

Poverty, prices and international inequality

Project outline (without administrative details), Norwegian Institute of International Affairs

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1. Introduction

Poverty depends on prices in two essential ways: First; the real income of the poor depends directly on the prices they pay for their consumption. Second; most of our knowledge about poverty and inequality depends crucially on our ability to measure and understand prices in developing countries. The reason is that the real incomes in poor countries are technically adjusted for international price differences in order to become comparable. This entails multiplying the nominal income of poor countries by up to six or seven, to make them comparable to those of rich countries. In this project proposal, we suggest that the methods used for this price adjustment are uncertain and potentially leads to large measurement errors. By relatively minor technical adjustments in the method applied, we may scale worldwide poverty up or down by several hundred millions. The purpose of this project is therefore to contribute to a better understanding of prices in poor countries, and how they should be measured in analysis of international inequality and poverty.

What is the practical or policy relevance of such a study? The project may have some policy relevance by contributing to better knowledge about how globalisation affects poverty via prices, and thereby how trade policy should be shaped in order to reduce – or not increase – poverty. The main policy impact will however be indirect, by attempting to improve our ability to measure and assess poverty in the context of other policies related to poverty. For example, we maintain that current knowledge about trend in global poverty over time is uncertain, and we may therefore know only very approximately whether and to what extent the Millennium Development Goal (MDG) on poverty was actually achieved.

As an illustration, consider the analysis of past trends in poverty presented by the World Bank; the leading supplier of background analysis for the MDGs. The early World Development Report titled “Attacking Poverty” (World Bank 2000) showed little progress; World Bank (2002) concluded that the number of poor worldwide had been reduced by 200 million from 1980 to 1998; and Chen and Ravallion (2004) suggested a reduction of almost 400 million. Deaton (2002) states that if the WB reports “continue to contradict each other, the Bank risks losing the authority to monitor its own success, and no one will know whether or not the Millennium Development Goals are being achieved.” The World Bank has done a great effort in order to improve our knowledge about poverty, but this is a difficult task where even more effort is needed.

There is some but not a very large amount of research internationally in the field to be covered by the project; and the project will attempt to be innovative by exploring new approaches. The project is therefore relatively small-scale; with the purpose of proving the merits of these approaches, as well as developing an international network beyond the cooperation partners we already have. If successful, the project can be expanded at a later stage, since the questions addressed are important and difficult enough to warrant a larger-scale effort.

In terms of research platform, the project will exploit experience from work on international inequality on one side; and on economic geography and new trade theory on the other. As noted above, international price differences constitute a core challenge for analysing international inequality and global poverty. When the question is asked why prices are lower in poor countries, the standard answer is still based on trade theory from the 1960s; the Balassa-Samuelson framework (Balassa 1964, see explanation later). While the Balassa-Samuelson explanation is still a seminal contribution that is not “out of date”, we believe that ideas from later research could fruitfully be added to the explanation of international price differences. For example, recent work of entry barriers and sunk costs in international trade might contribute to the explanation of why some markets remain “segmented” in spite of international integration. According to Dowrick and Akmal (2005), price structures in rich and poor countries have become less similar in recent years, and as a consequence, some of the currently applied methods for price level adjustment lead to an exaggeration of economic growth in poor countries. But international integration should – according to our intuition – lead to price convergence rather than divergence, and the Dowrick-Akmal result suggests the opposite. We need new tools and more empirical work in order to understand why, and the ambition of the project is to contribute. The project will therefore “import” concepts from economic geography and trade theory into the analysis of inequality and poverty, which has so far been dominated by standard microeconomics and index number theory.

