period 1 to 11:	9127	4887	34758	17023	5348	4001	16424	8251	20459	11208	n.a.	n.a.	9397	3666
period 6 to 11	685	508	2366	1622	379	318	1218	900	1395	1101	1661	1648	898	561
period 8 to 11 :	46	26	250	185	-15	-22	209	165	198	165	153	149	263	188

Note: Total = total FDI inflows in billion US\$; p.c. = FDI inflows per capita in US\$.

**I = FOCN; N = GUTOR; NC = EACMS; R = LOH**

**Table 3 Total FDI inflows (in billion US\$) and FDI inflows per capita (in US\$) for different country groups (continued)**

	(8)		(9)		(10)		(11)		(12)		(13)		(14)	
country group	Non-OECD excl. Eastern Europe and Central Asia <b>N\C</b>		South and East Asia and Pacific <b>E</b>		Latin America and Caribbean <b>A</b>		Middle East and North Africa <b>M</b>		Sub-Saharan Africa <b>S</b>		Low-income <b>L</b>		Higher-income <b>H</b>	
# countries	107		24		21		18		44		46		52	
	FDI		FDI		FDI		FDI		FDI		FDI		FDI	
	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.	Total	p.c.
1: 1970-1973	14.65	5.49	3.49	1.80	6.15	21.87	1.91	13.25	3.10	10.22	2.54	4.82	5.22	14.39
2: 1974-1977	24.43	8.33	5.97	2.81	10.66	34.35	3.06	19.00	4.74	14.04	3.67	6.30	9.10	22.65
3: 1978-1981	43.23	13.52	7.64	3.33	22.49	65.99	9.10	50.05	4.00	10.61	3.43	5.32	17.78	39.93
4: 1982-1985	66.94	19.21	14.40	5.80	21.27	57.21	26.46	127.85	4.80	11.35	3.31	4.60	18.41	37.31
5: 1986-1989	75.20	19.77	32.48	12.06	28.63	71.00	7.10	30.32	6.98	14.75	7.20	8.99	30.84	56.58
6: 1990-1993	166.19	40.25	96.96	33.38	48.31	111.06	11.19	43.10	9.74	18.39	13.99	15.70	59.81	100.61
7: 1994-1997	464.78	104.88	259.83	84.03	163.18	349.61	18.75	66.45	23.02	38.98	28.66	29.00	129.44	202.05
8: 1998-2001	666.96	141.40	287.97	88.36	306.62	616.05	34.06	111.81	38.31	58.44	29.57	27.21	173.24	251.73
9: 2002-2005	779.91	156.03	380.49	111.38	239.54	454.98	101.27	308.41	58.60	80.53	50.09	42.18	227.15	308.85
10: 2006-2009	1563.84	295.86	701.61	196.67	392.39	709.17	348.14	977.09	121.71	150.49	136.46	105.49	485.80	618.22
11: 2010-2013	1925.94	345.34	875.64	235.54	635.26	1095.95	239.14	619.68	175.90	196.81	185.02	131.80	551.61	657.95
Sum 1970-2013	5792.06	1150.06	2666.50	775.15	1874.49	3587.25	800.17	2367.00	450.90	604.62	463.9	381.4	1708.4	2310.3
Growth in %														
period 1 to 11:	13046	6195	24979	13003	10225	4910	12415	4576	5582	1825	7193	2634	10469	4473
period 6 to 11	1059	758	803	606	1215	887	2038	1338	1706	970	1223	740	822	554
period 8 to 11 :	189	144	204	167	107	78	602	454	359	237	526	384	218	161

Note: Total = total FDI inflows in billion US\$; p.c. = FDI inflows per capita in US\$.

**I = F** **U** **O** **N**; **N = G** **U** **T** **U** **R**; **N\C = E** **U** **A** **U** **M** **U** **S**; **R = L** **U** **H**

## Appendix A2: Regression analysis on FDI determinants

We assess whether factors that are widely considered to be major determinants of FDI flows can explain the changes of FDI concentration revealed by the decomposition of Theil indices. In particular, we attempt to explain the ‘convergence from the top’ observed for OECD versus non-OECD countries by the following multivariate regression analysis:<sup>46</sup>

$$(1a) \ln FDI_{jt} = \alpha_1 + \alpha_2 X_{jt} + \mu_j + \varepsilon_{jt}$$

$$(1b) \ln FDI_{jt} = \alpha_1 + \alpha_2 X_{jt} + \alpha_3 (DumN_j * X_{jt}) + \mu_j + \varepsilon_{jt}$$

$$(2a) \ln FDIpc_{jt} = \beta_1 + \beta_2 X_{jt} + \mu_j + \varepsilon_{jt}$$

$$(2b) \ln FDIpc_{jt} = \beta_1 + \beta_2 X_{jt} + \beta_3 (DumN_j * X_{jt}) + \mu_j + \varepsilon_{jt}$$

The dependent FDI variable is defined in million US\$ or, alternatively, in US\$ per capita of the host country’s population, which corresponds to our measures of absolute and relative FDI concentration.<sup>47</sup> The vector  $X$  consists of the following variables: The host country’s GDP in millions of US\$ in constant prices of 2010 ( $GDP$ ) and the growth in GDP ( $Growth$ ) reflect the size and growth of host-country markets which are widely supposed to drive market-oriented or horizontal FDI. Host countries with relatively low per-capita incomes ( $GDPpc$ ) may attract cost-oriented or vertical FDI. Vertical FDI is also expected to depend on the host country’s openness to trade (i.e., the ratio of exports plus imports over GDP,  $Open$ ). The depletion of natural resources (in % of the host country’s GDP,  $NatRes$ ) captures the host country’s attractiveness to resource-oriented FDI. We include the inflation rate ( $Infl$ ) as an indicator of macroeconomic instability and the degree of political constraints on the executive ( $Polcon$ ) to account for the potentially adverse effects of political discretion

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<sup>46</sup> The same approach is followed in the final step of our empirical analysis when distinguishing between low-income countries, **L**, and higher-income countries, **H**, among all other non-OECD countries, **R**.

<sup>47</sup> To avoid the problem with zero FDI values, one is added to the original FDI values before calculating FDI per capita and before taking the log of the two FDI variables.

on FDI.<sup>48</sup> Moreover, we account for the accumulated number of bilateral investment treaties (*BITs*) ratified by the host country since *BITs* may help attract FDI inflows. In addition to these FDI determinants, the basic specification in equations (1a) and (2a) accounts for country fixed effects  $\mu$ ;  $\varepsilon$  represents the error term.

In extended specifications of the basic model (equations 1b and 2b), *DumN* is a dummy variable set to one for all non-OECD host countries.<sup>49</sup> It is interacted with each variable included in  $X$  to assess whether its impact differs between OECD and non-OECD host countries. We also include time dummies, in addition to country fixed effects  $\mu$ , in further extensions of the basic model.

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<sup>48</sup> *GDP*, *GDPpc*, *Open*, *Polcon* and *BITs* are observed in the initial year of each 4-year sub-period since 1970; *Growth*, *NatRes* and *Infl* are calculated as annual averages during the previous sub-period (1967-70 for the first sub-period). The data are taken from the World Bank's World Development Indicators, except for *Polcon* which is taken from the Polity IV project and *BITs* which is collected from UNCTAD's Investment Policy Hub. *Polcon* ranges from one to seven with higher values representing stricter constraints on the executive.

<sup>49</sup> Alternatively, we consider a dummy variable *DumL* which is set to one for the low-income countries, **L**, among all other non-OECD countries, **R**. Note that *DumN* and *DumL* per se cannot be identified since they are absorbed by the country fixed effects.