WORKING PAPER 04/2014

How industrial development matters to the well-being of the population Some statistical evidence

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

How industrial development matters to the
well-being of the population
Some statistical evidence

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UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna 2014

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List of Acronyms

CIP	Competitive Industrial Performance Index	**PPP**	Purchasing Power Parity
GII	Gender Inequality Index	**UN**	United Nations
GNI	Gross National Income	**UNDESA**	United Nations Department of Economic and Social Affairs
HDI	Human Development Index	**UNDP**	United Nations Development Programme
IHDI	Inequality-adjusted Human Development Index		
ILO	International Labour Organization	**UNESCO**	United Nations Educational, Scientific and Cultural Organization
IMF	International Monetary Fund		
IPU	Inter-Parliamentary Union	**UNFPA**	United Nations Population Fund
LDC	Least Developed Countries	**UNICEF**	United Nations Children's Fund
LIS	Luxembourg Income Study	**UNIDO**	United Nations Industrial Development Organization
MDG	Millennium Development Goal		
MPI	Multidimensional Poverty Index	**US**	United States
MVA	Manufacturing Value Added	**WHO**	World Health Organization

1 Introduction

The Millennium Development Goals (MDGs), agreed at the Millennium Summit of the United Nations in 2000, are set to expire in 2015. There has been significant progress on reducing levels of poverty, with the goal to half extreme poverty and hunger met five years ahead of the target date. There have been other successes too, with child mortality almost halved and 90 percent of children in developing countries now in primary school. But the picture is a mixed one and as the world looks ahead to new development goals from 2015, there is a recognition that the MDGs did not focus enough on integrating the economic, social and environmental aspects of sustainable development.

The lack of emphasis on economic dimension has been the major limitation of MDG indicators as a monitoring tool for overall development. The targets themselves focused on the final destination and not the journey, with little mention of the processes required in terms of economic development to make the MDGs a reality. In many developing countries, the pace of economic growth was outstripped by faster rising populations and deepening economic inequalities. This, in turn, increased the dependence of the population on natural resources causing further degradation of environment. Most importantly, the MDGs made no mention of the immense impact of industrialization on economic, social and environmental sustainability.

Development of a modern society is based on the foundations created by industrial revolutions. The industrialization over the past 200 years brought fundamental changes in the use of resources from primary production to manufacturing and related services. It created new skills and advanced technology, revolutionized transport and communication and extended the market for the global exchange of goods and services. Industrialization rapidly accelerated economic growth and immensely influenced social structures. As economies progress towards industrialization, the demand of skilled labor rises and the average wage rate grows. The surplus labor from rural areas is absorbed by new industrial enterprises, leading to a rising number of middle-class households.

Although industrialization began in Europe more than two centuries ago the process is still far from complete. As of 1 January 2014, there were only 57 economies, making up less than 20 percent

of the world population, that were classified as Industrialized. At the same time, the gap between highly industrialized economies and least developed countries (LDCs) is increasing. The average per capita manufacturing value added (MVA) of industrialized countries is 10 times higher than that of developing countries and 90 times higher than the average of LDCs. Growing inequality among nations is the particular concern of the United Nations Industrial Development Organization (UNIDO), which was established in 1966 with the mission of promoting and accelerating industrialization in developing countries.

It is clear that citizens of modern, industrialized countries enjoy much more prosperous and healthy lives than those in LDCs. They benefit from high levels of education, better social security, sophisticated transport and communication networks, access to information, knowledge, technology and financial facilities necessary for businesses. The process of industrialization has had a direct impact on their well-being. By contrast, in many other countries the lack of productive employment and access to resources has not only resulted in extreme poverty but also caused social tensions and at times led to armed conflict.

Our analysis has shown that when MVA per capita increases by 1 percent annually, the poverty head count decreases by almost 2 percent. With an increase of MVA per capita of 1 percent the number of deaths related to armed conflicts falls by 4.5 percent[1]. This publication presents empirical evidence on the correlation between industrial development and well-being of populations, with a view to improving understanding among policymakers at both national and international level.

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[1]UNIDO estimates based on the data from conflict-stricken countries

2 Basic facts on distribution of global MVA
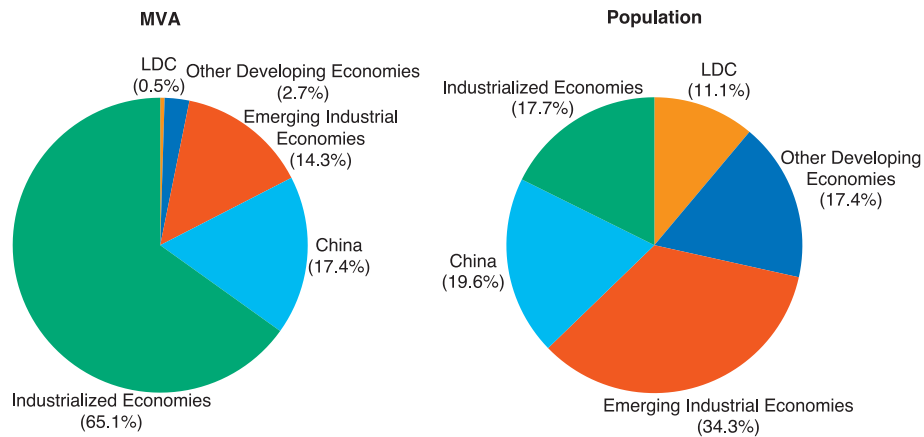
Industrialized economies, which make up only 17.7 percent of the world's population, accounted for 65.1 percent of world manufacturing value added (MVA) in 2012. And, as will be demonstrated in the following pages, they also have the highest social wealth.

By comparison, the emerging industrial economies including China contribute 31.7 percent of the world MVA. Social wealth is increasing rapidly in these countries, resulting in a narrowing of the gap on a number of development indicators, although social indicators continue to lag behind those of industrialized countries. Among emerging industrial economies China has the largest share in global industrial production at 17.4 percent, almost in line with its share of global population which stands at 19.6 percent.

Other developing countries account for a mere 2.7 percent of world MVA with 17.4 percent of the world's population. More glaring is the fact that 11.1 percent of the global population lives in least developed countries (LDCs), which contribute only 0.5 percent of world MVA. These countries comprise the "bottom billion"[2] who suffer a range of persistent socioeconomic problems, including high levels of extreme poverty, low levels of education and health facilities, poor infrastructure and limited economic opportunities. Due to high levels of social tension and economic inequality many countries in this group are affected by frequent political upheaval, lawlessness, ethnic violence and armed conflict.

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[2]UNIDO - Industrial Development Report, 2009 - Breaking In and Moving Up: New Industrial Challenges for the Bottom Billion and the Middle-Income Countries

3   Human development and competitive industrial performance of nations

A high level of human development is achieved by countries that are industrialized.
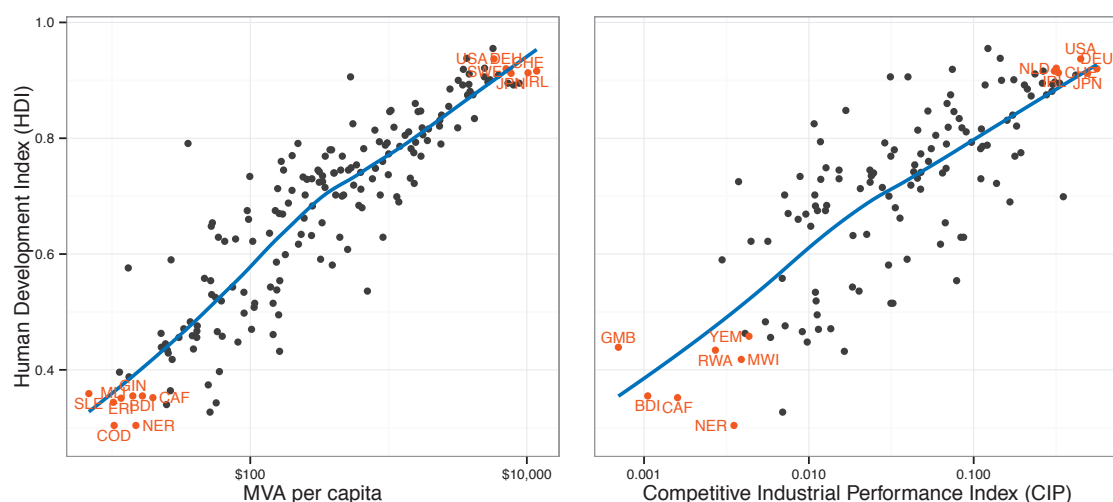
Definition: A composite index measuring average achievement in three basic dimensions of human development — a long and healthy life, knowledge and a decent standard of living. MVA per capita is the relative value of net manufacturing output to population size. CIP is a composite index developed by UNIDO to measure the industrial competitiveness of a country based on its capacity to produce and export manufactured goods, technological deepening and upgrading and the impact on the world market.

Source: UNDP: 2013 Human Development Report: Calculations based on data from UNDESA (2011), Barro and Lee (2011), UNESCO Institute for Statistics (2012), World Bank (2012a) and IMF (2012)

The Human Development Index (HDI) for 2012, released by the United Nations Development Programme (UNDP) expresses the social and economic development of a country in a range of the value between 0 and 1 where a greater value means more developed. If compared to manufacturing value added (MVA) per capita (in constant 2005 US dollars) in 2012, there is a very high correlation. MVA is defined as the value of output less the values of intermediate inputs in manufacturing industry. MVA per capita indicates industrial production relative to the population size of an economy. It is widely used to indicate the degree of industrialization.

The above figure shows the high accordance between these two variables. The actual measure of

this relationship was obtained from the rank correlation coefficient which was 0.91 (0 means no accordance at all, 1 is perfect accordance). For instance, the United States of America, Germany, Ireland, Sweden, Switzerland, and Japan are ranked in the top 10 on both indicators. At the bottom end of the scale of both indicators are Niger, the Democratic Republic of Congo, Mali, Eritrea, Guinea, and Burundi. The rankings are based on those countries for which both indicators are available.

MVA per capita is also a component of the Competitive Industrial Performance (CIP) index. The CIP measures the industrial competitiveness of an economy in the range between 0 and 1, with 0 low and 1 high.

Another graph compares the CIP for 2012[3] with the HDI of the same year and reveals a high degree of correlation between two. The rank correlation coefficient of the two indices was 0.78, with the list of top 10 ranked countries almost identical to that seen in the case of MVA, except for the presence of the Netherlands in the top 10 instead of Sweden. Niger is also at the bottom of the ranks of the HDI and the CIP index, along with the Central African Republic, Burundi, Malawi, Rwanda, and Gambia.

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[3]For few countries where the CIP value for 2012 was not available, the value of 2011 was used instead.

Inequality-adjusted Human Development Index
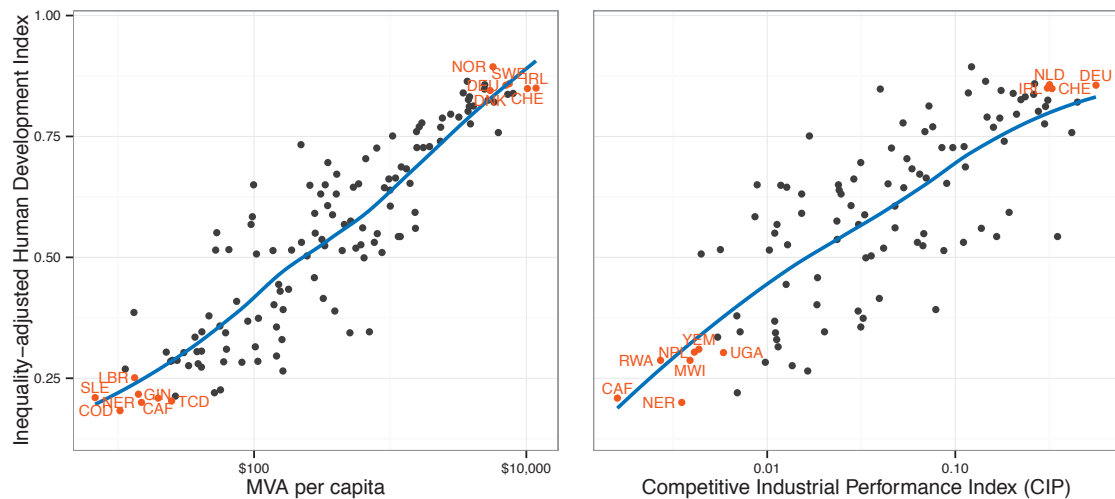
Definition: IHDI is similar to the HDI, but each of the three basic dimensions of the HDI is adjusted for inequality

Source: UNDP: 2013 Human Development Report: HDRO calculations based on data from UNDESA (2011), Barro and Lee (2011), UNESCO Institute for Statistics (2012), World Bank (2012a) and IMF (2012)

"The IHDI is the actual level of human development (taking into account inequality), while the HDI can be viewed as an index of the potential human development that could be achieved if there is no inequality."