2. Poverty, international inequality and the impact of price levels

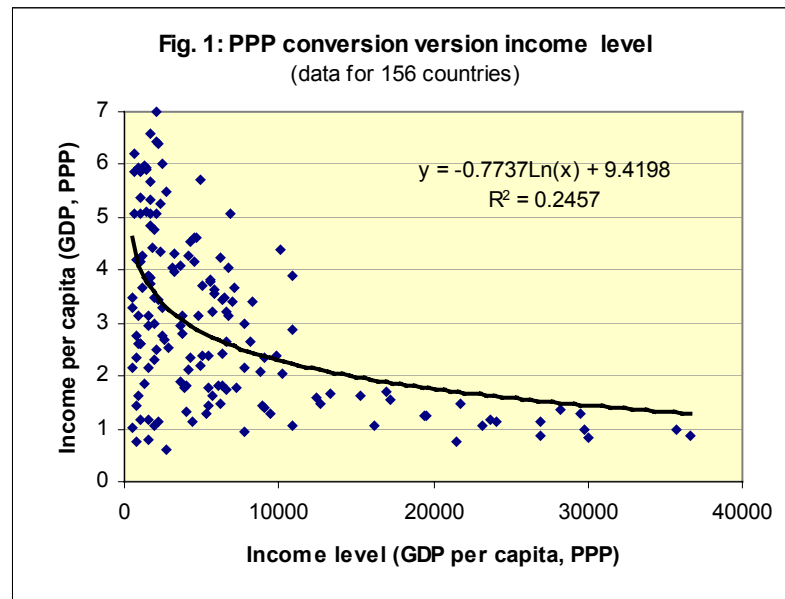
Poverty can be measured in different ways, and there is no universal agreement on the preferred method, which should probably vary with the purpose at hand. An important distinction is between *absolute* and *relative* measures. For national studies of poverty, relative measures are often used. An example of such a measure is “the number of people with an income below 1/3 of the national median income” (see e.g. Mongstad et al., 2005). In this case, the number of poor is unaffected by international comparison. Hence we do not need to adjust for international price level differences.

Using purely relative poverty measures, we could double the income of all citizens in the world, with no impact on worldwide poverty at all. In the context of global poverty, misery and starvation, most people would find such an approach not so plausible. Concerning worldwide poverty, the main focus has been absolute poverty measures such as “the number of people living on less than 1\$ a day”. Such “headcounts” have been provided by the World Bank, and has played a main role in the formulation of the MDG on poverty. In this project, we shall focus on such absolute poverty measures.

According to the most recent World Bank figures, there were 1.1 billion people living in absolute poverty (below 1\$/day) in 2001, compared to 1.2 billion in 1990. With a growing world population, the fraction of absolutely poor declined from 28 to 21%. MDG number 1 states that this proportion should be halved from 1990 to 2014, to 14%. Given the predicted rate of population growth, a reduction to 900 million poor in 2015 is sufficient to reach the overall target (Melchior 2005). The prospects for Asia and the world as a whole are optimistic, while the picture for Africa is more dismal.

While the measure of 1\$/day may sound simple, it is actually a big task to construct the estimates, involving huge data collection projects. For a survey on procedures and problems, see Melchior (2005a). The current poverty figures are based on household surveys from 97 countries; with the most recent set covering 1.1 million households. From this we get income or consumption in local currency and data on income distribution that can be extrapolated to the whole population in each country. In order to make these data internationally comparable, we cannot use ordinary exchange rates but so-called PPP (Purchasing Power Parity) estimates that adjust for price level

differences. Diagram 1 illustrates the importance of this procedure, by plotting the “scaling effect” (how much GDP is adjusted by PPP conversion) against income level (GDP per capita).¹



For countries with high prices, GDP is adjusted downward, so the ratio is below one. The majority of countries, however, have prices below the U.S. level, so their income is upward adjusted. We see from the diagram that this is particularly the case for poor countries, and that the scaling of real income due to price level adjustment range up to 6-7. The PPP adjustment is therefore a major transition of the data.

For constructing the PPPs, The World Bank relies on price surveys undertaken in more than 100 countries. This is undertaken in cooperation with OECD and Eurostat, in the International Comparison Program (ICP). For the current poverty estimates, the World Bank relies on surveys in 117 countries around 1993, and PPPs for another 38 countries are added by means of extrapolation.²

Having the price data, the final step is to use some method in order to calculate the PPPs. Several methods are possible but there are two methods that have been competing for the “hegemony”: The EKS method (named after three Central European analysts that created the method) and the Geary-Khamis (GK) method. The World Bank, the ICP and the so-called Penn World Tables of real income (see Kravis et al. 1982, or Heston et al. 2002 for the latest version) have mainly relied on GK, but for the latest poverty estimates from the World Bank, the EKS method has been used. OECD, on the other hand, has used EKS since 1990; although it currently also publishes alternative estimates using GK (OECD 2004).

There is a considerable literature on the merits of these two and other methods, but here we shall limit ourselves to a few highlights.³ It is generally acknowledged that

¹ We have used data on GDP per capita from the World Development Indicators (World Bank 2004). Data are generally from 2002, with some observations replaced with adjacent years due to limited data availability.

² See World Bank (2003) or Ahmad (2003) for a description of current methodology, and Ahmad (1994) on the earlier use of extrapolations.

