

The Development of inequality and poverty in Indonesia, 1932-1999

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Abstract

Inequality and poverty are nowadays major research topics. Especially the last decade, much attention has been devoted to constructing long-run datasets of inequality. However, the overwhelming majority of these studies still focus on developed countries. In addition, they often make use of income inequality, which is a relatively poor measure of welfare, especially in the late 20th century.

In this paper we use alternative data sources to estimate inequality in Indonesia and find, after an initial increase, a strong decline in inequality from the 1960s onwards. Prior to the 1940s the poverty effect of growing inequality was offset by an increase in per capita GDP, hence, the percentage share poor remained relatively stable. Between 1950 and 1980 a decline in inequality combined with increased per capita GDP caused a rapid decline in the share of people living below the poverty line.

Keywords: Indonesia, Inequality, poverty

JEL classification: D63, I32, N15, N35

INTRODUCTION

Inequality of income has received special attention during the last decades. Especially after the 1970s many studies have become available on both developed and developing countries. However, where most studies focus on Western countries and Western Offshoots (i.e. Piketty 2003; Saez and Veall 2005; Piketty and Saez 2006), relatively few studies address long-run inequality and poverty in less developed countries using comparable data (i.e. Banerjee and Piketty 2005; Bértola *et al.* 2009; Leigh and Van der Eng forthcoming 2010), even though it is often argued that that they experienced a somewhat different development than their developed counterparts (e.g. Oshima 1994).

This study focuses on Indonesia, where there is a large literature available on inequality and poverty, but no consensus has been achieved yet (Booth and Sundrum 1981). Since the introduction of the Indonesian household survey (Susenas) in 1963/1964, a great number of studies into inequality and poverty have been conducted. Unfortunately, definitions changed frequently, making comparisons over time difficult and the reliability of the Susenas data has been questioned as well (Booth 1993, 55). Sudjana and Mishra (2004) argue, for example, that richer households are underrepresented in Susenas data, which leads to a significant bias which increases over time. This is part of the reason why the total private household expenditure estimated on the basis of Susenas data in the 1980s and 1990s turns out to be much lower than what is reported in the national accounts.¹ The income inequality data, however, suffer from equal problems. The income tax still does not cover more than 5% of all income earners while the Susenas data only include income information after 1978. Hence, for long-run analysis of inequality in Indonesia, we have to rely on expenditure data

¹ See for example Van der Eng (2001)

and, as shown in table 1, these lead to a conclusion of a stationary inequality from ca. 1960 onwards. If one accept these series, however, it remains to be explained why historical events such as the New Order, the oil boom, or the Asia crisis, all causing structural changes within the economy, would have left inequality in Indonesia basically unaffected.

In the remainder of this paper, we construct a historical series of inequality and poverty which, although not necessarily better in all respects than the alternatives, have the advantage of comparability over time. In addition, we present estimates for the first half of the twentieth century too, making it possible to discern long-run trends in inequality. In section 2, we discuss the development of inequality. In section 3 we move on to the consequences of these results for poverty and section 4 concludes the paper.

INEQUALITY MEASURES

There are a large number of studies estimating income inequality for Indonesia (Booth and Sundrum 1981; Hughes and Islam 1981; Alatas and Bourguignon 2000; Cameron 2002, Frankema and Marks 2007; Van der Eng 2009). Most of these make use of expenditure data due to their better availability. In addition, expenditure data circumvent the problem of income from by-employment, which make income estimates often difficult, and they are a better measure of long-run welfare.

It is a general feature that inequality measures estimated from expenditure data are lower than those calculated from income data. The reasons are obvious: progressive taxation, extra earnings from by-employment, and the black economy all contribute to some kind of smoothing of expenditure in contrast to income. In addition, the wealthy are expected to save a larger share of their income, and therefore the observed expenditures are far from being a linear function of income. In addition, François and Rojas-Romagosa (2005, 17) point out that

expenditure measures are subject to biases caused by borrowing or lending. Indeed, if we look at the standard figures for Indonesia (table 1), we find that the Gini coefficients derived from

Table 1 about here

expenditure data are about 30% lower than the ones estimated from income data. A similar observation is made by Deininger and Squire (1996) and François and Rojas-Romagosa (2005) although they find the difference being somewhat lower, between 10% and 20% for a larger set of countries. It is likely, however, that in countries where the informal economy has more significance, or taxation is more progressive, the difference between the picture drawn from expenditure and gross income data will also differ more considerably.² This suggests that in Indonesia, where the difference between expenditure and income inequality is especially large, welfare analysis can better be done using the expenditure approach.

