Global interpersonal inequality
Measurement and recent trends

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The problem

- The concern of inequality is a critical factor in the success of development strategies in developing countries

- High inequality reduce the efficacy of economic growth to poverty reduction (Ravallion 2011)

- Inequality also affect a country's potential of economic growth, by impacting negatively on consumer demand, national savings and human capital formation

- Negative implications of high levels of inequality, in terms of **social cohesion and crime** (Kelly, 2000), **conflict and political instability** (Alesina and Perotti, 1996) and **corruption and governance** (You and Khagram, 2005) are widely acknowledged

The problem

- The report of the UN System Task Team (2012) to support the preparation of the Post 2015 UN Development Agenda points out that **"inequality is a *key concern, not just from the perspective of a future in which a decent and secure wellbeing is a prerogative of all citizens, but sustained development itself is impeded by high inequalities. Hence, redressing these trends will be a major challenge in the decades ahead*"**

- Despite this, there is no consensus regarding the direction of change in global interpersonal inequality. The most recent and authoritative review on the issue (Anand and Segal, 2008) points out that **"*it is not possible to reach a definitive conclusion regarding the direction of change in global inequality over the last three decades of the twentieth century*"**

Background

Earlier studies have looked at trends of ***within-country*** inequality using average per capita income, with countries counting as a unit (e.g. Cornia and Kiiski 2001)

Other studies have looked at ***between-country*** inequalities, by analysing the inequality among <u>individuals</u> who are assigned the average per capita income of their countries (e.g. Firebaugh 1999, 2003, and Boltho and Toniolo 1999)

Fewer studies have measured ***global interpersonal inequality*** decomposing both the within- and between-country inequality components. They look at the inequality among individuals in the world, with each individual assigned her/his own per capital income (e.g. Xavier Sala-i-Martín 2006, Bhalla 2002; Bourguignon and Morrisson 2002)

Background

Some studies use the additively decomposable **Theil L index (or Mean Logarithmic Deviation), which is the average of the logarithmic difference between mean income and each person's income** (e.g. Chotikapanich, Valenzuela, and Rao, 1997, Milanovic, 2002, 2005; and Dikhanov and Ward 2002)

Other studies use the **Theil T entropy measure, which is the income-share weighted average of the logarithmic difference between each person's income and mean income** (Bourguignon and Morrisson (2002), Dowrick and Akmal (2005), Korzeniewicz and Moran (1997), and Sala-i-Martín (2006, 2002a, 2002b)

Like the Gini, the Theil T index is NOT decomposable and therefore has the problem of interpreting its between-country component. **Only the Theil L index has a consistent interpretation of its between- and within-group components** (Anand 1983)

Motivation and main findings

In this paper we estimate global interpersonal inequality trends, paying particular attention to the impact of India and China on the level and evolution of global inequality over the period from 1975 to 2010

Overall, we find that the **changes in inequality in these countries resulted in increasing domestic inequality until 2005, together with a pronounced dampening force on global inequality levels**. Surprisingly, **after the 2008 financial crisis, we observe a fall in inequality in China and other countries that have further reduced the global inequality trends globally**

Methodology

We adopt two inequality measures: first, the conventional Gini index, which measures the cumulative share of income or consumption expenditure relative to the cumulative population share. Suppose that $\{(X_k, Y_k) : k \in \{0, 1, \ldots, n\}\}$ are the known points on the Lorenz curve, ordered so that $X_{k-1} < X_k$ for all $k \in \{1, \ldots, n\}$, so that X_k is the cumulative proportion of the population for $k \in \{0, 1, \ldots, n\}$, $X_0 = 0$ and $X_n = 1$; Y_k is the cumulative proportion of income or consumption expenditure for $k \in \{0, 1, \ldots, n\}$, $Y_0 = 0$ and $Y_n = 1$. Then the Gini coefficient can be approximated as follows:

$$Gini \approx 1 - \sum_{k=1}^{n}(X_k - X_{k-1})(Y_k + Y_{k-1})$$

When there are n equal intervals on the cumulative proportion of the population, equation (1) can be simplified as:

$$Gini \approx 1 - \frac{1}{n}\sum_{k=1}^{n}(Y_k + Y_{k-1})$$

Methodology

One of the main drawbacks of the Gini coefficient is that it is not decomposable into within-country and between-country inequality components. In contrast, the Theil L measure (or mean log deviation MLD) is additively decomposable, with population share weights. Suppose that, in a group of N individuals, Y_i is the income belonging to individual $i \in \{1, \ldots N\}$ and $\bar{Y} = \frac{1}{N} \sum\limits_{i=1}^{N} Y_i$. The MLD can then be expressed as:

$$MLD = \frac{1}{N} \sum_{i=1}^{N} \ln(\frac{\bar{Y}}{Y_i})$$

Of the various inequality indices which have been use in the past to measure global inequality, the MLD is the only measure which has a consistent interpretation of its between- and within-group components.

Methodology

To construct the global income distribution, let $y_{q,t}^{c}$ be the average per capita income in quantile $q \in \{1,\ldots,Q\}$ of country $c \in \{1,\ldots,C\}$ in year $t \in \{t_1,\ldots t_T\}$

Domestic inequality in a given country-year is estimated under the assumption that all individuals in the same quantile have the average per capita income for that country-year-quantile

The world distribution of income in year t is constructed by compiling all available country-quantile data in year t

In any given country, year and quantile, there will be a corresponding number of individuals $n_{c,q,t}$. In year t then the global income distribution will contain Q quantiles for each country c, each with a number of individuals $n_{c,q,t}$ who are assumed to have an income of $y_{q,t}^{c}$

Methodology

As previous studies, we make the simplifying assumption that all **individuals in the same country-quantile-year have the same income.**

Note that there are some notable exceptions e.g. Bhalla 2002, and Sala-i-Martin, 2006 that have constructed smooth within-country distributions

We expect that our approach biases the inequality estimates downwards, and thus the resulting **estimates should be interpreted as being lower bounds**

There are reasonable grounds for taking this conservative approach. In particular, we do not know the upper and lower bounds for the individual-level incomes in each country-quantile (Milanovic 2002)

Nevertheless, as a robustness check we have computed Shorrocks and Wan (2008) algorithm to smooth within country distributions

Counterfactual scenarios

- First, we consider the scenario that **India's and China's incomes per capita and distribution of incomes (i.e. domestic quantile shares) had remained unchanged from 1975 to 2005, at 1975 levels**. The populations in these countries are assumed to have grown as they actually did

- Second, we consider the scenario that **China and India had been able to grow their incomes per capita at the same rate as they actually did over 1975-2005, while maintaining the same quantile shares as in 1975**. Again, the populations are assumed to have grown as they actually did

Data

Data

- Quintile data comes from UNU-WIDER World Income and Inequality Database (WIID V3.0B), which is the longest and most comprehensive database of cross country income distributions

  Visit at: http://www.wider.unu.edu/research/Database/

WIID adopts the conceptual base of the Camberra Group to minimise the following problems:

- Income/consumption concepts often vary within countries overtime and across countries (instrument heterogeneity)

- Consistent income/consumption series are often not reconcilable

Data: WIID

Definitions of income-based or consumption-based inequality

- Deaton & Zaidi (2002) suggest to use consumption for welfare measures

- Atkinson & Bourguignon (2000) argue that for distributional analysis, income is preferable

- Deininger and Squire (1996) add 6.6 per cent to Gini coefficients based on expenditure to reduce the deviation from income Ginis

- Our estimates suggest that income Ginis are 7.8 points higher than consumption Ginis, thus we make the corresponding adjustment