Although data for the IHDI are not available for as many countries as for the HDI, the IHDI shows the same relation to MVA as the non-adjusted version as well as an almost identical rank correlation of 0.90. When adjusted for inequality, Denmark and Norway appear in the top 10 ranked countries on both indicators and Liberia and Sierra Leone are in the bottom 10. Figures for the IHDI are not available for the two last ranked countries by CIP, namely Gambia and Burundi, but the correlation of the ranks in the IHDI and the CIP index is still 0.77 (compared to 0.78 between HDI and CIP). Including inequality-adjustment Nepal and Uganda are in the bottom 10 countries ranked by IHDI and CIP.

Although economic inequality may widen at the early stage of industrialization, especially between richer urban and poorer rural communities, further industrial growth, as Kuznets curve suggests, is necessary to reduce inequality. Economic inequality today is much higher in low-income countries than in high-income industrialized countries.

Overall Life Satisfaction
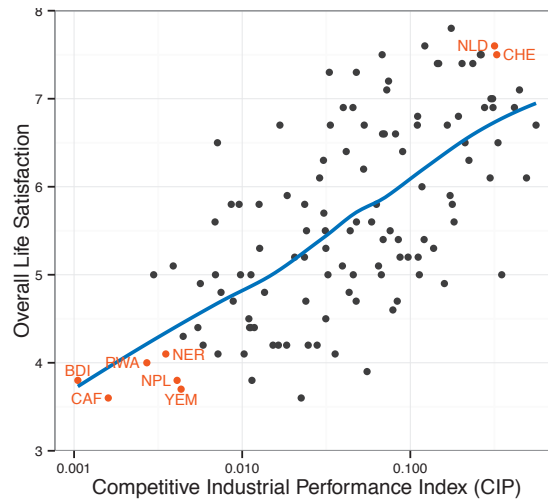
Definition: Overall life satisfaction is measured from the average response to the Gallup World Poll Question: Please imagine a ladder, with steps numbered from zero at the bottom to ten at the top. Suppose we say that the top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time, assuming that the higher the step the better you feel about your life, and the lower the step the worse you feel about it? Which step comes closest to the way you feel?

Source: UNDP: 2013 Human Development Report: Gallup

Overall life satisfaction is a very subjective measure that is generally influenced by different factors. It is widely believed that economic prosperity alone does not make people satisfied. Despite these arguments the picture above shows that overall life satisfaction is highly related to a country's industrial development. Belize is the only country with a CIP index value below 0.01 whose population has an overall life satisfaction above 6 (on a scale from 0 to 10). The majority of those who report high levels of life satisfaction come from highly industrialized countries such as the Netherlands or Switzerland, which are ranked at the top of the CIP index.

Gender Inequality Index
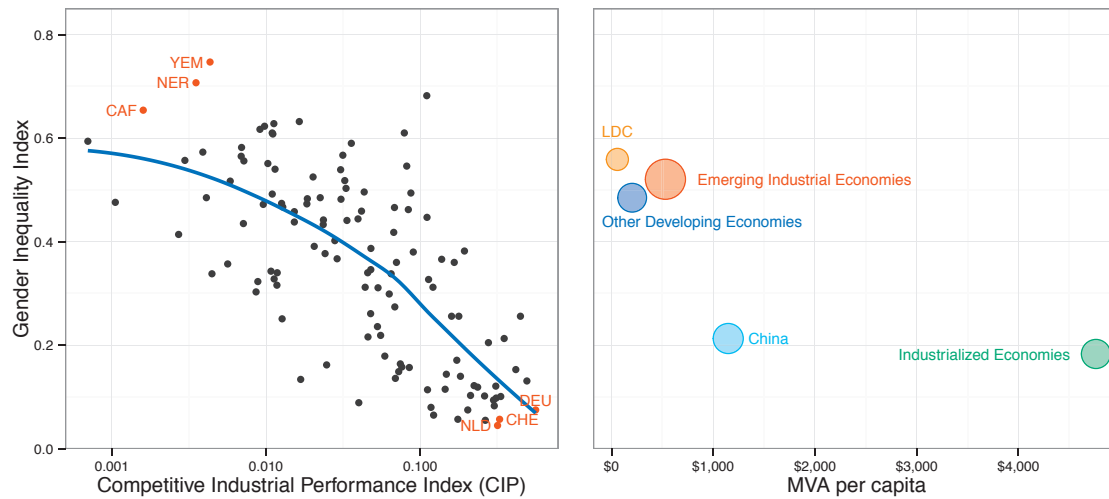
Definition: The gender inequality index is a composite measure reflecting inequality in achievements be-tween women and men in three dimensions: reproductive health, empowerment and the labor market.

Source: UNDP: 2013 Human Development Report: Calculations based on UN Maternal Mortality Estimation Group (MMEIG) WHO, UNICEF, UNFPA and the World Bank (2012), UNDESA (2011), IPU (2012), Barro and Lee (2010), UNESCO Institute for Statistics (2012) and ILO (2012)

The Gender Inequality Index (GII) is an important measure that shows the disadvantages women and girls face in a country. "All too often, women and girls are discriminated against in health, education and the labor market – with negative repercussions for their freedoms." (UNDP: Human Development Report 2013) The GII uses values between 0 and 1, with lower values indicating less inequality between the genders.

From the above graph it is clear that in 2012 women and girls faced less disadvantages in countries with higher CIP index values than in countries with lower CIP index values. This is also supported by a high correlation of the ranks of 0.71. The Netherlands, Switzerland and Germany, for instance, are ranked at the top on both indicators and Yemen, Niger and the Central African Republic are at the bottom of both indicators.

Aggregating the values by country group, it is revealed that least developed countries (LDCs) have the highest gender inequality while industrialized countries have the lowest. In terms of gender

equality, China has notably outperformed other emerging industrial economies of similar level of MVA per capita. Women in China face less discrimination and the inequality between genders on average is about the same as that of industrialized countries. Looking at the size of the bubbles in the graph, which is proportional to the total number of women living in the represented country groups in 2012, it becomes clear that more than half of the world's women live in countries where gender inequality is significant (*Gender Inequality Index* higher than 0.4).

4   Industrial development and poverty

Poverty drops significantly as economies are more industrialized.

Industrialization helps to reduce income poverty through the creation of employment and self-employment opportunities. A rise in the level of industrial activity also enables other sectors, especially agriculture, to increase productivity and efficiency through the introduction of new technology, witnessed by the higher levels of productivity in agriculture and service sectors seen in industrialized countries. Subsequently, industrialization generates wealth which is then available to support overall human development throughout society. This effect has been most clearly visible in parts of South East Asia where dynamic industrial growth in countries such as Malaysia, Singapore and the Republic of Korea have dramatically lowered levels of poverty in a relatively short space of time. With the continuous growth of manufacturing, the poverty index has fallen significantly in emerging industrial economies such as Brazil, China and India too. By contrast, extreme poverty persists in many least developed countries (LDCs) where industrial development has been slower.

Multidimensional Poverty Index

The Multidimensional Poverty Index (MPI) from the 2013 Human Development Report published by UNDP measures poverty by considering multiple deprivations and their overlap. The index identifies deprivations across the same three dimensions as the HDI and shows the number of people who are multidimensionally poor (suffering deprivations in 33 percent of weighted indicators)

and the number of deprivations with which poor households typically contend.
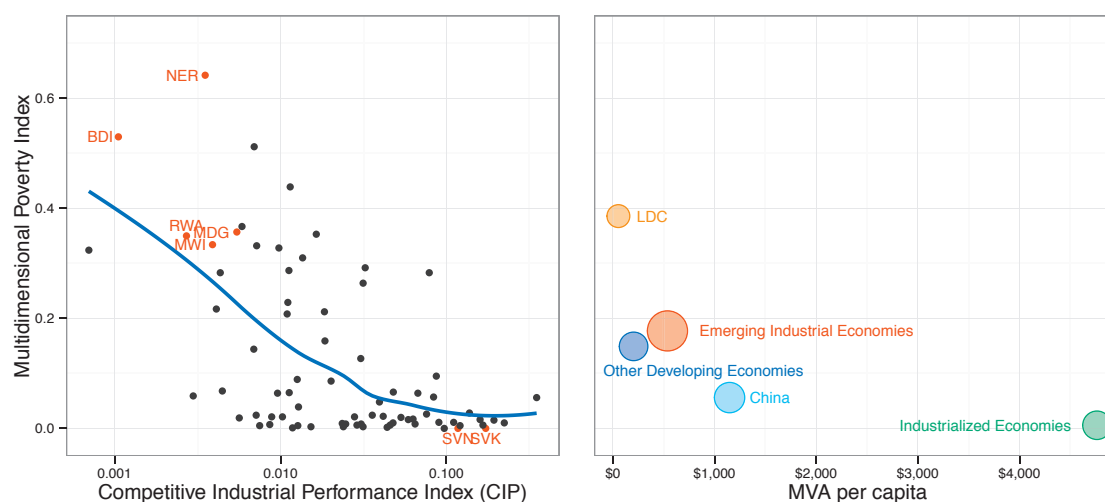
Definition: Percentage of the population that is multidimensionally poor adjusted by the intensity of the deprivations.

Source: UNDP: 2013 Human Development Report: Calculated from various household surveys, including ICF Macro Demographic and Health Surveys, United Nations Children's Fund Multiple Indicator Cluster Surveys and World Health Organization World Health Surveys conducted between 2000 and 2010.

As empirical evidence, the MPI for 2012 is compared to the CIP index for 2012. It shows that countries with a higher CIP value tend to have a lower Multidimensional Poverty Index. Despite the fact that data for many countries with medium to high CIP values are unavailable (the MPI is only available for seven industrialized economies), the rank correlation is 0.54. Slovenia and Slovakia are ranked in the top 10 countries on the MPI and the CIP (among the countries for which both indicators are available). The bottom ranked countries on both indicators include Niger, Burundi, Madagascar, Rwanda, and Malawi.

Aggregating the poverty index by stage of industrial development status, severe poverty is evident in LDCs where MVA per capita is too low. The bubble size in the right plot is proportional to the number of people living in the represented countries. Therefore, it is clear that almost half of the world's population still live in countries with a MPI higher than 0.1.

Inequality-adjusted income index
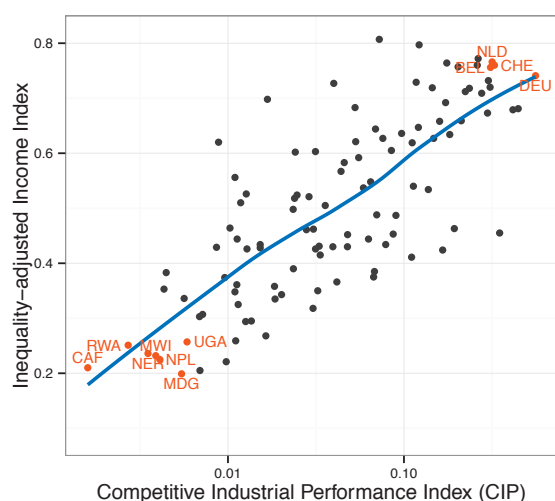
Definition: The inequality-adjusted income index refers to the HDI income index, calculated from the gross national income (GNI) per capita, adjusted for inequality in income distribution based on data from household surveys.

Source: UNDP: 2013 Human Development Report: Calculated based on data from LIS (2012), Eurostat (2012), the World Bank (2012b), UNICEF (2002-2012), and ICF Macro (2012)

The third primary dimension of the Human Development Index is income. It is taken to be the gross national income (GNI) per capita at the PPP in US dollars. To take income distribution across a country's population into account, the inequality-adjusted income index was released for 2012.

The relationship between the inequality-adjusted income index and industrial development can be seen clearly in the above picture. No country with a CIP value over 0.1 in 2012 had an inequality-adjusted income index value of less than 0.4 and only two countries with a CIP below 0.01 surpassed this income index value.

The high correlation of the ranks of 0.78 further supports this relationship and the 10 countries with the highest inequality-adjusted income index, the Netherlands, Switzerland, Belgium, and Germany, are also ranked in the top 10 on the CIP index. The high correlation of the ranks is particularly visible in the bottom 10 ranked countries on both indicators, which include Madagascar, the Central African Republic, Nepal, Malawi, Niger, Rwanda, and Uganda.