The difference in the magnitude of income inequality is not the only problem when using income Ginis for welfare analysis, however. If we look at the income approach, we see an almost constant level between 1984 and 1996. A similar pattern of almost constant inequality can be found in the Gini coefficients based on expenditure data. This relative

² Another possible source of deviation is whether the data is disaggregated at per capita or per household level. It has been argued that the bias might be upward, downward, or even non-existent. De Gregorio and Lee (1999, 6), for example, argue that as poorer households have more members, one will find a more equal distribution of incomes at the household level than at the individual level. Alternatively, richer households may have more children, which further lowers the Gini coefficient. Indeed, based of the data from Booth (1988, table 7) for 1925, we find that the Gini estimated from the per family income on Java is almost 7 points higher than Gini calculated from the per capita income (0.32 versus 0.25) which is caused by the situation that persons in the lowest 80 per cent income class had on average per family 4.8 children where the upper 20 per cent had 5.8 children. François and Rojas-Romagosa (2005), on the other hand, argue that taking either household, person, or household per capita, does not affect the Gini coefficient.

stability of inequality is strange, given the many economic and social developments that Indonesia witnessed during this period. Therefore we try to construct an alternative series of expenditure inequality which, although certainly with its limitations, might offer a better picture of the change of the development of long-run inequality.

Our starting point is Van Leeuwen (2007, tables 3.5, A.4.2, and A.4.3) who provides data on expenditure and population shares for 10 urban and rural household categories based on the social accounting matrices for some benchmark years between 1932 and 1999. From these data, we constructed social tables for the years 1932, 1942, 1953, 1959, 1975, 1980, 1985, 1990, 1993, and 1999 as described in appendix A.1. These were then converted into Gini coefficients as described in the appendix. We can see in Table 2 that our estimates compare well with the alternative data from Leigh and Van der Eng (forthcoming 2010) on the income share of the upper quantiles of the population. In order to make these results comparable, we convert them into Gini coefficients by assuming a lognormal probability distribution of income (see Appendix A.2). Since we argued in Appendix 2 that income shares have a comparable trend (but not level) up to ca. 1960 and after 1980, one needs to compare the trends in income inequality between the different measures rather than the level.

We also used the subdivision into household categories to create Gini-coefficients for the rural and urban sector. These results are reported in column 2-3 of Table 2 and are compared with the estimates obtained from the WIID2b (2007).

Table 2 about here

The results are in accordance with the expectations. We see an increase in inequality during the economic crises in the 1930s and 1990s and a decline in the 1960s-1970s when it is not only likely that inequality declined, but there was probably an acceleration of expenditure smoothing. Indeed, contrary to the Susenas, we use data that are conform to the national accounts, hence probably increasing the impact of black market and other activities that enhance expenditure smoothing.³ Although the estimated Gini is low in 1980 and 1985 (0.24), it is not implausible, since the alternative estimates are comparably low: expenditure Ginis in this period can be as low as 0.28 in Bangladesh, 0.23 in Canada, and 0.16 in Luxemburg. In addition, several authors have stressed the low expenditure inequality in Indonesia (i.e. Van der Eng 2009, 7). In Table 2, we may observe that for the pre-1960 period the trend in income Ginis based on the income shares resemble our expenditure Ginis, especially between 1920 and 1932 where we can see a strong increase in inequality in both series. Even if we assume, as we did in the notes below Table 2, that the estimate of Booth is too low, still there must have been a considerable increase in inequality between 1925 and 1932. This co-movement of income and expenditure measures suggests that expenditures were not only smoothed to a lesser extent, but also the relationship between both measures was stable. For the post-1960 period we can observe that the newly estimated expenditure Ginis and, to a lesser extent, the expenditure Ginis obtained from the WIID2b (2007), move in the same direction as the Ginis based on the income quantiles albeit at a different level (see also Figure A.2.1 in appendix

³ Thorbecke (1991, 1596) and Frankema and Marks (2007) all find a strong increase in the urban informal sector as from the 1960s onwards. Although, as Frankema and Marks (2007, 22) also note, the increase in the urban informal sector not necessarily lowers the Gini in all periods because of the interaction with other factors, the lowering effect is especially strong in the 1980s. This corresponds with figure A.2.1 in appendix A.2 where we see a divergence between expenditure and income Ginis since around 1970.

A.2).⁴ Indeed, although the low number of observations does not allow for a statistical analysis, we can see from Table 2 that for the pre-1960 period, the income share Gini picks up clearly the rise from a relatively low inequality at the start of the 1920s to a high inequality at the start of the 1930s. Equally, from 1985 onwards, the income shares follow the trend in expenditure Ginis. As limited as the available data may be, the fact that in both the pre-1960 and post-1960 period the income shares and the expenditure Ginis seem to have a common trend suggests that expenditure smoothing in both periods was relatively constant and that it changed substantially only in the period ca. 1960-1980.

Above pattern of inequality hides changes in the relation between agriculture and the other sectors. In accordance with the WIID2b, we find that the urban Ginis are higher than the rural Gini. The only periods for which this changes are between 1942 and 1953, and after 1999, when rural inequality exceeded urban inequality. This is similar to what took place in a comparable country, China. In China we see that rural inequality has been lower than urban inequality since the 1980s. Unfortunately, no really comparable information for China exists for the 1930s. However, Brandt and Sands (1992, 189) estimated for 1929 a rural Gini of 0.49, which is comparable to the one we find for Indonesia.