Correlations between income- and consumption-based Ginis

Gini income-consumption
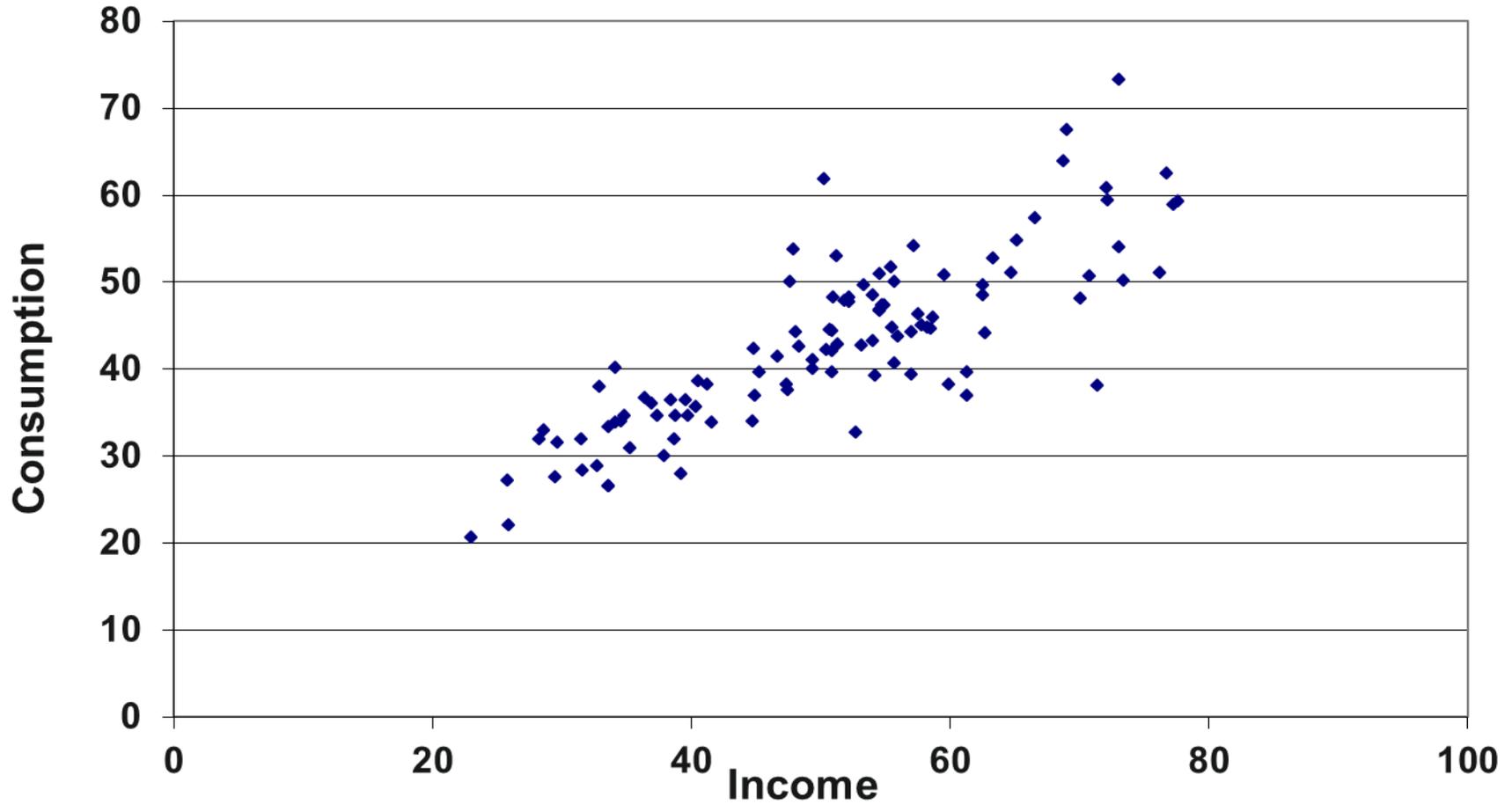
Data

The **number of individuals per country-quantile** was calculated based on population data from the following sources:

(1) United Nations Population Division. World Population Prospects
(2) Census reports and other statistical publications from national statistical offices
(3) Eurostat: Demographic Statistics
(4) Secretariat of the Pacific Community: Statistics and Demography Programme
(5) U.S. Census Bureau: International Database