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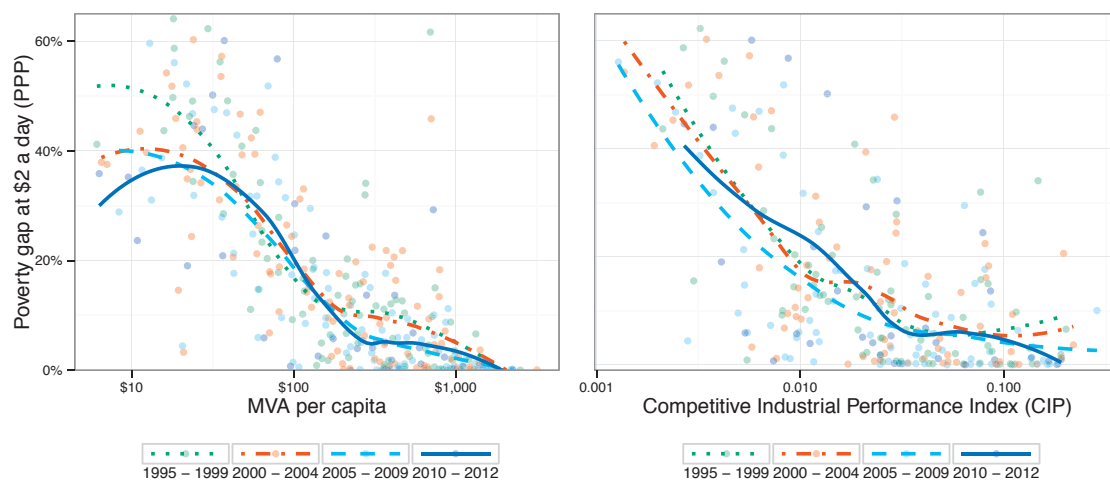
Poverty gap

Definition: Poverty gap is the mean shortfall from the poverty line (counting the nonpoor as having zero shortfall), expressed as a percentage of the poverty line. This measure reflects the depth of poverty as well as its incidence.

Source: The World Bank: World Development Indicators: World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database

The poverty line for this analysis has been taken at $2 a day. Using purchasing power parity (PPP) – here defined as the number of units of the country's currency that are needed in that country to purchase the same quantity of individual goods or services as one unit of US dollars will purchase in the US – makes the poverty gap comparable between countries.

The poverty gap in almost all countries with a MVA above $100 per capita is less than 20 percent, while for most of the countries with MVA per capita below $100, it at least 20 percent. The relationship between the CIP and the poverty gap provides further evidence that higher levels of industrialization mean lower levels of poverty. This is particularly true in countries with a CIP value lower than 0.01 where the poverty gap is often above 20 percent and it doesn't seem to decrease over time.
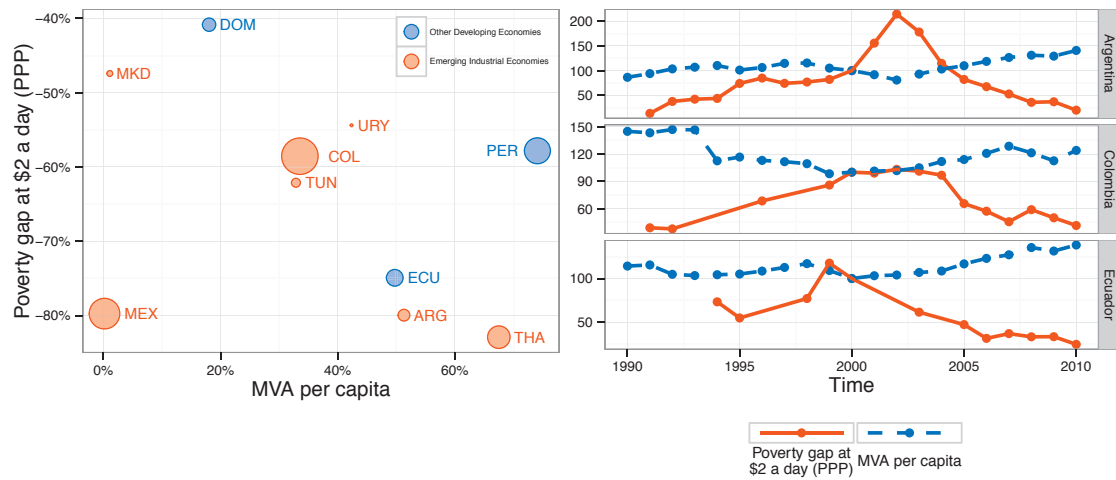
The left plot shows the average yearly growth rates of the poverty gap (at $2 a day) and MVA per capita between 2000 and 2010 for selected countries. The bubble size shows the total number of people living with less than $2 a day in those countries in 2010. In almost all countries, a high growth rate of MVA per capita is accompanied by a strong reduction in the poverty gap.

By taking a closer look at the development of MVA per capita as well as the poverty gap relative to the year 2000, a high accordance between these two values can be seen. In Argentina for instance, MVA per capita did not change much from 1990 to 1998 but the poverty gap widened slowly. The drop in MVA per capita from 1999 to 2002 was accompanied by a steep increase in the poverty gap, but since then MVA per capita grew to about 150 percent of the value in 2000 and the poverty gap to 20 percent of the value in 2000.

In Colombia and Ecuador the poverty gap is also almost perfectly aligned with MVA per capita. In years with a growing MVA per capita, the poverty gap narrows while in the years MVA per capita depletes, the poverty gap widens.
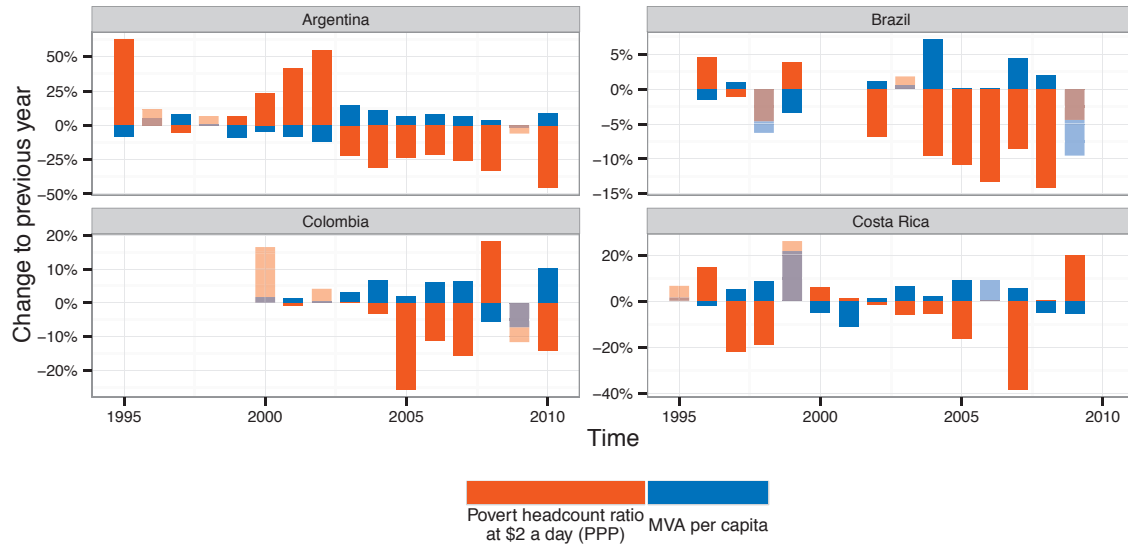
Poverty headcount
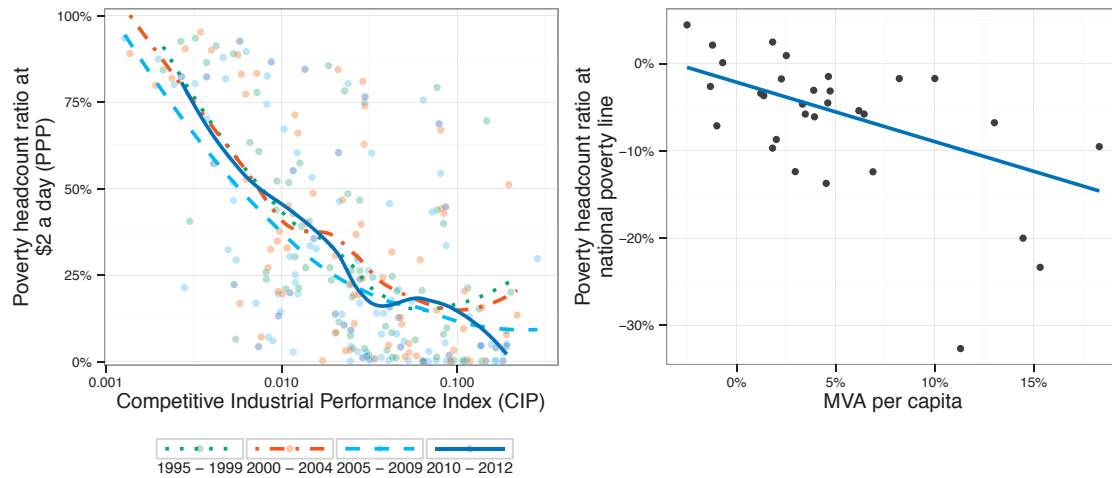
Definition: Population below $2 a day is the percentage of the population living on less than $2.00 a day at 2005 international prices.

Source: The World Bank: World Development Indicators: World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database

The head-count ratio of people living below $2 a day (PPP) is an important measure of poverty in a country and it is apparent in the above graph that the ratio falls with increasing levels of industrial development. In most countries with a CIP value of less than 0.01, more than half of the population lives on less than $2 a day, although numbers are constantly decreasing over time. About 87 percent of countries with a CIP value above 0.01 had a head-count ratio of less than 50 percent between 2005 and 2010, while in nine out of 10 countries with a CIP value higher than 0.1, less than 25 percent of the population lived with less than $2 a day.

Examining the effect of a growing MVA per capita between 2000 and 2005 on the average decline of the head-count ratio (at the national poverty line) in 2005 – 2010, it can be seen that the higher the MVA per capita growth rate, the faster the poverty head-count ratio decreases.

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By plotting the relative change to the previous year of the poverty head-count ratio and the MVA per capita for Argentina, Brazil, Colombia and Costa Rica, a close correlation can be seen. The bars represent the change of the indicator relative to the previous year. When both indicators increase / decrease, the bars are overlapping and are shown half-transparent.

In Argentina, where data for all years from 1995 to 2010 are available, in all but three years a growing MVA per capita is accompanied by a decrease in the poverty head-count ratio, while in years with decreasing MVA per capita the poverty head-count ratio rises.

For the other three countries the poverty head-count ratio is not available for all years. But for the available years, the vast majority of the bars are solid. This means, that an increase in MVA per capita is accompanied by a drop in the poverty head-count ratio and vice versa.

Income share held by lowest 20 percent
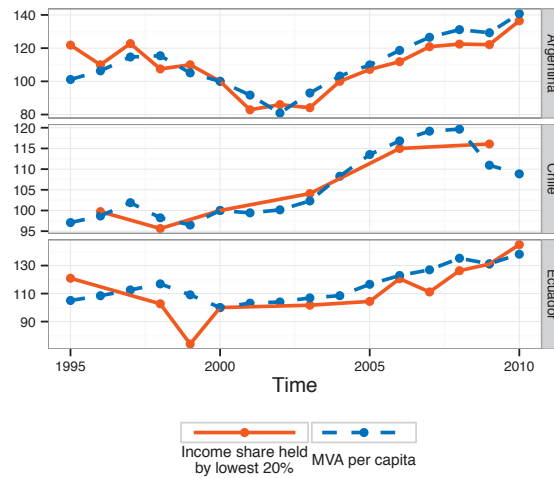
Definition: Percentage share of income or consumption is the share that accrues to subgroups of population indicated by deciles or quintiles.

Source: The World Bank: World Development Indicators: World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. Data for high-income economies are from the Luxembourg Income Study database.

The income share held by the lowest 20 percent is one measure of the inequality of income distribution in a country. The patterns of income share and MVA per capita relative to the values in 2000 for different countries show a close correlation.

In Argentina, Chile and Ecuador the income share held by the lowest 20 percent not only increases when MVA per capita increases, but the growth rate is also very similar. In Argentina both curves are almost identical and in Chile, although the income share is only available for every third year, the trends look very similar.

Total unemployment rate
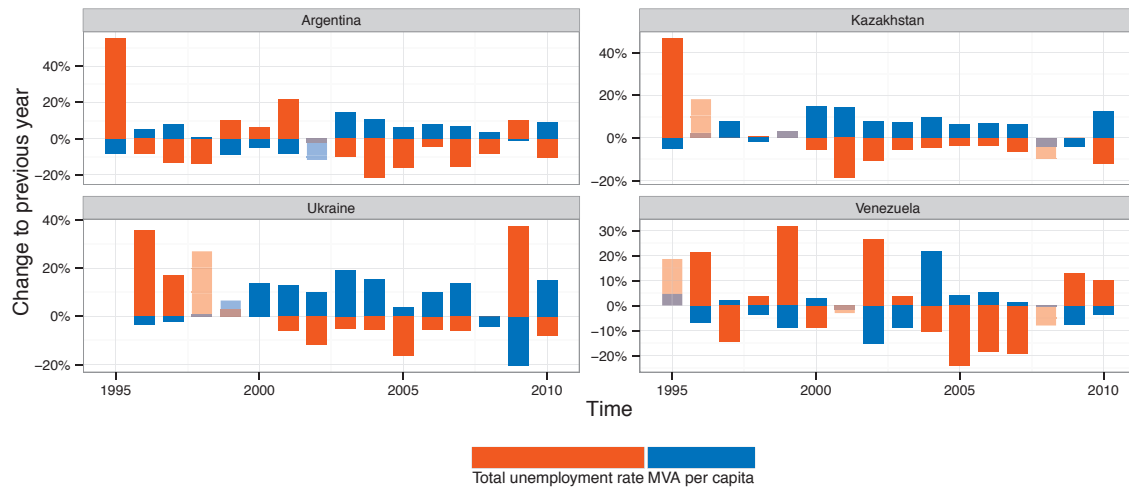
Definition: Unemployment refers to the share of the labor force that is without work but available for and seeking employment. Definitions of labor force and unemployment differ by country.