The pattern that emerges from Table 2 is one that, although roughly comparable to other countries, is subject to Indonesia specific factors. The pattern of increasing inequality in the 1920s-1930s and decreasing inequality in the second half of the century corresponds with the hypothesis of Lindert and Williamson (2003) that before the 1930s inequality in Indonesia

⁴ In this paper, this does not cause any problem since we are more interested in the pattern than the level. However, if one wants to construct a consistent series based on income inequality, it is advisable to extend our pre-1960 expenditure series with either the income Ginis or the average Gini estimated from the income shares benchmarked on the income Ginis.

increased as a result of the increased use of abundant land-resources for export production, which increased land rents relative to wages. In other words, low productivity resources were put to use for (urban) high productivity purposes. Such transition between growth regimes has been modelled by Lewis (1954) and Kuznets (1955). The transition should lead to a general increase in real wages, paired by inequality rising at least to the point when the majority of labour is already employed by the modern high productivity sector. Following this way of thinking, Leigh and Van der Eng (forthcoming 2010) argue that the use of labour for export-oriented production since the 1970s should contribute to a lowering of inequality, and therefore the maximum of inequality must have been reached somewhere in the 1960s.

Hence, before the 1930s it was, according to Lindert and Williamson, especially a shift from domestic to export agriculture, and not a shift from agriculture to industry/services as argued by Kuznets, that caused a rise in inequality. Although both hypotheses lead to an increase in inequality, they differ fundamentally in one aspect. While the Lindert and Williamson hypothesis implies that between rural-urban inequality increased as rural income was replaced to urban sector, according to the Kuznets hypothesis people move from the lower productivity agricultural to higher productivity urban sector resulting in a reduction in rural-urban inequality (between-group component). Consequently, in the case of Lindert and Williamson, we would expect a lowering of labour productivity in agriculture relative to other sectors while in the case of Kuznets we expect a relative increase in agricultural labour productivity because labour is transferred from agriculture to the other sectors.

Indeed, based on our dataset we can also estimate that the urban-rural Gini increased in the 1930s from 0.009 to 0.14.⁵ In addition, Van der Eng (1996, table A.3) shows that rural

⁵ This is based on a separate estimated of a within-, between-, and overlap Gini as suggested by Pyatt (1976).

The overlap Gini is the result of the situation that the position of an individual in a population differs from its position within a given group. It is also important to note that, since these are expenditure Ginis, they do not

employment was 76% of the total employment in 1900 and 74% in 1940, hence there does not seem to be a shift from agricultural to industry and services employment. Finally, labour productivity (expressed in per capita GDP) in agriculture relative to services and industry declined from 25.2% in 1900 to 18.3% in 1930 (Van der Eng 2002).⁶ This makes it likely that there was an income shift to the urban sector, caused by an increase in the production of export crops, which earnings went largely to the urban sector. Indeed, private expenditure in the urban sector went up from 34% in 1932 to 43% in 1939 while the share of estate crops (mainly directed at exports) in total agricultural GDP increased from 11.5% in 1900 to 24% in 1930 (Van der Eng 1996, 260-262).

This trend was exacerbated during the Great Depression in the 1930s. Not only was the Ethical Policy abandoned (Timmer 2005, 20), but also a drop in the prices of the most important export commodities took place. The current price value of export of seven major crops dropped by 75% between 1929 and 1933 while the quantity exported decreased by 42% (Creutzberg 1975, Table 1), only to increase between urban-rural inequality as the share of agricultural household consumption in total household consumption declined from 66% in 1932 to 53% in 1942, which was largely caused by a decline in the income share of richer, more export oriented households. Strangely enough this also created an increase in rural inequality. At the same time, the economic crisis caused a reduction in the prices of the most important domestic consumption crops, causing a decline in income of small scale farmers. This caused an over-all increase in the rural Gini relative to the urban Gini leading to more inequality in Indonesia. It might be worth noting that an inequality increasing effect of the Great Depression has been observed for the USA (McLean 1991, 198) where the change in

take account of the difference in rural-urban price levels. However, Asra (1999, 58), found that these price difference are much smaller than generally found in official publications.

⁶ We have to be careful interpreting these figures as deflation may be different in agriculture compared to service or industry. It is, however, doubtful if the nominal figures would be significantly different.

the Gini coefficient was 4.8 points in just 12 years (0.413 in 1921, 0.461 in 1933). In a recently published article Földvári (2009) finds an 18 point increase between 1928 and 1938 in Hungary (using tax data), which might be a bit more comparable to Indonesia, being a more rural economy than the USA.

This situation was reversed, however, in the 1940s. During that decade, inequality slightly declined from ca. 0.59 in 1939 to 0.54 in 1953. Although this is a development that can often be seen during war-periods (see for example Van Zanden (1995, 646); Piketty and Saez (2006, 203)), we do not have enough evidence to substantiate this. At best we can say that any changes in income shares during the period 1942-1953 in agricultural households were relatively large, largely because the income share of small landowners increased while that of bigger landowners declined (see appendix A.1). The same applies to the urban Gini, which declined only slightly, largely caused by a relative decline in urban wages. Hence, over-all inequality had to decline.