The income levels per capita, per country-quantile were calculated based on GDP for the various country-years in 2005 US$ at PPP from the World Bank's databank

Results

Global Inequality

Global Interpersonal Inequality has fallen steadily between 1975 and 2005, and then with a more pronounced decline after the 2008 financial crisis

- Gini coefficients fell from 0.739 in 1975 to 0.621 in 2010
- Theil L (MLD) index fell from 1.349 in 1975 to 0.763 in 2010
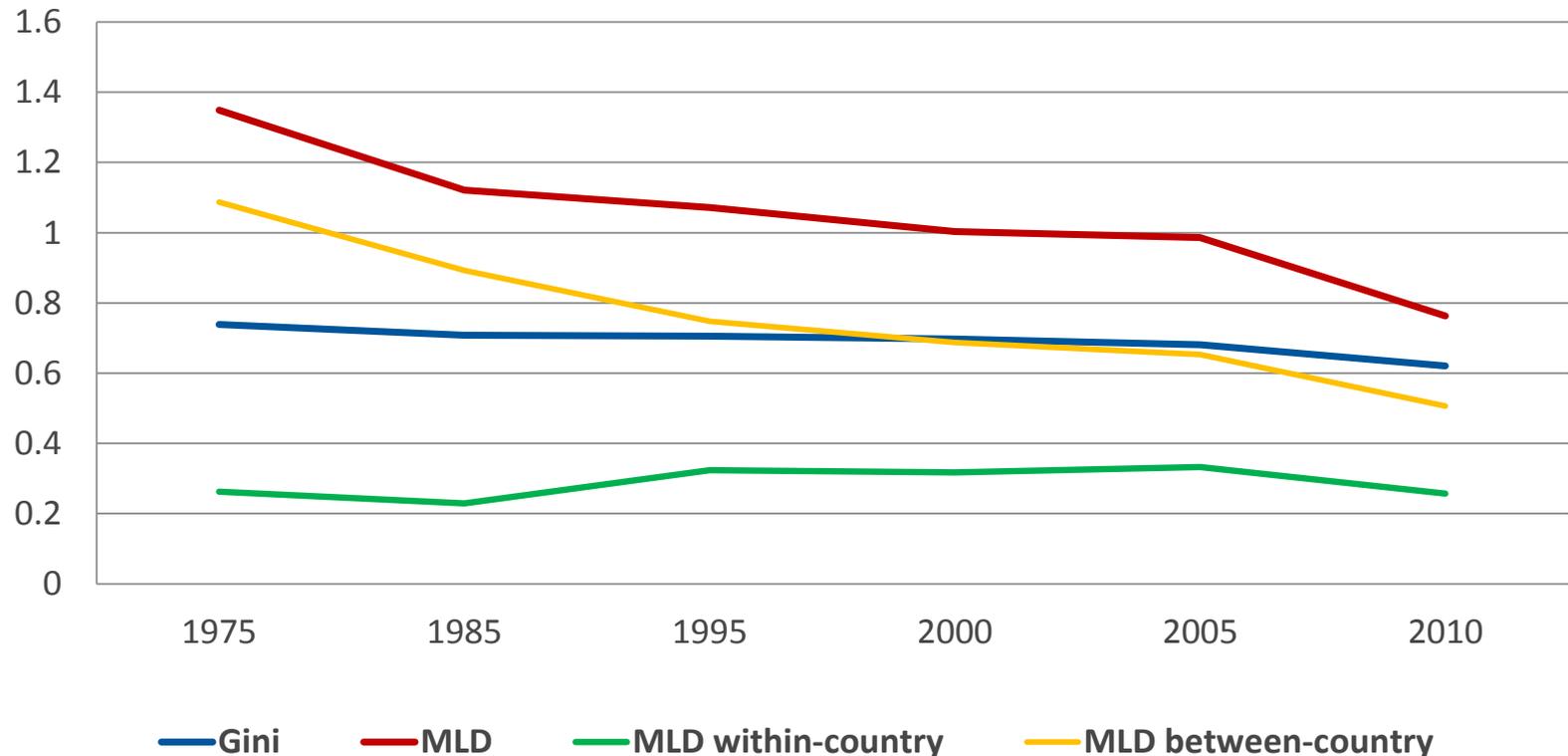
Global Inequality