³ For useful overviews and discussions see Balk 1996, Caves et al. 1982, Diewert 1999, Hill 1997, Neary 2004, Nuxoll 1994.

both the EKS and GK methods have their weaknesses. GK is a procedure whereby a hypothetical world price structure is constructed, and this is used to value consumption of the different goods and services. According to Nuxoll (1994), this hypothetical world price in the intermediate range, and estimates for countries with very deviating price structures will be biased. For example, if a poor country has extremely low prices for some services and therefore high consumption of these, the value of this consumption will be boosted by the GK estimates. This “substitution bias” or “Gerschenkrohn effect” as it is also called (ibid., see also Neary and Gleeson 1997), is a main potential weakness of the GK method. The EKS method is constructed so that it largely avoids this problem (see e.g. OECD 2004, 31). On the other hand, it may not be an advantage that EKS gives all countries, small and large, the same weight, and also results in real expenditure calculations that are not additive.

Table 1 shows some results from Melchior (2005a), which illustrate how the estimate on worldwide poverty in 2001 depends on the PPPs used in the calculation:⁴

	% poor	Method	PPPs for
Replication of World Bank estimates	20.7	EKS	Consumption
With PPPs from World Bank (2004)	18.2	GK	GDP
With PPPs from Penn World Tables	15.1	GK	GDP
With PPPs from Penn World Tables	16.3	GK	Consumption

Hence just by varying the PPPs, we may change the global poverty incidence by up to 5.6% - a difference of almost 300 millions. We thereby do not say that the World Bank estimates are wrong, but that they are sensitive to the PPPs. For example, the World Bank decision to use PPPs for consumption rather than GDP for the purpose of poverty headcounts seems plausible, and the PWT results suggest that this leads to an increase of 1.2% in the poverty estimate.

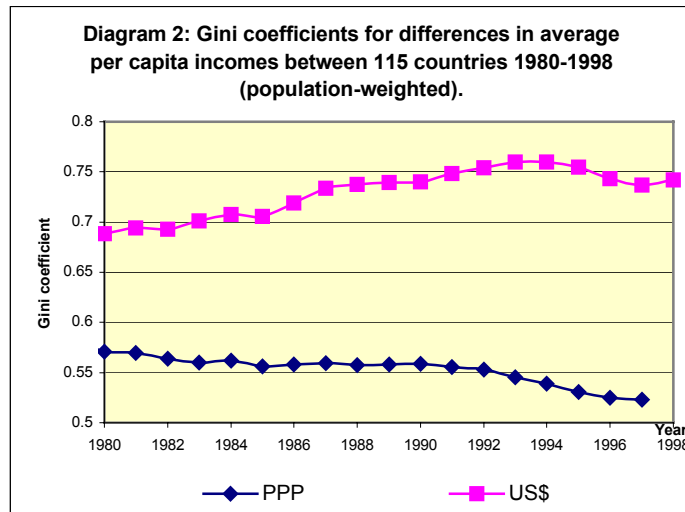
3. Measuring inequality and poverty: What are the problems?

A core problem which applies to poverty measurement as well as analysis of growth differences between countries is that we have too little knowledge about the behaviour of PPPs over time. In the most recent set of poverty data, this has been solved by using only one selected year for the cross-country comparison (1993), and national data for changes backward and forward from that year. When we get the new results from the current ICP survey, what shall we do if the results do not fit in with in with the extrapolated figures? Shall we just throw away the current poverty data, and revise the estimates for changes over time once more?

The problem becomes visible when we consider growth, inequality or poverty over long periods. As a point of departure, we may we may show the following diagram on international income inequality, based on results from Melchior and Telle (2001).⁵

⁴ Calculations are undertaken with PovcalNet, and interactive tool provided by the World Bank. The PWT data are taken from Heston et al. (2002).

⁵ See also Melchior et al. (2000), Melchior (2001).



The diagram shows Gini coefficients for inequality between countries, with observations weighted by population. The PPP data (GK data from the World Bank) suggest that international inequality has been steadily reduced, while income data based on nominal exchange rates indicate the opposite.

Dowrick and Akmal (2005) agree that nominal exchange rates exaggerate international inequality. On the other hand, they also maintain that the PPP data based on GK underestimate inequality due to the “Gerschenkrohn effect”. Since price structures between rich and poor countries diverge over time, the underestimation of inequality increases over time. For the OECD in the 1980s, price structures converged so the opposite was the case; GK data underestimated the extent of income convergence (Dowrick and Quiggin 1997, see also Dowrick 2002). Using an alternative index, Dowrick and Akmal suggest that the true development in Diagram 2 should be a flat line, with little change over time.