Although rural inequality declined faster than urban inequality, the situation remained that rural inequality exceeded urban inequality. At the same time the pattern that started in the 1940 continued that a general trend existed that income groups more and more resembled their shares in population, i.e. the Ginis declined. This latter trend we explained largely by income smoothing, since we use expenditure Ginis. The pattern of decreasing inequality after 1940s as described above continued in the 1960s and 1970s. The main difference was that during this period urban inequality again surpassed its rural counterpart. There were several factors that reduced rural inequality faster than urban inequality. Especially public expenditure on agriculture promoted labour productivity in this sector, which may have narrowed both the between rural-urban inequality as, by increasing the wages of rural labourers, within rural inequality. In addition, the Green Revolution largely benefitted rice farmers and therefore reduced inequality (Van der Eng 2009, 5-6). At the same time we can

see a decline in income shares of medium and large size agricultural operation households, a development also spotted by Van der Eng (2009, 13-14) who notes a significant decrease, especially in the Outer Provinces. This was especially in the Outer Provinces part of a trend towards increasing equality between 1963 and 1993 during which the Gini decreased towards levels of Java.

This process of declining expenditure inequality continued in the 1970s and 1980s. For example Timmer (2004) convincingly demonstrates that the pro-poor growth policy of the Suharto government worked fine enough so that the poorest 20% of the population experienced the same growth as the average individual during this period. Even though we do not have a growth incidence curve for the period prior to 1990, if we assume that the growth incidence curve was similar to the one in the period 1996-1999 (Timmer 2004), it must have reduced inequality. This was exacerbated by the oil shocks, which increased government spending. Also, possible impact of the oil price shocks and the Dutch disease might have been less detrimental to the poor than in other oil-exporting countries. Temple (2003) argues that the government reacted to the boom in oil prices in a much more appropriate way than most other oil-exporting countries, and pursued a balanced budget expenditure policy paired with an increasing export orientation and trade liberalization during the 1980s.

However, the 1990s, dominated by the Asia crisis, again witnessed an increase in inequality. Frankenberg *et al* (1999) published a study based on household surveys that reflects that especially the quick rise in rice prices caused an increase in poverty, and forced households to increase the share of basic foodstuff in their expenditure. Indeed, Timmer (2005) reports that the annual increase in rice prices between 1996 and 1999 was 19.2%, which was unprecedented during the previous three decades. This is reflected in an increase in rural inequality, both in absolute numbers and relative to urban inequality.

Clearly, the whole pattern of inequality is heavily influenced by political and social factors during this period that covers almost a century. Yet, there are also structural factors that were not necessarily Indonesia-specific. First, Indonesia witnessed a decline in the share of agricultural labour compared to services and industry to under 50% in the 1990s. Hence, the relative decline of the agricultural labour force must have caused an increase in labour productivity in agriculture relative to the other sectors. Indeed, while in 1930 per capita labour productivity in agriculture was 18.3% of that in industry and services, in 1990 it rose to 29.1% thus diminishing between urban-rural inequality from 0.19 in 1959 to 0.11 in 1985. Secondly, just like many other developing countries, the post-war decline in inequality is also attributable to a decline in racial inequality because of the removal of the colonizer countries from both the political and the economic power. Although the effect may have been small, it was a feature shared in many developing economies. Van Zanden (2003)⁷ estimated the income Gini for Indonesians to be 0.32 versus 0.63 and 0.61 for Chinese and Europeans respectively in 1880. Booth (1988, 326) showed that 45 years later, in 1925, this pattern was about the same with an inequality among European taxpayers of 0.51, among Chinese 0.53 and among Indonesian taxpayers 0.37.⁸ Especially the removal of many Europeans from their positions thus caused a significant decline in inequality which became visible after 1959. Third, the newly independent countries also witnessed not only an increase in income, but also a change in tax system which increased expenditure smoothing and, hence, decreased inequality.

⁷ These Gini estimates are updated at the Global Price and Income History Group website:

<http://gpih.ucdavis.edu/Distribution.htm>

⁸ These data may, however, be subject to bias given that the uncorrected taxes were used (see Leigh and Van der Eng 2007, 2).

Thus, the fact that over 50% of the people were working in the high productivity service and industrial sectors, combined with a relative increase in labour productivity in the rural sector, the removal of racial inequality, and economic growth, expenditure inequality had to drop.

POVERTY

Obviously, inequality has a strong impact on poverty. This relationship has been established in many studies on Indonesian poverty. However, most of these studies have a short time dimension (Booth 1993). In the previous section we found a long-run pattern of increasing inequality up to the 1940s, and decreasing inequality afterwards (with a brief increase during the economic crisis in the 1990s). These changes obviously strongly influenced poverty as well.

The first step is to estimate the population share under the poverty line. We opt for an absolute poverty line of 2 USD/day in constant 1990 prices for 'extreme poverty'. The definition of extreme poverty used by the World Bank is 1 USD a day, which is, however, based on consumption and inequality data both drawn from household surveys. Following Sala-i-Martin (2002a, b) and López and Servén (2006), we use consumption data from household surveys and per capita income data from the national accounts. Chen and Ravallion (2004) and Ravallion (2004) have shown that both methods result in roughly similar results provided we accept 2 USD a day as poverty line.