Source: The World Bank: World Development Indicators: International Labour Organization, Key Indicators of the Labour Market database.

By displaying the change rates of MVA per capita and the total unemployment rate for Argentina, Kazakhstan, Ukraine, and Venezuela, it seems the change in the unemployment rate is highly related to the change in manufacturing value added.

In Argentina, with the exception of 2001 and 2002 when both MVA per capita *and* unemployment fell, albeit only slightly, the unemployment rate dropped when MVA per capita increased and vice versa, thus showing an almost perfect correlation.

In Kazakhstan the picture is a similar one. The growth in MVA per capita from 1995 to 1996 was not accompanied by a decrease in the unemployment rate, but the increase was less than half as strong as from 1994 to 1995. From 2000 to 2002 Kazakhstan had a very high growth in MVA per capita and a very steep drop in the unemployment rate.

In years with growing MVA per capita in Ukraine, the unemployment rate dropped almost every year and decreasing MVA per capita was always accompanied by an increased unemployment

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rate. The massive depletion in MVA per capita from 2008 to 2009 and an abrupt boost of the unemployment rate in the same year are also clearly visible in the graph.

Venezuela also experienced two strong drops in MVA per capita and a very sharp increase of the unemployment rate in the same years. But during steady growth in MVA per capita from 2003 to 2007, the unemployment rate decreased rapidly again.

Child labor
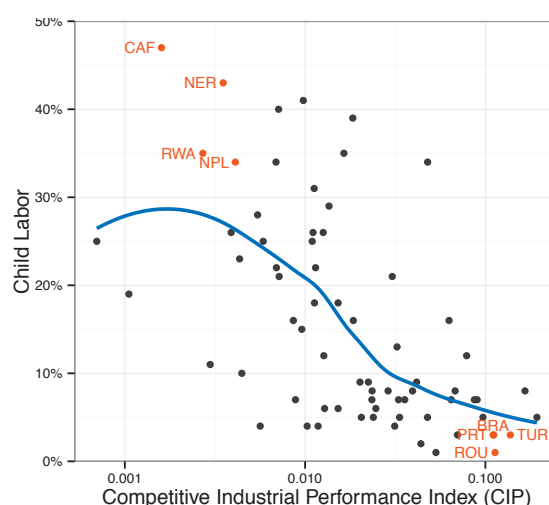
Definition: Percentage of children ages 5–11 who, during the reference week, did at least one hour of economic activity or at least 28 hours of household chores, or children ages 12–14 who, during the reference week, did at least 14 hours of economic activity or at least 28 hours of household chores.

*Source*: UNDP: 2013 Human Development Report: UNICEF

Child labor is mainly present in countries with high degree of poverty and low level of industrial development. Cases of child labor are not reported in most industrialized countries. Comparison for countries where data exist clearly shows that child labor sharply decreases with industrial development. Countries with the lowest levels of child labor and the highest value in the CIP index include Romania, Brazil, Portugal and Turkey. In the Central African Republic, almost 50 percent of the children are involved in economic activities and it also has the third smallest value of CIP among the countries for which both indicators are available in 2012. Niger, Rwanda and Nepal also have a high percentage of child labor and a low level of industrialization.

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5   Industrial development and education

With industrial development a greater number of people have access to knowledge.

There is a two-way relationship between industrial development and education. Growth in industrialization creates high demand for a skilled and trained workforce thereby encouraging youth into education, while at the same time providing revenues that can then be directed to further develop education. However, a lack of job opportunities for youth in developing countries has forced many to emigrate to industrialized countries, which has been the root cause of international human trafficking, one of the worst humanitarian problems facing the global community today. Only industrialization and the creation of employment opportunities can provide the livelihoods to allow people in many developing countries to flourish in their place of origin. This section presents evidence on the high level of education from primary to tertiary levels in industrialized countries.

Adjusted net enrollment rate in primary school
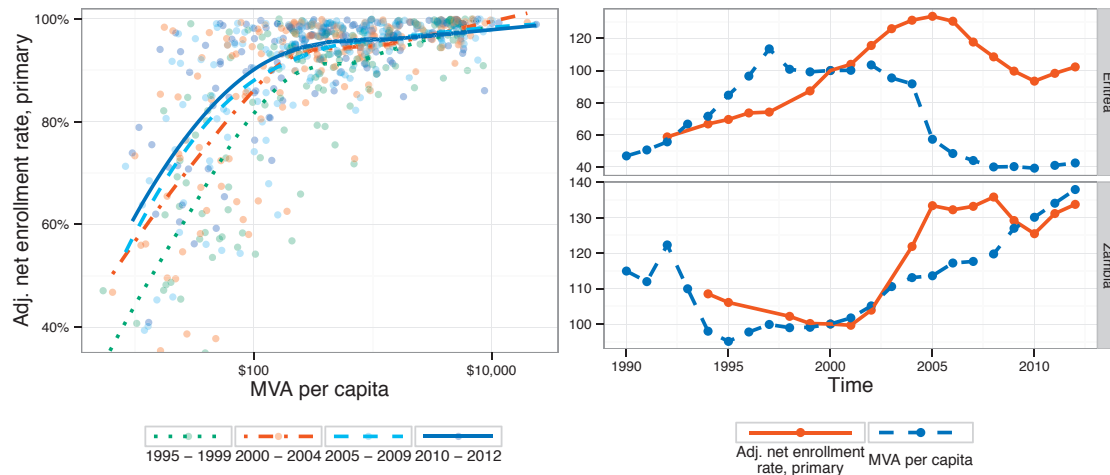
Definition: Adjusted net enrollment is the number of pupils of the school-age group for primary education, enrolled either in primary or secondary education, expressed as a percentage of the total population in that age group.

*Source*: The World Bank: World Development Indicators: UNESCO Institute for Statistics

The adjusted net enrollment rate is a measure of whether a country's education system has the capacity to meet the needs of universal primary education. In the above graph, the median value of the adjusted net enrollment rate and of MVA per capita at constant 2005 US dollars for each country has been calculated for each of the displayed time periods. The median value for a country in the period is the value that is exactly in the middle. This means, that in half of the years during the period the value was less and in the other half of the years the value was greater or equal. A line is added for every time period to better visualize the overall trend.

It is clearly visible that the adjusted net enrollment rate is generally increasing over time, and that countries with a MVA per capita of less than $100 have education systems that face difficulties in serving all pupils.

As the enrollment rate in primary education is especially low in countries with scant industrial development, the trend for Eritrea and Zambia, both considered as LDCs, is shown relative to the value in 2000. The curves for MVA per capita and the net enrollment rate in primary education

closely resemble each other in both countries, but the enrollment rate is shifted to the right. Thus, an increase or decrease in MVA per capita results in an increase or decrease of the enrollment rate several years later.

**Population with at least secondary education**
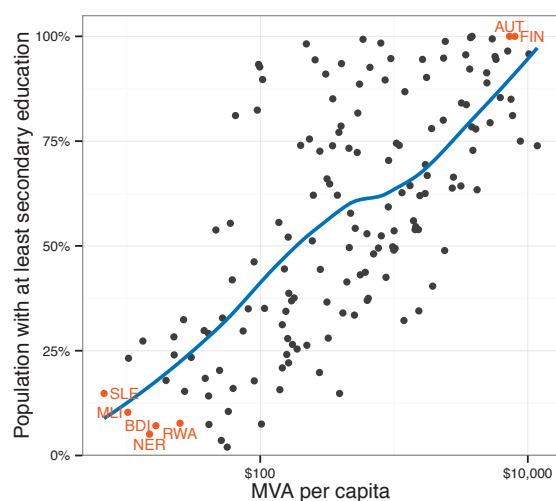
Definition: Population with at least secondary education is the percentage of the population ages 25 and older that reached at least secondary education.

Source: UNDP: 2013 Human Development Report: UNESCO Institute for Statistics

In countries with a low MVA per capita only a small portion of the population reaches secondary education. Countries such as Niger, Burundi, Rwanda and Mali for example are in the bottom 10 countries in MVA per capita and have one of the lowest percentages of people with at least secondary education. On the other hand in Finland and Austria, where MVA per capita is very high, all people above the age of 25 have reached at least secondary education.

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**Inequality-adjusted education index**
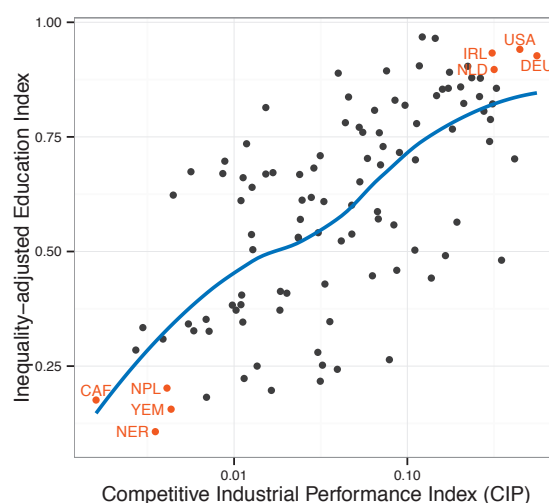
Definition: The inequality-adjusted education index refers to the HDI education index, calculated from the mean years of schooling (for adults aged 25 years) and the expected years of schooling (for children of school entering age), adjusted for inequality in distribution of years of schooling based on data from household surveys.

Source: UNDP: 2013 Human Development Report: Calculated based on data from LIS (2012), Eurostat (2012), the World Bank (2012b), UNICEF (2002-2012), and ICF Macro (2012)

Education is one of the three primary dimensions of human development for the Human Development Index and the mean years of schooling as well as the expected years of schooling are taken into account. The inequality-adjusted education index for 2012 is highly related to the CIP index for 2012 as suggested by the graph above. The higher a country's industry is developed, the more years pupils will be in school.

The high correlation rank of 0.69 is also reflected by the fact that the US, Ireland, Germany, and the Netherlands are in the top 10 countries according to the inequality-adjusted education index and among the top 10 on the CIP. The countries at the bottom of both ranks are also very similar, including Niger, Yemen, the Central African Republic and Nepal.

**Net enrollment rate in secondary education**
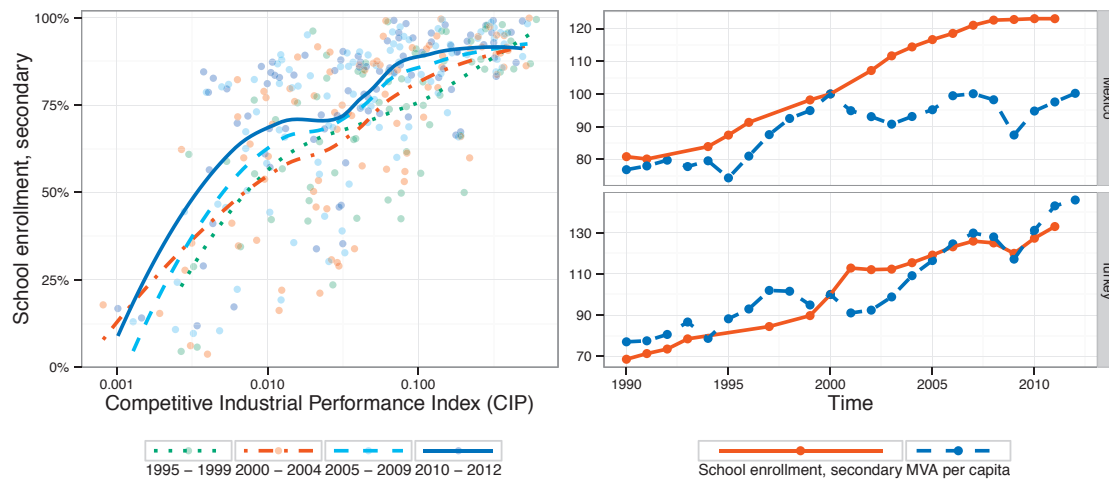
Definition: Net enrollment ratio is the ratio of children of official school age based on the International Standard Classification of Education 1997 who are enrolled in school to the population of the corresponding official school age. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.

Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics

The net enrollment rate in secondary education is clearly increasing with a rise in competitive industrial performance. In almost all countries and time periods, a CIP value above 0.1 also indicates a school enrollment rate in secondary education of more than 75 percent, which is higher than most countries with a CIP value of less than 0.01.