Another indication of a problem is that there seems to be a discrepancy between data on real income growth and data on poverty. Sala-i-Martin (2002a, b) use the standard GK-based international income data, combine this with Deininger-Squire data on income distribution (Deininger and Squire 1996), and derive the implications for poverty. Along with the results of Bhalla (2002), Sala-i-Martin’s results suggest that poverty should be more limited, and it should have declined faster than suggested by the WB estimates. Sala-i-Martin finds that the 1\$ poverty headcount figure declined from 554 millions in 1970 to 353 millions in 1998; i.e. far below the WB estimates. We have already noted that the GK income estimates may be one explanation for the difference.⁶

Deaton (2005) also examines this discrepancy between growth figures and poverty figures. He concludes that growth figures from national accounts are upward biased, while measures of consumption from surveys are downward biased. The implication is that poverty headcounts based on surveys are upward biased. He (p. 17) states “there is no credibility to the claim that globalization has been good for the poor based on calculations that applies badly measured distributional shares to (upward biased) measures of growth from the national accounts”. Nevertheless, we do not yet have a convincing explanation of the gap. If the critique of Dowrick and Akmal (2005) is correct, it would have severe implications for almost all research on international growth

⁶ The uncertainty concerning the Deininger-Squire data is also an element, see Atkinson and Brandolini (2001).

and income differences. More work is needed in order to draw a firm conclusion.⁷ Hence the problems and uncertainties related to PPPs apply to poverty measurement as well as research and analysis on cross-country differences in growth rates and international inequality.

This crucial uncertainty about international inequality as well as poverty is the main point of departure for this project. In addition, there are numerous other methodological and practical challenges involved in the process behind current poverty figures. There are important questions about

- data quality; in spite of large-scale efforts to improve data there are still anomalies that one discovers by a closer look at e.g. the household survey data (see e.g. Szekely et al. 2000 on the implications, or Deaton 2005 on the difference between income levels from national accounting data and the household surveys);
- the results for individual countries; several authors e.g. believe that the World Bank's poverty estimates for India – the country with the largest number of poor – are upward biased⁸;
- the inflation adjustment of the poverty threshold over time; it was set at 1\$ in 1985 prices and then adjusted to 1.08\$ in 1993 prices, but was this enough in the light of U.S. inflation?⁹
- concerning data, an issue is also whether the price surveys undertaken are appropriate for poverty measurement or whether poor people face different prices so that special “poverty PPP data” should be collected. If prices are collected in the cities, which is actually often the case, they may be different from rural prices. If poor people face lower prices than those collected by the ICP, the extent of poverty will be overestimated.¹⁰

While such issues may be relevant throughout the project, we leave out a more detailed assessment, for the sake of brevity.

From the above, it is evident that the project will focus on the relationship between *international inequality and poverty*. We therefore do not focus on domestic inequality. Using the most recent World Bank figures on global poverty, we find that 98% of the world's poor live in low-income and lower-middle-income countries (Melchior 2005a). The extent of poverty is partly due to the inequality between countries – the international inequality – or the inequality within countries – the national or domestic inequality. Based on the international literature (see e.g. Milanovic 2002, Bourguignon and Morrisson 2002, Sprout and Weaver 1992), there is nevertheless little doubt that international inequality is a more important determinant of global poverty than domestic inequality. The intuition is that on the whole, international income gaps are larger than domestic gaps.

⁷ Sala-i-Martin (2002b) e.g. argues that the country coverage of the Dowrick-Akmal analysis is important for the results.

⁸ See Bhalla (2002), Deaton and Dreze (2002) and Deaton (2003).

⁹ See the debate in Chen and Ravallion (2004), Ravallion (2002), Bhalla (2002), Reddy and Pogge (2003).

¹⁰ Rao (2003) discusses the issues and concludes that current evidence suggests that prices paid by the poor are not higher than those prevailing in general, and in some cases there is evidence that poor people face lower prices. A potential reservation is that an adjustment for product quality could modify this conclusion. Rao recommends that additional price surveys are undertaken to collect price data for “poverty PPPs”. This will undoubtedly be very costly, so an alternative (ibid.) is to use ad hoc methods, for example adjusting for different consumption shares for poor people.