Fortunately, the population share under the poverty line can be estimated directly based on the Gini coefficients from the previous section. López and Servén (2006) found that income distribution is largely consistent with log-normality. Under this assumption, poverty

estimates only depend on the poverty line, average income, and the Gini coefficient. The share of population below the poverty line (the poverty headcount, P_0) can thus be calculated as:

$$P_0 = \Phi(\log(z/v)/\sigma + \sigma/2) \quad (1.)$$

, where

$$\sigma = \sqrt{2}\Phi^{-1}((1+G)/2) \quad (2.)$$

Here, Φ is the cumulative normal distribution, v is average per capita income (here proxied by per capita GDP), z is the poverty line (in our case 2 USD in constant 1990 prices a day), σ is the standard deviation of the distribution, and G is the Gini coefficient.

The results are presented in table 3 below. No matter whether we take our absolute poverty line, the data from the World Bank using 1 USD/day, or the relative poverty lines presented in Booth (1993), we see that in the 1960s/1970s a strong decline in poverty took

Table 3 about here

place. More interesting is, however, that the share of the population below the poverty line remained constant at least up to 1960.⁹

⁹ An exception could be the period 1880-1930 when the percentage poor decreased slightly. However, the economic crisis from the 1930s again increased the percentage poor to above 60 per cent. We think, however, as pointed out in the notes to table 2, that the Gini of 0.32 as estimated on the basis of the data of Booth (1988, table 7) is too low. She also acknowledges this herself and comes up with a Gini of around 0.67 based on tax data. Yet, this seems to be highly unlikely given the preceding and following estimates. A Gini close to 0.45 as based on the data of Leigh and Van der Eng (2007) (see table 2) is more likely and corresponds with the thesis of Lindert and Williamson (2003). In this case, the share poor in 1925 is with 60.1% almost equal to the figure in 1888 and 1932 (see table 3).

Given the equations above, the reason is straightforward. An increase in equality (reduction in Gini-coefficient) and an increase in per capita GDP can both cause a decrease in absolute poverty. We present in Table 4 this analysis, based on the decomposition suggested by Datt and Ravallion (1992). We can see that in the 1920s and 1930s poverty increased, largely because the distribution effect as GDP per capita did increase, albe it marginally,

Table 4 about here

whereas inequality rose. Although poverty rose further in the 1940s, this time it was GDP/capita which suffered a strong blow because of the War and the ensuing “police actions” while inequality decreased .

Only between 1950 and 1980 we can see a decline in both inequality and an increase in GDP/cap going hand in hand to reduce poverty. This is also the period Timmer (2005) defined as the period in which the incomes of the bottom 20% grew in line with per capita GDP, hence reducing inequality. The decline in poverty share after 1985, however, is completely driven by economic growth.

CONCLUSION

Inequality in Indonesia is a much researched topic. Only the measurement issues may easily cause the results to differ by as much as 30-40%. In addition, most studies, based on expenditure data, show a rather constant series on inequality between 1963 and 2000. This is strange given that Indonesia during that period underwent phases of rapid economic growth, the oil boom, and the Asia crisis. We therefore constructed a long-run dataset on inequality that, although not necessarily better than its predecessors, has the advantage of comparability

over time. Given the availability of data, we used expenditure to calculate the Gini. In addition, this better captures welfare within the population than income Ginis.

Although Indonesia follows the same pattern as many other countries, there are Indonesia specific factors behind these processes. Using a longer-term series of inequality measures, we find that inequality increases in the first half of the century due to a shift of income from the rural to the urban sector. As the share of the rural labour force in total labour remained about constant, this also reduces rural labour productivity, hence increasing between rural-urban inequality. In addition the effects of the Great Depression were also felt. In the 1930s the release of 'ethical policy' and decrease of small farmers' income increased rural inequality. Although this was partly offset by a decrease in export farmers' incomes, over-all inequality still increased.

In the same way the decrease in inequality after 1960 was caused by expenditure smoothing, which was a common factor in many countries (see Baten *et al* 2009). In addition, the share of services and industry in total employment increased at the expense of agriculture. With very wide assumptions regarding the technology of production we can safely assume that the reduction in the share of agricultural labour caused an increase in labour productivity in agriculture (and thus a lowering of urban-rural inequality). This also implies that the share of people working in the higher productivity urban sectors approached 50% which also contributed to a lowering of overall inequality. Another factor shared by many countries was the eradication of racial inequality after the War which, although small, did contribute to a reduction in inequality. Finally, also more country-specific factors like the Green Revolution and pro-poor growth had an effect.

This pattern of inequality had profound impact on poverty. Prior to World War II, inequality and per capita GDP were both increasing. These two processes cancelled each other out, creating an almost steady share of the poor over time. However, after the War, the

decline in inequality and the increase in per capita GDP both caused a decline in the share of poor in the population. This changed after 1985 when inequality increased again but the poverty reducing effect of GDP/capita growth remained dominant.

Appendix A.1: Expenditures Inequality

The data are obtained from Van Leeuwen (2007, 72; Appendix A.4). Since the data and their construction are well described there we will only give a brief description and then move on to the conversion into expenditure Ginis.