- **Within-country inequality increased steadily between 1975 and 2005**, from 0.262 to 0.333. The contribution of within-country inequality to global interpersonal inequality jumped from 19.3% in 1975 to 38.8% in 2005

- *Ceteris paribus*, **this would be expected to lead to an increase in overall global interpersonal inequality. However, this dynamic was more than offset by a reduction in between-country** from 1.087 in 1975 to 0.653 in 2005.

- Surprisingly, **we observe after the 2008 global financial crisis, a decline both in within- and between-country inequality** that led to a pronounced fall in interpersonal global inequality

Regional Inequality

- We observe **considerable variation in within-country inequality trends across regions**: For example, whereas **within-country inequality in LA, EA, SA has declined,** it has increased in **North America and SSA**
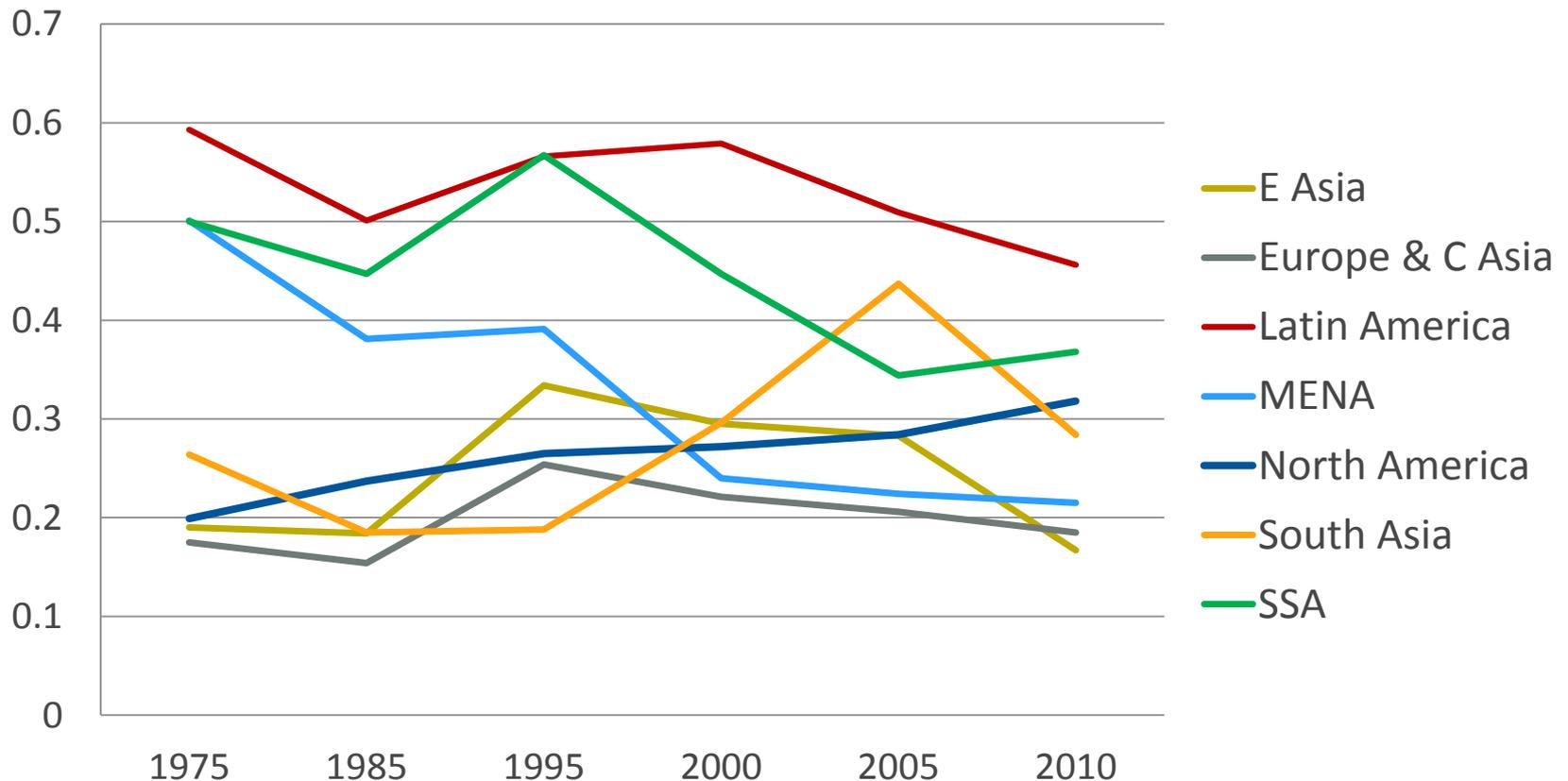
Regional Inequality