Taking a closer look at the relation between MVA per capita and the net school enrollment in secondary education, in Mexico and Turkey both indicators are shown as the value relative to the value in 2000. Both countries experienced times of growth and times of contraction in MVA per capita over the period concerned. It can be seen that in periods with only moderate growth or even decrease in MVA per capita, the school enrollment rate also decreased or showed only moderate increase.
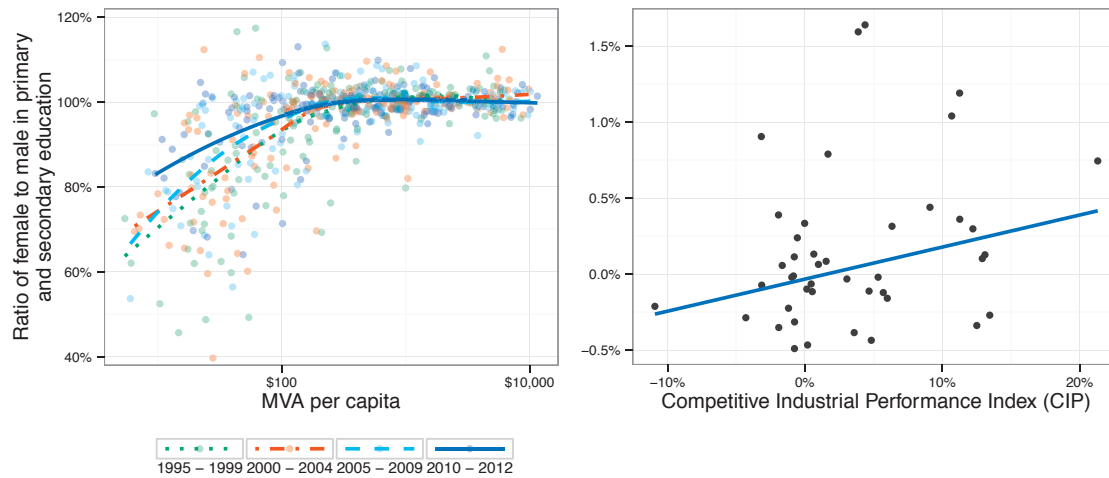
23

Ratio of female to male in primary and secondary education

1995 – 1999   2000 – 2004   2005 – 2009   2010 – 2012

Definition: Ratio of female to male in primary and secondary education is the percentage of females to males enrolled at primary and secondary levels in public and private schools.

Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics

To help raise women's status and improve their skills, gender disparities in education should be eliminated. A good indicator of these disparities is the ratio of female to males enrolled in primary and secondary education. While countries with a MVA of more than $100 per capita seem to have a more balanced ratio of female to males in primary and secondary education, countries below that value of MVA per capita show a major imbalance.

By plotting the *average yearly growth rate* of the CIP between 1990 and 1995 against the average yearly growth rate of the ratio of female to males enrolled in primary and secondary education between 2005 and 2010, we can see the effect of industrial development on gender disparities in education. Although only a few data points are available, a clear trend is visible. Countries with a growing competitive industrial performance from 1990 to 1995 also had a growing ratio of female to males in primary and secondary education between 2005 and 2010. Thus, it is clear that a rise in industrialization helps to improve the female to male ratio in primary and secondary education after about 10 years.

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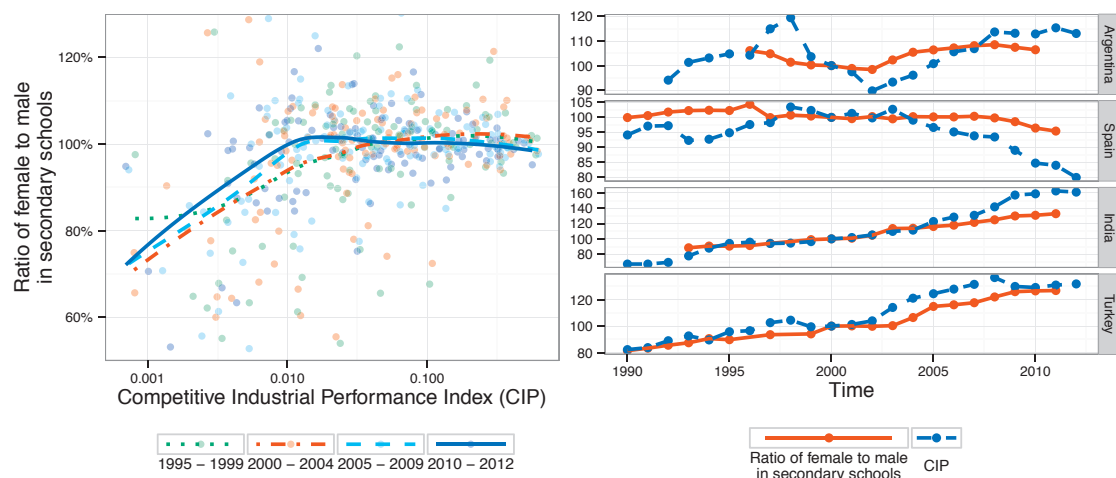
Definition: Ratio of female to male secondary enrollment is the percentage of females to males enrolled at secondary level in public and private schools.

Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics

The ratio of female to male secondary enrollment is even more related to a country's industrialization. As shown in previous graphs, countries with lower levels of industrialization also have a lower total enrollment rate in secondary school. In the graph above it is visible that they not only tend to have a lower total enrollment rate, but also more males than females are enrolled in secondary education. Therefore, it seems that education systems in countries with low industrialization tend to fail to provide young women with access to secondary education.

In the graph on the right the relation between the CIP and the ratio of female to male secondary enrollment is examined for countries with different levels of industrialization. The general conclusion is that regardless of the level of industrialization, the ratio of female to male secondary enrollment is directly proportional to the CIP. Even in industrialized Spain, in years with a decreasing CIP value the ratio of female to males in secondary schools fell. In the emerging economies of Argentina, India and Turkey the relation is even more pronounced. It is clearly visible that in the periods when the CIP index increased the ratio of female and male secondary enrollment also rose, and vice versa. In India and Turkey, where the CIP value climbed almost every year, the slope of the increase in the CIP value matches the slope of the growth of the ratio of female to males in secondary education.
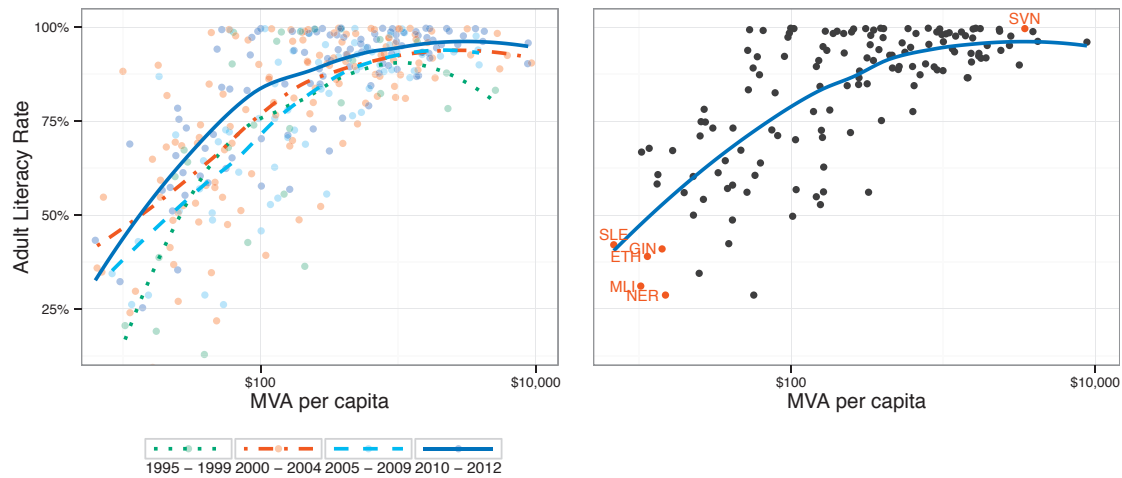
Youth literacy rate
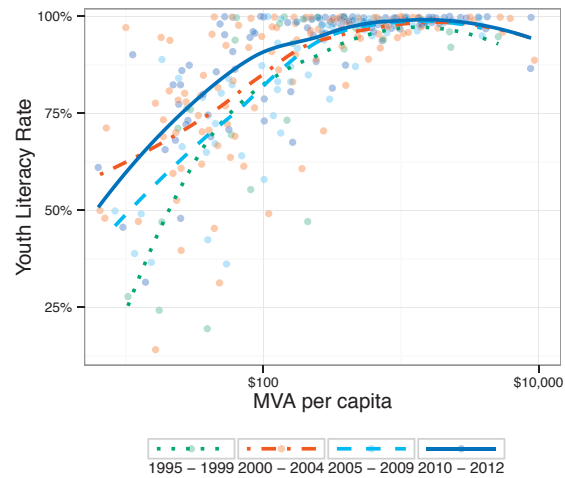
Definition: Youth literacy rate is the percentage of people ages 15–24 who can, with understanding, read and write a short, simple statement on their everyday life.

Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics

The literacy rate is an important measure of whether an education system has the capacity to provide a large population with opportunities to acquire literacy skills. The literacy rate of youths (ages 15–24) is a good indicator of recent progress in education.

It can be seen that, over time, the youth literacy rate generally increases for most countries. However, in countries with a MVA of less than \$100 per capita even reaching universal primary education is problematic.

Adult literacy rate

Definition: Adult literacy rate is the percentage of people ages 15 and above who can, with understanding, read and write a short, simple statement on their everyday life.
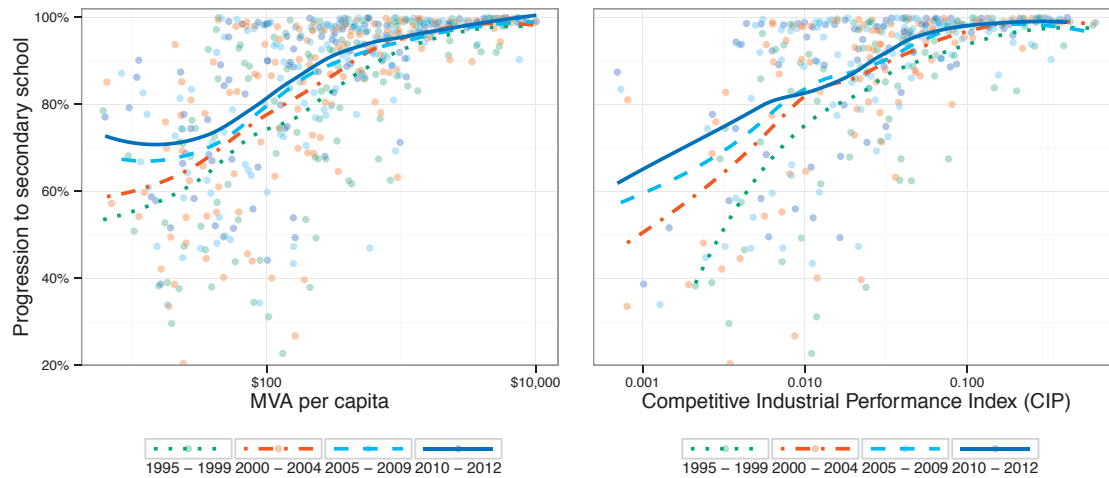
Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics UNDP: 2013 Human Development Report: UNESCO Institute for Statistics

Along with youth literacy, the rate of adult literacy in a country has an important role in gender equality. When women are literate they can seek and use information to improve the health, nutrition and education of their household members. Most countries report the literacy rate for the whole population aged 15 or older, thus reflecting not only the recent progress in the education system but also past achievements and failures.

The relation between MVA per capita and the adult literacy rate is very similar to that of the youth literacy rate. However, countries with medium MVA per capita, which have almost 100 percent youth literacy rates, have a small but noticeable illiterate population.

Taking a closer look at the adult literacy rate in 2012 shows that the bottom ranked countries in MVA per capita have a particularly large illiterate population. Niger, Mali, Ethiopia, Guinea and Sierra Leone are bottom ranked in both indicators. The resulting correlation of the ranks is 0.65 and indicates a strong relation between industrial development and the literacy rate.

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Progression to secondary school

Definition: Progression to secondary school refers to the number of new entrants to the first grade of secondary school in a given year as a percentage of the number of students enrolled in the final grade of primary school in the previous year.

Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics

A low progression to secondary school can indicate problems such as an inadequate examination and promotion system or insufficient secondary education capacity, as growing numbers of pupils completing primary school create pressure for more available places at secondary level.

The graphs at the top show that the transition rate from primary to secondary school is closely related to both MVA per capita and CIP industrial indicators. It is shown that the transition rate in countries with low industrialization also increased over time, however, there are still many pupils in those countries who do not progress to secondary school.