The data are collected for 10 Indonesian household categories (4 rural and 6 urban). We decided not to include Europeans to make the data comparable with post-War period. Although we therefore exclude Europeans, this does not bias the results since, first, we focus on expenditure inequality where there was a less blatant distinction between Europeans and Indonesians and, second, because the share of Europeans in total population was so small. For example, if we take the ethnic specific Ginis for 1925 from Booth (1988) and weigh this by the population, we end up with an over-all inequality measure of 37.3 for the entire population versus 37 for only Indonesians.

For the period after 1970, data on the share of each household category in total income was obtained from the social accounting matrices provided by the BPS (1975, 1980, 1985, 1990, 1993, and 1999). Since these matrices provide consistent data on all income,

expenditure, and production streams within the Indonesian economy, these data can be regarded as reliable. As we only report income and population size for each household category, our estimates are equivalent to what is called in the literature “social tables”.

For the period prior to 1960, no consistent data exist. Following Van der Eng (2001), we opted to use household expenditure data from several surveys in the period 1880-1960,

Table A.1.1 about here

which are given in Table A.1.1. Van der Eng (2001) constructed private consumption using a part of these data. He calculated only the expenditure of the 6 most important food crops and combined it with expenditure data from Japan. However, since this makes use of only a part of the expenditure data and since the Japanese data are not necessarily representative of Indonesia we followed a different approach. Following the post-1970 Social Tables, we divided the households in the surveys in the 10 household classes. For each household class we estimated their share in total consumption by multiplying the expenditure per class with the total share of that household class in the population as given in Table A.1.3. This still leaves some missing observations. These were filled by calculating the optimum of the change of that household class over time and the position of that household class versus other household classes within the year given (Table A.1.2). The results are consistent over time with a clear growth in non-agricultural expenditure shares. Moreover, Van Leeuwen (2007, Appendix 4) shows that it is consistent with existing current price GDP estimates of Indonesia.

Table A.1.2 about here

In addition to the income shares, we also have to obtain information about the population shares in each household class. We took the population share from the BPS (1975, 1980, 1985, 1990, 1993, and 1999) and extrapolated them back to 1960 (see table A.1.3). The result was only a relatively small increase back in time in the share of agricultural households. Yet, on average the shares of the different household classes remained fairly stable in the period prior to 1980. This warrants the assumption that the changes in household classes cannot have been large in the earlier periods as well. Especially since these shifts generally start slowly and speed up only later, we expect that the change from rural to non-agricultural household classes was even smaller in the pre-1960 period. Also, we find that, whereas in 1960 about 67% of the households resided in rural areas, in 1920 circa 76% of the labour force was employed in agriculture. These figures correspond rather well, especially considering the situation that some urban households also were employed in agriculture and given the situation that the average household size is likely to be larger in rural areas.

Table A.1.3 about here

The resulting social tables can be used to estimate the Gini measure of inequality with the trapezoid approximation method similarly to Milanovic *et al.* (2007). First we calculate the cumulative share of the population and income in the different income categories with an ordering from the wealthiest to the poorest. These are denoted by p and $L(p)$ respectively. Because of the reverse ordering of the data, the Lorenz curve in this case is above the 45 degree line. If we have k classes in the population, we can estimate the Gini as follows:

$$G = \sum_{i=1}^k (p_i - p_{i-1})(L(p_i) - p_i + L(p_{i-1}) - p_{i-1})$$

$$\text{where } \begin{aligned} p_0 &= L(p_0) = 0 \\ p_k &= L(p_k) = 1 \end{aligned}$$

The resulting total, urban and rural Ginis are reported in Table 2 in the paper.

Appendix A.2: converting income shares to Gini coefficients

In appendix A.1 we provided the data and estimation method of the expenditure Ginis. Yet, more data is available for Indonesia. First, there are sporadic estimates from the 1960s onwards of the household income Ginis from the WIID2b. The most comprehensive dataset, however, is that of Leigh and Van der Eng (forthcoming 2010) who provide the share in total income of the 10%, 5%, 1%, 0.5%, 0.01%, and 0.001% richest persons in Indonesia between 1920 and 2004. In order to compare them to the other inequality measures, we need to convert these results into Gini coefficients.

Leigh and Van der Eng essentially provide one point at the Lorenz-curve. Assuming that income follows some two parameter probability distribution (lognormal or Pareto), Gini coefficients can be estimated in a straightforward way. We start with log-normal distribution. Lopez and Servén (2006), based on Aitchison and Brown (1966), claim that the Lorenz-curve, under the assumption of log-normality, can be expressed as follows:

$$L(p) = \Phi(\Phi^{-1}(p) - \sigma)$$

Where p denotes the poorest p^{th} quantile of the population, and σ is the standard deviation of the log income and $\Phi(\cdot)$ denotes the cumulative normal distribution. The Gini coefficient (G) can thus be expressed as:

$$\sigma = \sqrt{2} \Phi^{-1} \left(\frac{1+G}{2} \right)$$

For calculating the Gini coefficient under the assumption of a Pareto distribution, we have to take an extra step. We start with the Cumulative Distribution Function (CDF) of the Pareto probability distribution:

$$F(x) = P(X \leq x) = 1 - \left(\frac{x_m}{x}\right)^k$$

where $X_m > 0$ is the minimum value of x and the positive parameter k is called the Pareto index. The Lorenz curve can be derived as follows by assuming Pareto distribution:

$$L(F) = 1 - (1 - F)^{1 - \frac{1}{k}}$$

Where $L(F)$ is the share of the poorest F^{th} quantile of the population in the total income. For example, if the richest 0.1% has 1% of the total income, we should write: $L(F)=0.99$, $F=0.999$. From this we can express k , which, as derived by Aabergé (2005), can be used to estimate the Gini coefficient:

$$G = \frac{1}{2k - 1}$$

The results for our expenditure Gini, the income Ginis and the Ginis based on an assumed lognormal and Pareto distribution are presented in figure A.2.1. One remarkable point seems that income and Pareto and lognormal Ginis all move in the same direction. This is not so surprising since the lognormal and Pareto estimates are based on tax data and hence resemble the income approach. More interesting is the question if the movement over time of the Gini based on income shares is really independent of assuming a Pareto or lognormal distribution. However, since both methods use only one point of the Lorenz curve (mostly of the upper quantiles), this is actually the question as to whether the relative distribution of the upper quantiles versus the lower quintiles changes over time. Milanovic *et al.* (2007) estimate the extraction ratio, which indicates how much of the above-subsistence income is extracted by the rich. Although it therefore does not say much about the distribution *sec*, it can be

considered as an indication of the shape of the Lorenz curve. As indicated by Milanovic *et al.* (2007, Table 2 and Figure 4), with the exception of some very poor countries, this changes relatively little over time in the twentieth century.¹⁰ Consequently, the relative position of the upper and lower quintiles also does not change much over time meaning that using either a Pareto or lognormal distribution does not bias the change of the estimated Gini coefficients over time.

Figure A.2.1 about here

The second interesting point is that, whereas the expenditure Gini follows the same pattern as the Ginis estimated from income shares (under the assumption of lognormality or a Pareto distribution) and the income Ginis estimated from surveys, before ca. 1960 and after ca. 1980, between 1960 and 1980 it declines much faster than the other measures. Indeed, for the period after 1980, this is confirmed by Leigh (2009) who estimated for the late twentieth century that income shares did have a strong positive relation with the Gini coefficient (Leigh 2007). Since we argued before that all factors that made the expenditure Gini trend deviate from the income Gini trend took place between ca. 1960 and 1980, this implies that income, income share, and expenditure Ginis must have a positive correlation at the end of the twentieth century.

As pointed out in Section 2 of this paper, we explain the strong decline in expenditure relative to the income Gini between ca. 1960 and 1980 by a strong increase of expenditure smoothing after 1960. Taxation, the increase of the black economy, and, more importantly, the economic growth caused the wealthy to save a larger share of their incomes. These factors

¹⁰ The decline of the extraction ratio was especially strong during the Industrial Revolution in Europe.

became especially prevalent between ca. 1960 and 1980 and caused the expenditure Gini to decrease relative to the other Ginis which were less sensitive to these factors.

This implies that before ca. 1960 the income Ginis, income shares, and expenditure Ginis must have a positive relation again. This is doubted by Milanovic (2007) who find that income and income share Ginis have no significant relation. However, our argument was that the trend moved in the same direction and not the level. Since Milanovic only has single observations, the differences in the levels of the income share Ginis across countries blurs his regression. Indeed, that the effect of country specific effects is large can also be seen from Leigh (2007) who finds that, including country specific effects increases the R^2 of his regressions from 0.2 to 0.76, while inclusion of year effects (the trend) only gives a small increase in the R^2 . Hence the different results from the two cited studies can be attributed to the different data structure. Milanovic basically tests if the top income shares and the income Ginis have the same level, which is of course rejected, while Leigh tests also for a similar trend, which he cannot reject. Our results seem to confirm the latter finding. More directly, the changing relationship between expenditure and income Ginis was also tested for a large sample of countries by Baten *et al.* (2009) who find that indeed the relationship between income and expenditure Ginis changes between ca. 1960 and 1980.

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Table 1. Gini coefficient of income inequality in Indonesia, 1964-1999

	Expenditure*	Income*
1964	0.33	
1970	0.31	
1976	0.32	
1978	0.35	
1980	0.32	
1981	0.31	
1984	0.31	0.40
1990	0.32	0.39
1993	0.34	0.42
1996	0.37	0.40
1999	0.31**	

* Unit of analysis: household per capita

** As pointed out by the WIID2b (2007), the expenditure Gini for 1999 is unexplainably low.

Source: WIID2b (2007)

Table 2. Gini coefficients on inequality Indonesia

	This text			WIID2b			Leigh and Van der Eng (2007)**	
	rural	urban	Total	rural	urban	Total	Pareto distribution	Log-normal distribution
1880			0.39****					
1920							0.23	0.42
1925			0.32*****				0.34	0.56
1930							0.38	0.60
1932	0.52	0.57	0.56				0.44	0.70
1942	0.60	0.53	0.59				0.42*	0.64*
1953	0.51	0.50	0.54					
1959	0.46	0.40	0.51					
1964						0.39		
1970						0.35		
1975	0.17	0.32	0.29					
1976				0.31	0.35	0.34		
1978				0.34	0.38	0.37		
1980	0.14	0.19	0.24	0.31	0.36	0.34		
1981				0.29	0.33	0.33	0.27***	0.47***
1984				0.28	0.32	0.33		
1985	0.19	0.20	0.24					
1987				0.26	0.32	0.32	0.28	0.48
1990	0.15	0.20	0.25	0.25	0.34	0.32	0.29	0.49
1993	0.16	0.22	0.30	0.26	0.33	0.34	0.32	0.53
1995								
1996				0.27	0.36	0.36	0.32	0.53
1999	0.17	0.11	0.32	0.24	0.32	0.31	0.38	0.61
2002							0.34	0.56

* 1939 (corrected for the omission of the income share of the 10% richest using the ratio of 1934.