- We observe a more **consistent decline in between-country inequality trends across countries**
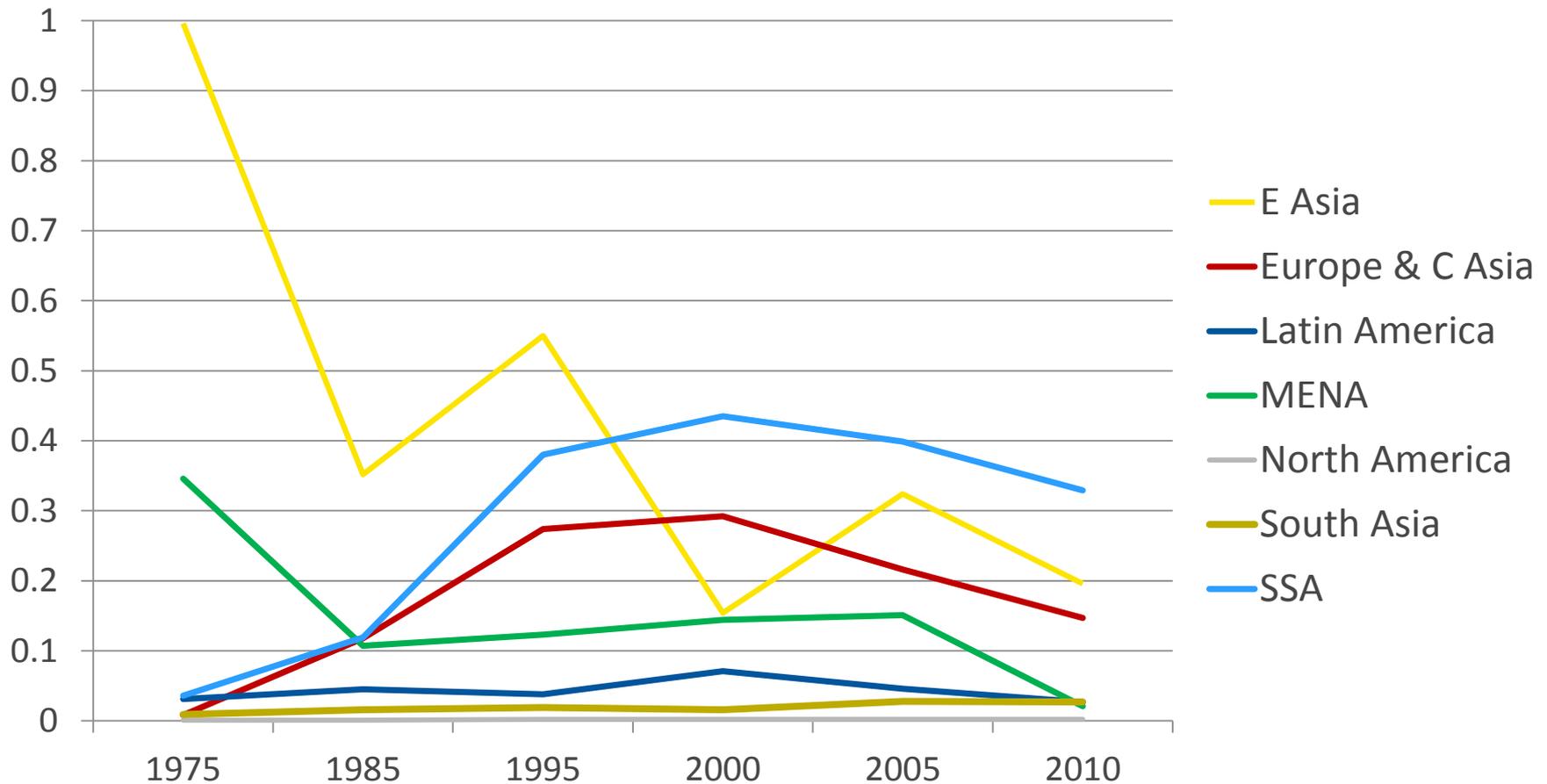
Regional Inequality