4. Theoretical platform

Much on the literature on PPP and price level adjustment is rooted in standard microeconomics and index number theory (see e.g. Diewert 1999). In this approach, methods of price adjustment are assessed using axioms and general economic criteria (e.g. whether substitution in consumption is properly accounted for). In the index number approach underlying the PPP calculations, there is no theory about economic structure or why prices differ. In order to assess possible biases over time, it would be useful to know more about the determination of price differences. For example, it is a paradox why price structures should diverge internationally in a period of globalisation and freer trade. A possible explanation could be growth in the services sectors. With specific knowledge about why price structures change, we may in turn examine how the PPP methods capture these changes.

When the issue of why poor countries have lower prices is raised, the theoretical workhorse since the 1960s has been the so-called Balassa-Samuelson (BS) theory (see e.g. Balassa 1964, Kravis et al 1983). This theory explains differences in prices the following way:

- a) Prices for tradable goods are equalised across countries, and countries with higher productivity in the traded sector have higher wages.
- b) These wages also apply to the non-traded sectors, but the productivity gaps are smaller in these.
- c) Therefore, the country with higher productivity in the traded sector has higher prices in the non-traded sectors.
- d) Since the overall price level is an average for traded and non-traded sectors, the overall price level is higher in the more productive or richer country.

The BS theory has received some but not unambiguous support (see e.g. Rogoff 1996). A promising alley of research currently is to exploit properties of new trade theory where firms face entry barriers in foreign markets.¹¹ Such barriers provide an explicit reason why markets remain segmented and prices differ (see e.g. Bergin et al. 2004, Ghironi and Melitz 2004). According to empirical research, it is not always the case that freer trade leads to immediate price convergence, as in the BS framework (see e.g. Cheung et al. 1999, DRI 1997). A possible approach to international price differences and PPP is therefore to improve knowledge about why prices differ and how this evolves over time as poor countries grow. For example, poor countries have lower consumer prices but higher equipment prices (Eaton and Kortum 2001), and an issue is how this evolves over time and how it is or should be captured by PPPs.

This “structural” approach to prices and PPP could be a useful supplement to the standard microeconomic or index number approach that has dominated work in the field. It will form an important point of departure for the project. The project will however draw on the whole existing research base in the field, including index number theory when appropriate.

5. What will be the contribution of the project?

The project is relatively small-scale, with 10 man-months in 2006-2007. The research will be a combination of theoretical and empirical work. The analysis will focus on particular aspects of prices, with the purpose of deriving implications for poverty analysis and measurement.

¹¹ Concerning own contributions in the field, see Medin and Melchior (2002), Melchior (2003, 2004, 2005b).

For the empirical work, price data from the ICP surveys are available from PWT (Heston et al. 2002) for the years 1980, 1985 and 1996¹². We will also try to obtain access to data from the current survey, which may become available in 2006. Due to changes in the methodology for data collection, there are problems with comparison over time with disaggregated data. Hence the purpose will be to examine changes in price structures over time for relatively aggregated components, and use cross-section analysis at the more disaggregated level (most likely using 1996 data). We will work to get access also to even more detailed price data from the ICP, but we do not know yet whether this will be possible.

The ICP data do not only include price data, but also data on domestic consumption of the different disaggregated categories. For goods, we will combine these with international trade data from COMTRADE, in order to analyse how openness affects price divergence. Potentially, we will also use data on trade barriers (from the TRAINS or IDB databases). We will also use country data from the World Development Indicators of the World Bank.

As a contribution to the theoretical foundation for this analysis of openness and price convergence, we intend to extend the analysis of Melchior (2004), with a focus on price implications, in order to provide a better taxonomy concerning how entry barriers and other industrial characteristics affect the extent of price convergence or divergence. This will be the main theoretical contribution from the project. In addition, we will draw on the BS framework as well as recent contributions that shed light on market segmentation due to entry barriers (see some references above). We will also draw on the existing empirical literature on price differences between countries (especially rich countries, unfortunately) (see e.g. Rogers and Jenkins 1995, and several later contributions).

Furthermore, the project will undertake more research along the lines of Dowrick and Akmal (2005). While the results of these authors suggest that PPPs based on GK may lead to a bias in inequality and poverty estimates, more work is needed in order to check the reliability of EKS-based estimates over time. We will undertake empirical analysis of the extent of convergence or divergence in price structures across countries, and the determinants of this. An issue to be explored is how changes in the price structures are captured by the EKS estimates. On the time dimension of PPP, see Hill (2004).

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¹² We also thank Samuel Kortum for sharing with us an alternative data set for 1996; we have not yet had the chance to examine whether it contains information beyond the PWT data set.

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