Burkina Faso · Ecuador · Costa Rica · Tunisia

Progression to secondary school — MVA per capita
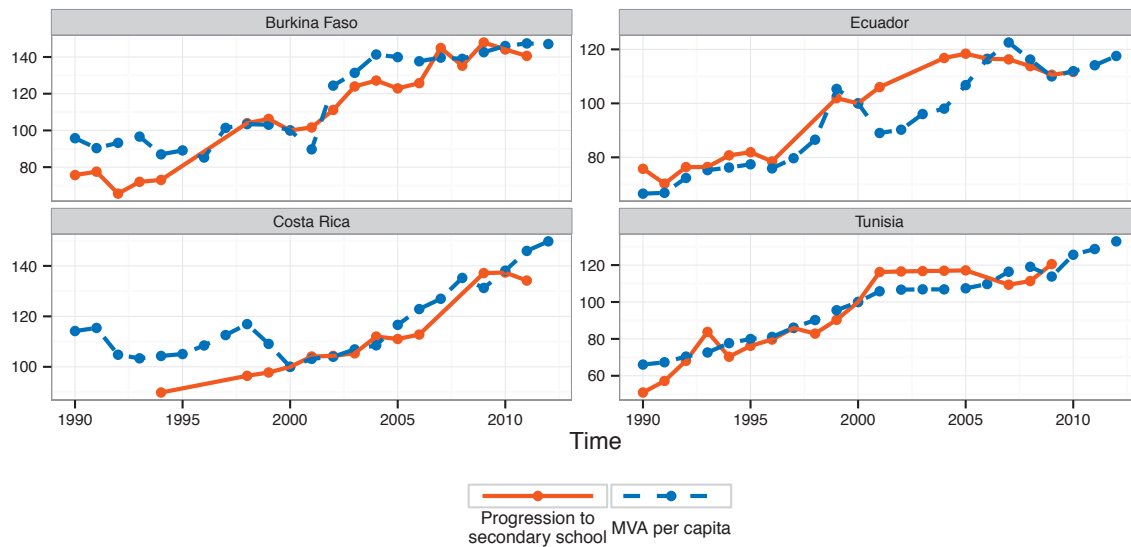
By plotting the progression to secondary school and the MVA per capita relative to values 2000, the high accordance between the two indicators can be seen easily. In Burkina Faso, a least developed country, MVA per capita and the progression to secondary school were almost one and a half times as high in 2010 as they were in 2000. In most years with a rise in MVA per capita, the progression to secondary school grew as well. In Ecuador, which has a developing economy, the rise in the rate of MVA per capita is also closely matched by the rate of progression to secondary school.

In the emerging economies Costa Rica and Tunisia, the progression to secondary school also increased and decreased in the same periods as the MVA per capita. Only the steep decline of MVA per capita in Costa Rica from 1999 to 2001 was accompanied by a moderate decline in the progression to secondary school for a single year. But in 2010, the progression to secondary school and the MVA per capita in Costa Rica were both 1.15 times as high as in 2000.
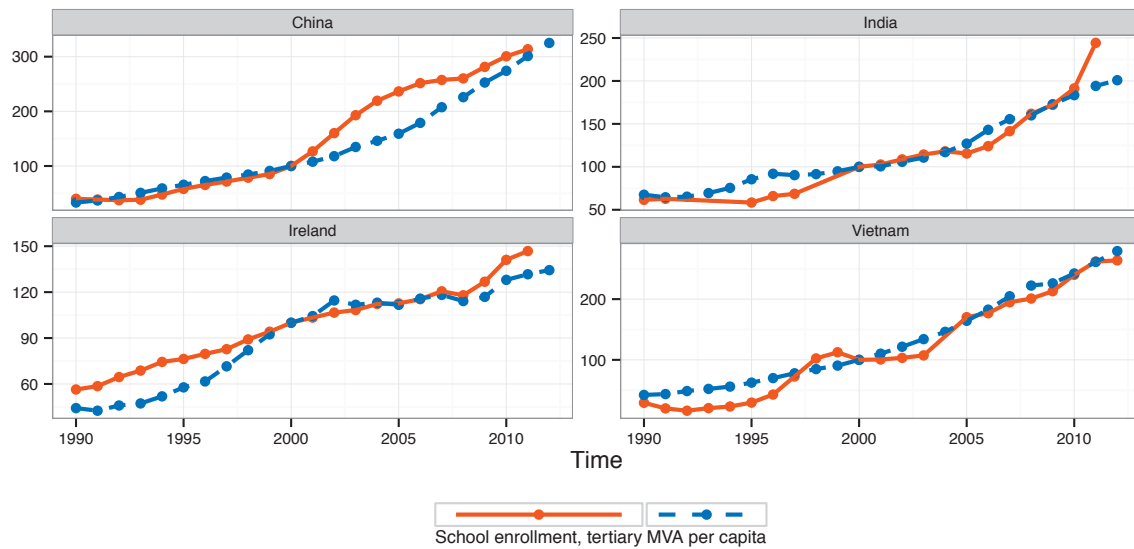
Enrollment in tertiary education
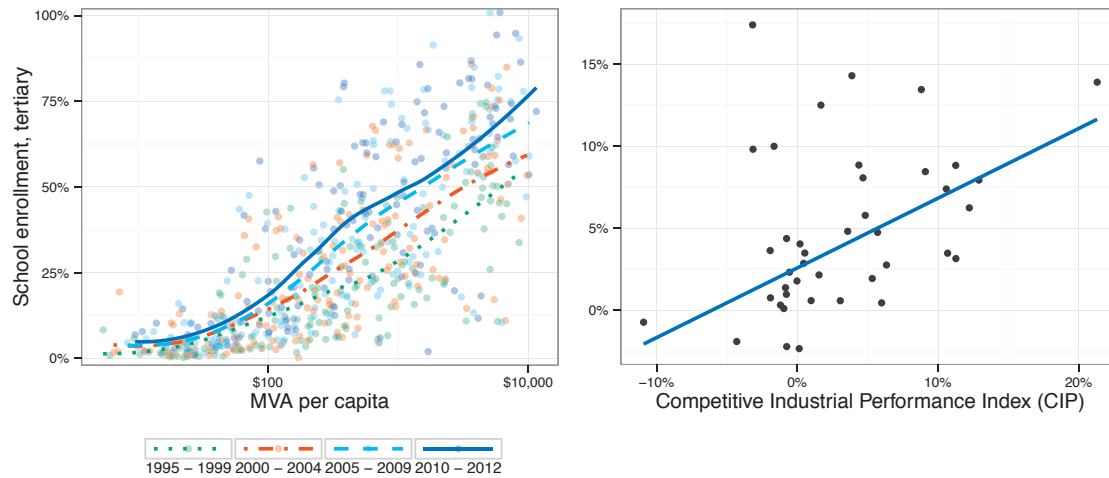
Definition: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

Source: The World Bank: World Development Indicators: UNESCO Institute for Statistics

As tertiary education usually requires the successful completion of education at the secondary level, countries must already have a high enrollment rate in secondary education to achieve a high enrollment rate in tertiary education.

This fact is clear from the above graph which shows that countries with a MVA per capita of less than $100, and which already have a low enrollment rate in secondary education, rarely have an enrollment rate in tertiary education of more than 25 percent. In these countries, this rate tended to remain static compared to countries with medium to high MVA per capita, where the enrollment rate in tertiary education steadily grew over time.

Looking at the next graph it can be seen that industrialization is not only related to the enrollment rate in tertiary education but also strongly influences it. The average yearly growth rate of the CIP between 1990 and 1995 is plotted against the average yearly growth rate of the enrollment rate in tertiary education between 2005 and 2010. A growing competitive industrial performance resulted in higher enrollment rates in tertiary education approximately 10 years later and no country with growing CIP between 1990 and 1995 had a decreasing enrollment rate from 2005 to 2010.

School enrollment, tertiary   MVA per capita

Taking a closer look at the relation between tertiary enrollment trends and MVA per capita for countries with different levels of economic development again reveals the high correlation between the two indicators. In the booming economy of China, MVA per capita and levels of enrollment in tertiary education were three times as high in 2010 than they were in 2000. In highly developed Ireland, there is also a clear match in tertiary education enrollment trends and MVA per capita. In 2008, MVA per capita and the enrollment rate in tertiary education both slightly decreased, rising again in 2009.

A similar trend is also visible in emerging country India. Relative to the year 2000, MVA per capita and the enrollment rate in tertiary education grew by almost 100 percent. In Tunisia, another emerging country, both indicators increased by even more. The trends again closely match each other and both indicators were more than twice as high in 2010 as they were in 2000.

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6 Industrial development and health

Health care facilities are more effective and accessible in industrialized countries.

**Inequality-adjusted life expectancy index**
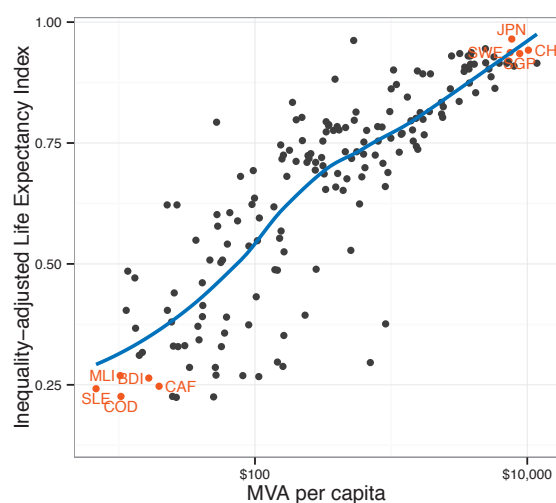
Definition: The inequality-adjusted life expectancy index refers to the HDI life expectancy index, calculated from the life expectancy at birth, adjusted for inequality in distribution of expected length of life based on data from life tables.
Source: UNDP: 2013 Human Development Report: Calculated based on abridged life tables from UNDESA (2011)

Life expectancy at birth is another major component of the Human Development Index. A high value of the inequality-adjusted life expectancy index means that a large part of the population has high life expectancy at birth.

Looking at data for 2012, one can see a clear relation between industrialization levels and the inequality-adjusted life expectancy index. In all but one of the countries with a MVA of $100 per capita and above, the life expectancy index is above 0.75 (corresponding to approximately 68 years). The resulting rank correlation is very high at 0.87. Japan, which has the highest life expectancy level, has the fifth highest MVA per capita, while Switzerland, Sweden and Singapore are also among the top 10 ranked countries in both indicators. The Democratic Republic of Congo, Sierra Leone, Burundi and Mali are ranked in the bottom 10 on both.

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Life expectancy at birth
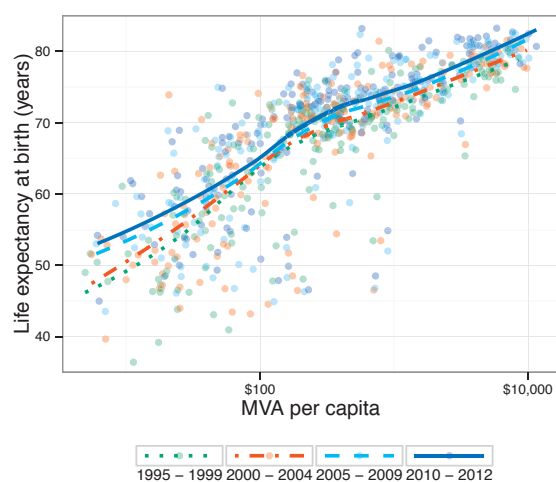
Definition: Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Source: The World Bank: World Development Indicators: Derived from male and female life expectancy at birth from sources such as: (1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.

Non-adjusted life expectancy also shows a high relation to MVA per capita from 1995 to 2012. Even though life expectancy increased overall from 1995 to 2012, it remains below 70 years in all but a handful of countries with MVA per capita less than $100. On the other hand, in the majority of countries with MVA per capita above $100 life expectancy is greater than 70 years.

Infant mortality rate
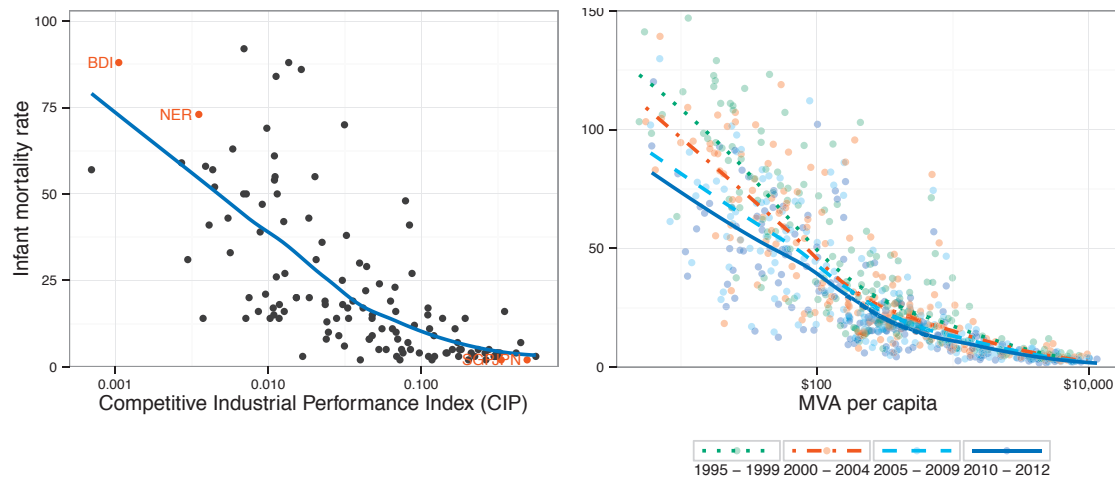
Definition: Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year.

Source: UNDP: 2013 Human Development Report: World Health Organization

Data for 2012 show that infant mortality rates fell in line with a rising CIP. Figures demonstrate that highly industrialized countries with a CIP of more than 0.1 all have an infant mortality rate below 2.5 percent, while most countries with an infant mortality rate of more than 5 percent also have a CIP index value of below 0.01.