- Correlations show that **higher Ginis are strongly negatively correlated with levels of GDP per capita**, and the strength of the correlation was higher in 2005 than it was in 1975

- We find **a modest positive correlation between the increase in Ginis and growth in GDP per capita**. This pattern is not consistent across regions and is mainly driven by China

	Correlations		
	1975 Gini & GDP per cap	2005 Gini & GDP per cap	% △ in Gini & Growth in GDP per cap
Latin America & Caribbean	-0.306	-0.435	-0.215
Africa & Middle East	-0.357	-0.487	0.028
Asia	-0.376	-0.867	0.705
Europe & North America	0.316	-0.036	0.018
Total Sample	-0.564	-0.801	0.356

What happened in India and China?

Gini China
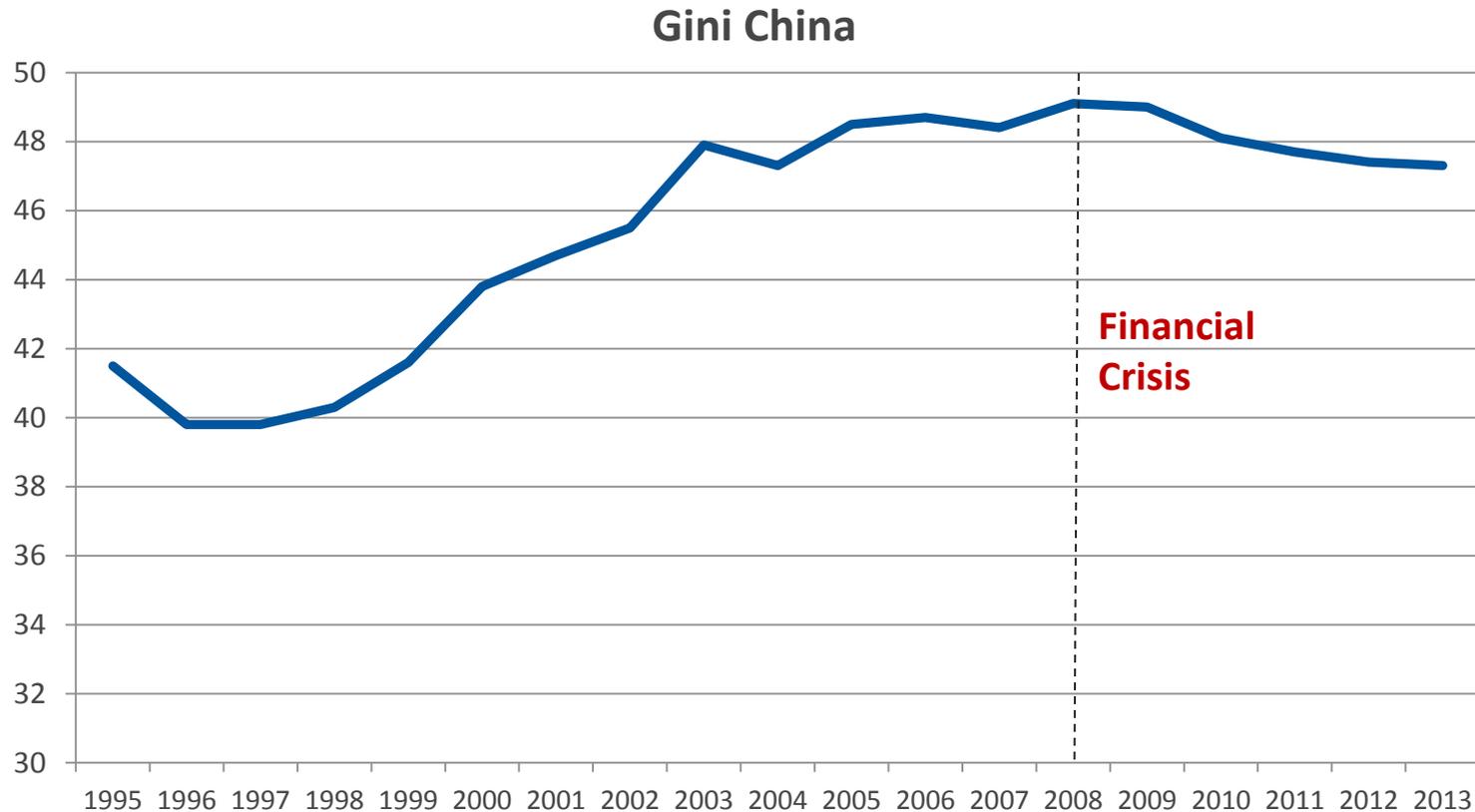
- India experienced an increase in within inequality from 29.7 in 1990 to 36.8 in 2004 and has remained at that level throughout 2009