The rank correlation of 0.77 indicates a high relation. Singapore and Japan are among the best 10 countries in relation to CIP and infant mortality, while the Central African Republic, which had the highest infant mortality rate in 2012, is ranked in the bottom 10 on both indicators along with Burundi and Niger.

As the graph on the right shows, although infant mortality rates have fallen all over the world, newborn babies in countries with a MVA per capita of less than $100 still have a high probability of dying before reaching the age of one.
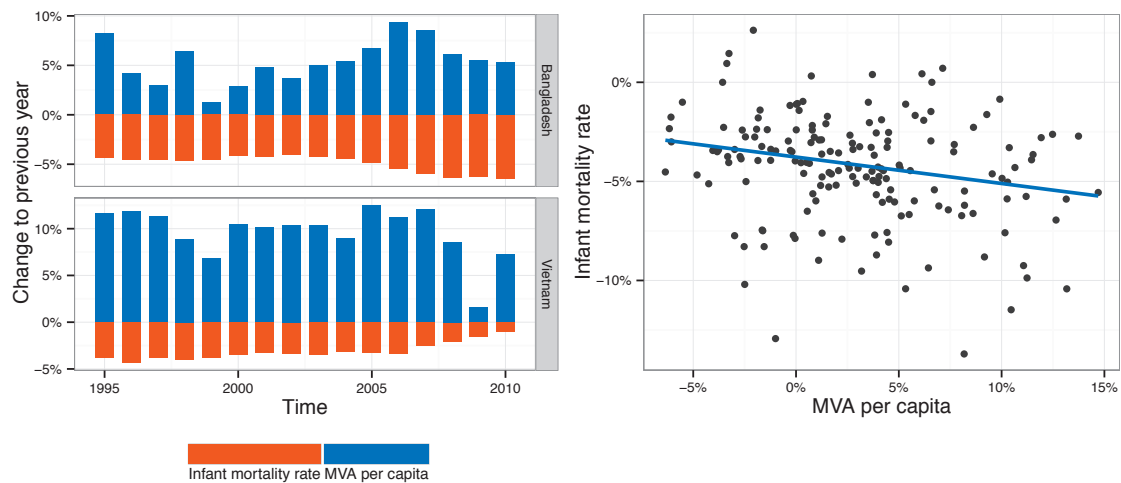
Source: The World Bank: World Development Indicators: Estimates developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UNDESA Population Division) at www.childmortality.org.

The chart on the left shows the annual change rate of MVA per capita and infant mortality from 1995 to 2010 for the least developed country Bangladesh and the emerging economy Vietnam. MVA per capita increased every year in both countries, while infant mortality fell.

Recent rates show a close resemblance to this historical trend. In Bangladesh, the growth rate of MVA per capita decreased slightly from 1995 to 2000 and then increased again until 2006. The opposite trend can also be seen for the infant mortality rate from 1995 to 2006. After 2006 the growth rate of MVA per capita slows again, while the rate of descent of the infant mortality rate stagnated.

In Vietnam, the growth rate of MVA per capita was almost constant from 1995 to 2007, as was the rate of decline in infant mortality. With the slowing of the growth of MVA per capita in 2008, the infant mortality rate also decreased.

The right-hand chart shows the effect of the average yearly growth rate of MVA per capita between 1995 and 2000 on the average yearly growth rate of infant mortality rate between 2005 and 2010. The figures indicate that the higher the growth rate of MVA per capita, the faster the infant mortality rate decreases five years later.

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Under-5 mortality rate
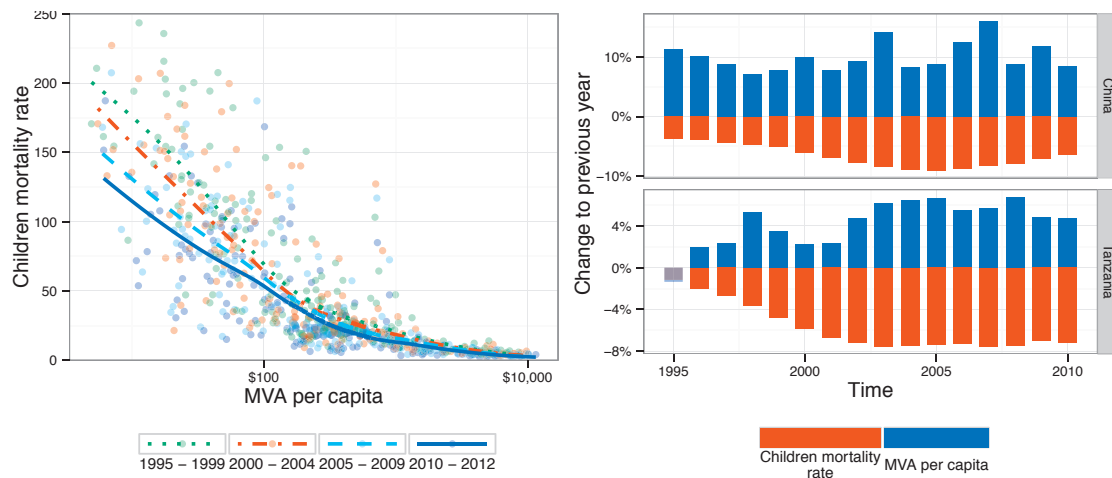
Definition: Under-five mortality rate is the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates.

Source: The World Bank: World Development Indicators: Estimates developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UNDESA Population Division) at www.childmortality.org.

The probability that a newborn baby will die before reaching the age of five decreases steadily with rising MVA per capita. Over time, child mortality rates have fallen in almost all countries around the world. Despite this, as recently as 2012 some countries with a MVA per capita below $100 still had a child mortality rate of above 15 percent, with very few in this category achieving rates below 5 percent. Conversely, highly industrialized developed countries had very low child mortality rates throughout the period examined.

The relation between industrialization and child mortality is visualized in more detail for China and the United Republic of Tanzania on the right. The chart shows the change in MVA per capita and in the under-five mortality rate for each year from 1995 to 2010. The graph shows not only that the under-five mortality rate decreased continuously as the MVA per capita grew, but also that they moved in tandem.

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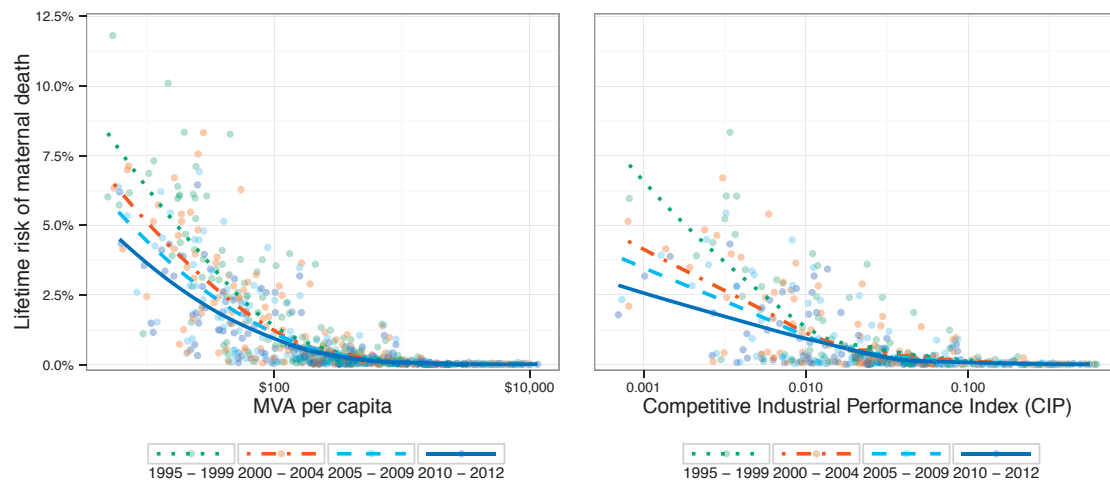
Maternal mortality ratio
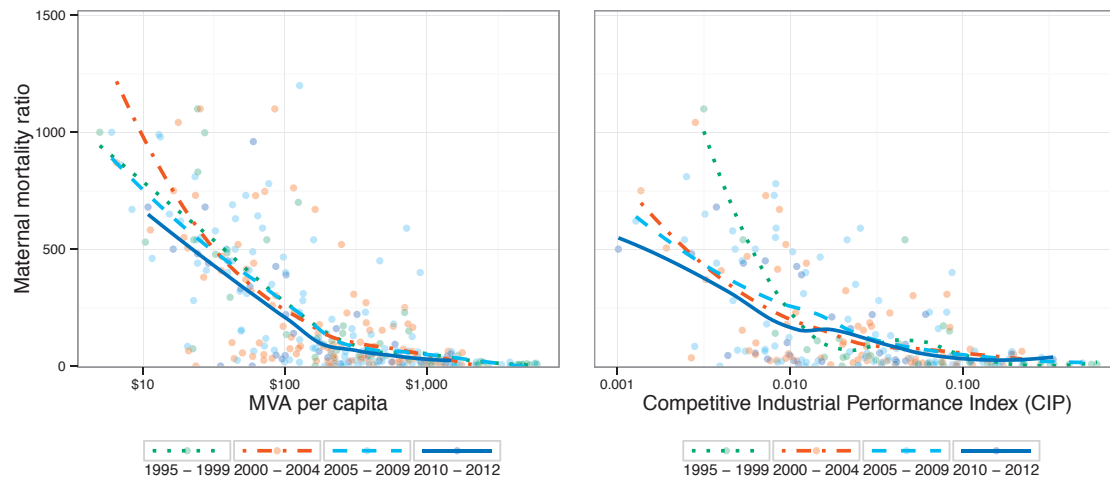
Definition: Maternal mortality ratio is the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births.

Source: The World Bank: World Development Indicators: UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys by ICF International

National estimates for the maternal mortality ratio are not available for all countries, but looking at the above graph it is clear that there are still many countries with a maternal mortality ratio of over 0.5 percent, in particular those where MVA per capita is less than $100. Between 2010 and 2012 the maternal mortality ratio was lower than in all previous periods, and in these recent years, countries with a MVA of more than $100 per capita had a maternal mortality ratio below 0.5 percent.

The relation between the maternal mortality ratio and the CIP is very similar.

Lifetime risk of maternal death

Definition: Life time risk of maternal death is the probability that a 15-year-old female will die eventually from a maternal cause assuming that current levels of fertility and mortality (including maternal mortality) do not change in the future, taking into account competing causes of death.

Source: The World Bank: World Development Indicators: Trends in Maternal Mortality: 1990-2010. Estimates Developed by WHO, UNICEF, UNFPA and the World Bank

In countries with a medium or highly developed industry, the lifetime risk of maternal death is very low. But despite an overall downward trend, in countries with less than $100 MVA per capita, or with a CIP below 0.01, the risk of maternal death is still a concern. Countries with a CIP value above 0.1 have all had a lifetime risk of maternal death of almost zero since 1995, while countries with a CIP between 0.01 and 0.1 seldom exceed a risk of 2.5 percent.
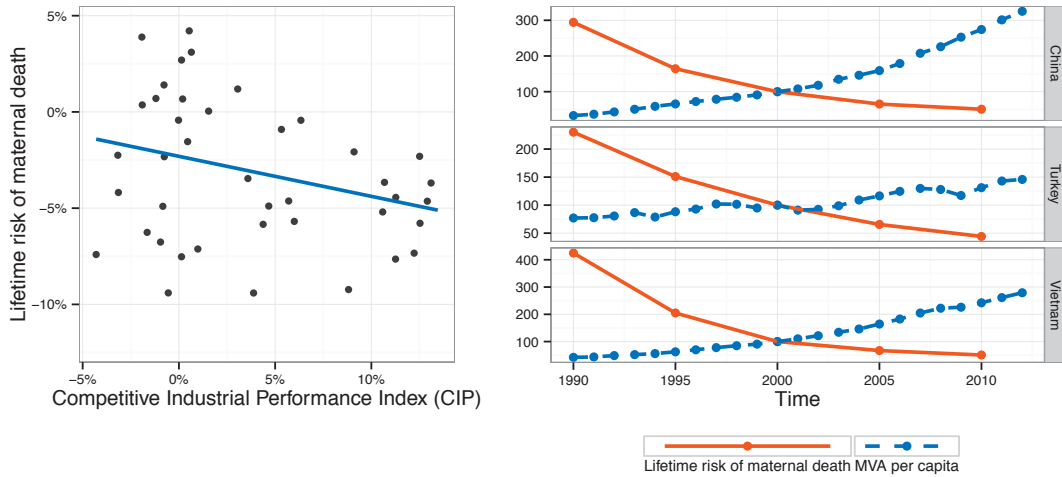
Studying the average yearly growth rate of the CIP index from 1990 to 1995 in relation to the average yearly growth rate of the lifetime risk of maternal death between 2005 and 2010, one can see a positive correlation. Higher industrial growth results in a faster reduction of the lifetime risk of maternal death about 10 years later.

Comparing the trend of MVA per capita and the lifetime risk of maternal death for China, Turkey, and Vietnam, fast growing industrialization seems to be accompanied by a rapid decline in the risk of maternal death. From these three countries, Turkey's industry grew the slowest and the lifetime risk of maternal death decreased at the smallest rate. Vietnam on the other hand, managed to reduce the lifetime risk of maternal death in 2000 to a quarter of the value seen in 1990.
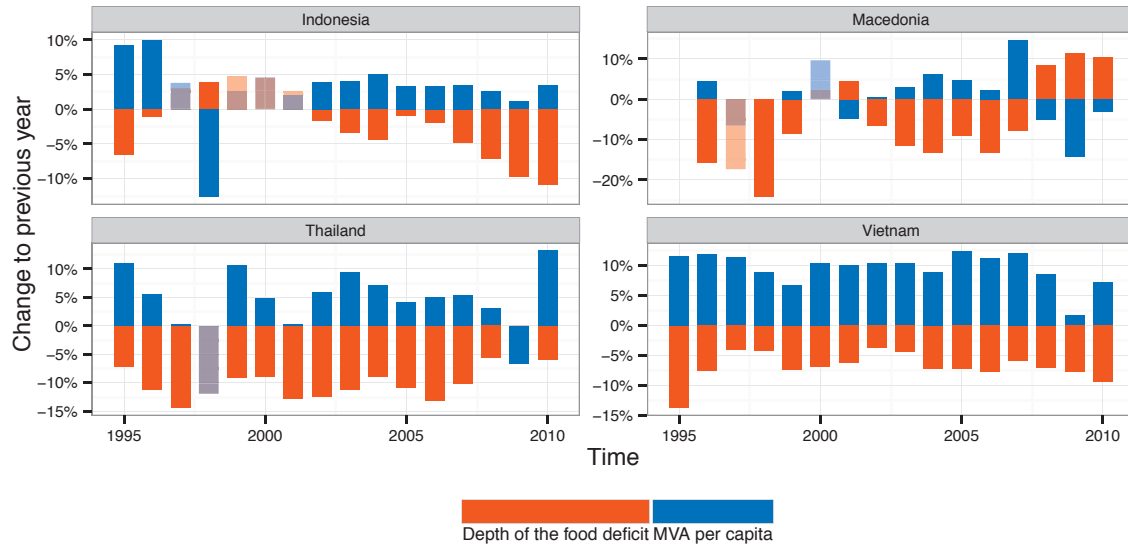
Depth of the food deficit
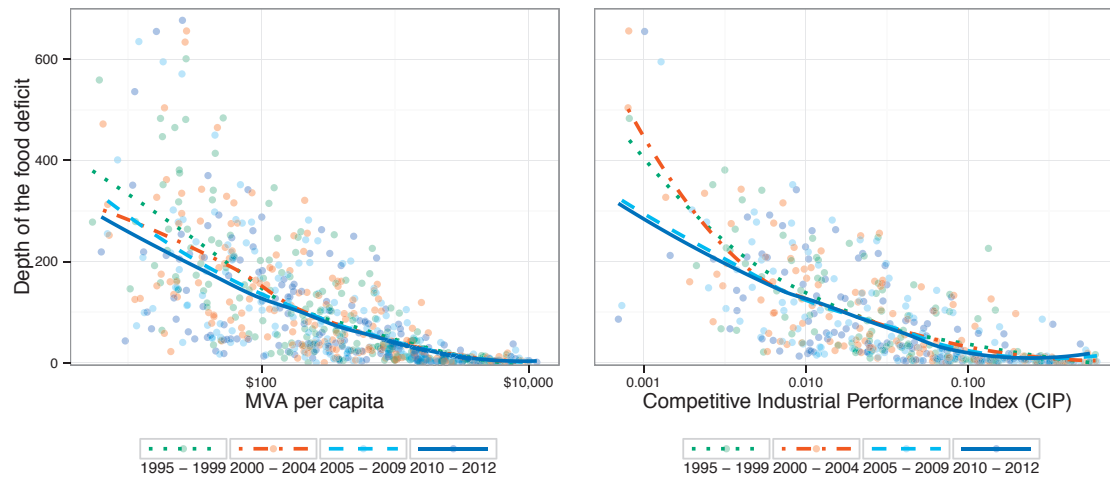
Definition: The depth of the food deficit indicates how many calories would be needed to lift the undernourished from their status, everything else being constant. The average intensity of food deprivation of the undernourished, estimated as the difference between the average dietary energy requirement and the average dietary energy consumption of the undernourished population (food-deprived), is multiplied by the number of undernourished to provide an estimate of the total food deficit in the country, which is then normalized by the total population.

Source: The World Bank: World Development Indicators: Food and Agriculture Organization, The State of Food Insecurity in the World

The graphs indicate that the more industrialized a country is, the lower the depth of the food deficit. Only very few countries with a MVA above $100 had a depth of food deficit of more than 200 kcal per day and almost no countries with a CIP above 0.1 had a food deficit depth of more than 100 kcal per day in any time period.

The charts above show the annual change rates of the depth of the food deficit and of the MVA per capita in the four emerging economies of Indonesia, the former Yugoslav Republic Macedonia, Thailand, and Vietnam.

In Indonesia the depth of the food deficit decreased when MVA per capita rose and vice versa. A steep decrease in MVA per capita from 1997 to 1998 saw a rise in the depth of the food deficit for three additional years, even though MVA per capita increased slowly again after 1998.

In the Former Yugoslav Republic of Macedonia, the depth of the food deficit also developed in the opposite direction of MVA per capita over most of the period. The recent decline of MVA per capita from 2008 to 2010 was accompanied by an increase of the depth of the food deficit, while from 2002 to 2007 MVA per capita grew and the depth of the food deficit declined.

In Thailand and Vietnam, MVA per capita increased in almost every year while the depth of the food deficit decreased in every year from 1995 to 2010. Only from 2008 to 2009 did MVA per capita decrease in Thailand while the food deficit depth remained exactly the same.

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Prevalence of child malnutrition
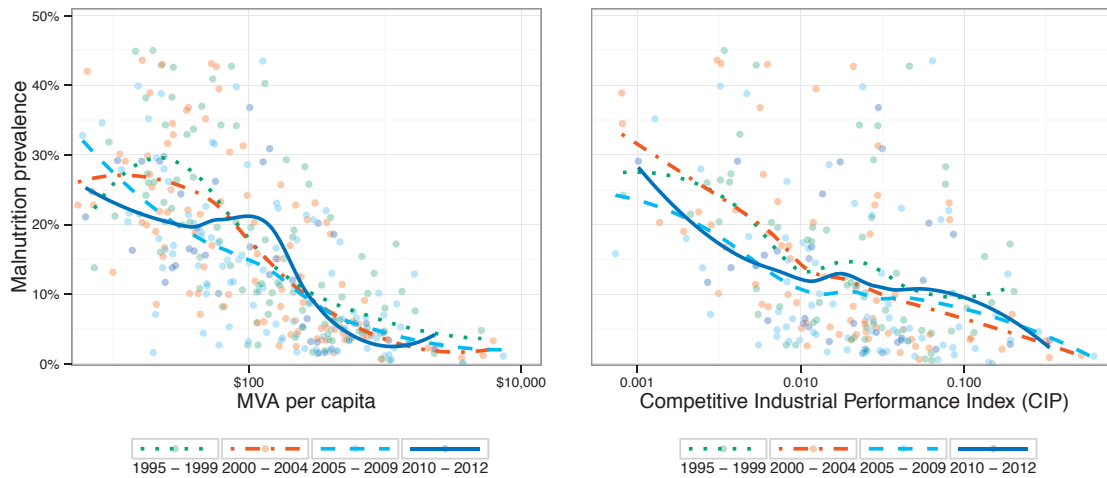
Definition: Prevalence of child malnutrition is the percentage of children under age 5 whose weight for age is more than two standard deviations below the median for the international reference population ages 0-59 months. The data are based on the WHO's new child growth standards released in 2006.

Source: The World Bank: World Development Indicators: World Health Organization, Global Database on Child Growth and Malnutrition.

According to UNICEF, "good nutrition is the cornerstone for survival, health and development. Well-nourished children perform better in school, grow into healthy adults and in turn give their children a better start in life. Well-nourished women face fewer risks during pregnancy and child-birth, and their children set off on firmer developmental paths, both physically and mentally". (www.childinfo.org)

Measuring malnutrition prevalence against industrial development, it is clear that higher levels of industrialization mean lower rates of malnutrition. Between 2010 and 2012 in about 90 percent of countries with a MVA of more than $100 per capita, malnutrition prevalence was less than 20 percent, while in 42 percent of countries with a MVA per capita below $100, malnutrition prevalence was over 20 percent. A similar conclusion can be drawn from the relation between malnutrition prevalence and the CIP index.
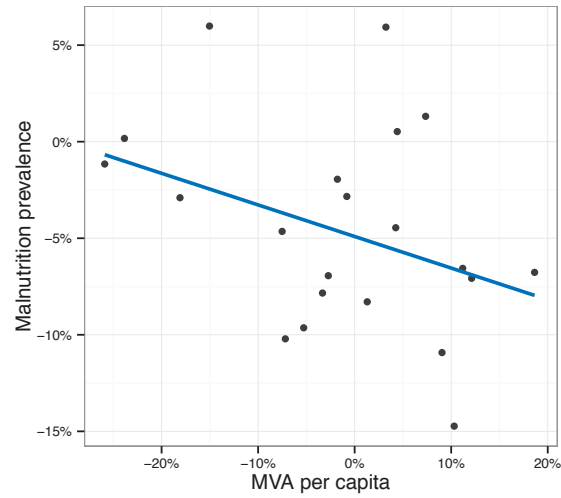
Although data is patchy on the effect of growing industrialization between 1990 and 1995 on the drop in malnutrition, what figures are available show a discernible trend. The higher the average growth rate of MVA per capita in a country in those years, the faster the rate of malnutrition prevalence fell between 2005 and 2010.

Access to an improved water source
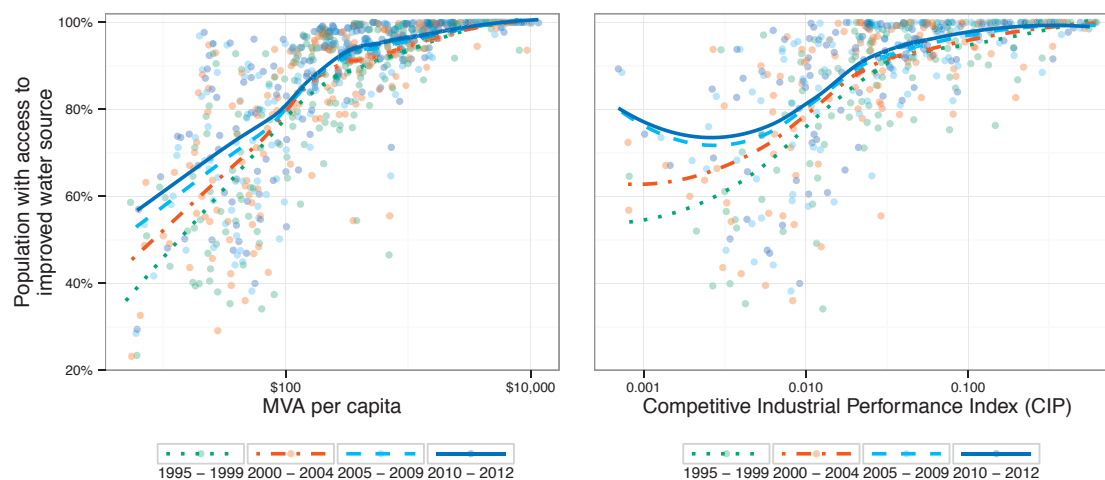
Definition: Access to an improved water source refers to the percentage of the population using an improved drinking water source. The improved drinking water source includes piped water on premises (piped household water connection located inside the user's dwelling, plot or yard), and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection).

Source: The World Bank: World Development Indicators: WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation

As water is the most important resource for sustaining ecosystems, access to an improved water source is crucial. However, countries with low levels of industrial development are often unable to provide these basic necessities to their populations.

There is no country in the world which has MVA is below $100 per capita or a CIP index value of less than 0.01 where the whole population has access to an improved water source. Overall access to improved water sources has expanded over time and in most countries with medium and high levels of industrialization almost the whole population has access to an improved water source.

From 2005, only a handful of countries with MVA per capita above $100 could not provide more than 80 percent of the population with an improved water source.

7 Conclusion

Statistics presented throughout the report show a clear and strong connection between industrialization and the three basic dimensions of human development: poverty, education and health. When MVA per capita rises by 1 percent, the poverty head count decreases by almost 2 percent. It is also evident from the report that poverty is most prevalent in least developed economies. At the same time, figures demonstrate that a higher level of competitive industrial performance, as measured by the CIP index, means more children in secondary school. When the CIP value is above 0.1 school enrollment rates for secondary education exceed 75 percent. Finally, living a long and healthy life is much more likely for people in more industrialized countries, as seen by the significantly lower levels of child mortality and lifetime risk of maternal death experienced in countries with higher levels of industrialization.

On every important measure, adjust or not adjusted for inequality, human development is greater in industrialized countries.