- China experienced a consistent increase in inequality until 2009 and then a steady decline in inequality

What does explain the fall in inequality China?

Possible explanations

1. Domestic policies introduced since the 2000s seem to have played a role (Li and Sicular 2014)

   - Minimum wage increases
   - Extension of social protection and antipoverty policies (e.g. DiBao)
   - Agricultural support policies
   - Targeted tax reductions

2. A major stimulus package of 4 trillion yuan

   - Increase investment in infrastructure
   - Tax cuts
   - Increase in social spending (education and health)

Counterfactual Scenario I

- We assumed that India's and China's populations grew at the same rate as they actually did during 1975-2005, but remained with per capita incomes at the 1975 levels

Results

- **Global interpersonal inequality would have increased during 1975-2005** from 0.727 to 0.764, using the Gini coefficient, and from 1.314 to 1.449 using the Theil L (MLD) index

Inequality Measure	1975	2005
Gini	0.727	0.764
Theil L (MLD)	1.314	1.449
Theil L within-country component	0.254	0.272
Theil L between-country component	1.060	1.177

Counterfactual Scenario I

- The increase would have been driven by increases in both between- and within-country inequalities, with the *between* component playing a slightly bigger role

- China and India were low-income countries in 1975. **If their incomes per capita had remained unchanged during the subsequent 30 years an increase in between-country inequality would have been very much expected**

Counterfactual Scenario II

We consider the hypothetical case that India and China had grown their per capita incomes at the same rates as they actually did over 1975-2005, while maintaining the same quintile shares as in 1975

Results

Global interpersonal inequality would have fallen even further

Inequality Measure	1975	2005
Gini	0.727	0.662
Theil L (MLD)	1.314	0.872
Theil L within-country component	0.254	0.272
Theil L between-country component	1.060	0.600

Final remarks

- We live today in a very unequal world. **Global inequality estimates are much higher than domestic levels in even the most unequal countries of Latin America and sub-Saharan Africa**

- Global interpersonal inequality has gone down due the fall in its between-country component until 2005, and then after the 2008 financial crisis, also from its with-country component

- **Reductions in within-country inequality in populous countries like China have influenced the recent downward trends in global inequality**

- Domestic policies seem to have played a critical role: labour market reforms, tax cuts, extension of antipoverty policies (e.g. DiBao) and aggressive countercyclical policies to address the financial crisis

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