** "Pareto distribution" and "log-normal distribution" are the averages of the Gini coefficients estimated using the income shares of the x% richest persons under the assumption of Pareto or lognormal probability distributions respectively (see appendix A.2).

*** 1982

**** Van Zanden (2003)

***** Calculated on the basis of Booth (1988, table 7). This figure seems to be too low compared to the previous and next estimates and does not fit the observations made by Lindert and Williamson (2003). Therefore, a Gini coefficient of 0.45 using the data from Leigh and Van der Eng (forthcoming 2010), which are benchmarked on the expenditure Gini of 1932, seems more appropriate.

Table 3. Share population below poverty line in Indonesia

	This text		World Bank (2007)	Booth (1993)		World Bank (2007): East Asia and the Pacific (average)
	2 USD/day	Idem, Mln persons	1 usd/day	BPS	Esmara poverty line	1 usd/day
1880**	66.3%	21.78				
1925***	52.0% (60.1%)	29.65 (34.27)				
1932	65.8%	41.08				
1942	68.1%	49.33				
1953	66.2%	55.36				
1959	63.7%	59.60				
1970					47.4%	
1975	36.9%	48.02		40.1%*	45.2%*	
1980	23.2%	34.08	28.2%	28.6%	41.9%	57.7%****
1984				21.6%	37.3%	39.0%
1985	21.6%	35.26				
1987				17.4%	34.4%	28.2%
1990	16.6%	29.59		15.1%		29.8%
1993	19.8%	37.23	17.4%			25.2%
1996			14.1%			16.1%
1999	21.2%	43.23				15.5%

*1976

** Gini-coefficient based on Van Zanden (2005) for Java

*** Gini coefficient based on Booth (1988) for Java. Alternative estimates based on a Gini of 0.45 (see notes table 2).

****1981

Note: We argued in the previous section that in the pre-war period expenditure smoothing is less of an issue and hence, that income and expenditure inequality are converging in that period. Using 2 USD a day for the pre-war period therefore possibly overestimates poverty. Using 1 USD a day the figures are 1942: 58.4%; 1932: 55.3%; 1925: 32.1% (assumed Gini 0.32)/46.01% (assumed Gini 0.45); 1880: 50.1%. Although the percentage poor in the pre-War period is lower when using these figures, the over-all pattern of development of poverty does not change.

Table 4. Annual effect of growth and redistribution on changes in poverty in Indonesia

	change in poverty share	distribution effect	growth effect	residual
1880-1925	-0.18%	0.08%	-0.21%	-0.04%
1925-1932	0.82%	0.86%	-0.03%	-0.01%
1932-1942	-0.06%	0.18%	-0.22%	-0.02%
1942-1953	0.09%	-0.23%	0.37%	-0.05%
1953-1959	-0.47%	-0.27%	-0.22%	0.02%
1959-1975	-1.68%	-1.23%	-0.85%	0.40%
1975-1980	-2.76%	-1.42%	-1.47%	0.13%
1980-1985	-0.32%	0.00%	-0.32%	0.00%
1985-1990	-1.32%	0.29%	-1.30%	-0.31%
1990-1993	-1.16%	2.29%	-1.36%	-2.09%
1993-1999	-0.42%	0.45%	-0.18%	-0.82%

*Changes in poverty taken from table 3

Table A.1.1: Overview of the main household expenditure surveys in Java/Indonesia, 1885-1960

Source	Sample size	Region	Year
Boeke (1927)	29 rural households	Java (various parts)	1924-25
CKS (1928)	314 urban households	Indonesia	1925
Rohrman (1932)	18 rural households	Kraksaän (Probolinggo)	1932
CKS (1939)	95 labourers' households	Jakarta	1937
Huizenga (1958)	1,945 rural labourers' hh	Java	1939-40
Sato (1994: 96)	421 farm households	Tasikmadu (Malang, E.Java)	1942
Sato (1994: 102-3)	345 farm households	Tumut (Bantul, C.Java)	1942

ILO (1967) = Ministry of Labour	2,639 urban households	Jakarta	1957
ILO (1967) = Ministry of Labour	2,180 urban households	Surabaya	1958
Sukamto (1962)	503 households	DI Yogyakarta	1958-9

Table A.1.2: Total household consumption expenditure per household category (%)

household category		1932	1942	1953	1960	1975	1980	1985	1990	1993	1999
Agriculture	Agricultural employee household	5%	8%	5%	4%	5%	5%	4%	4%	4%	6%
	Operator, land owner 0,0-0,5 ha agriculture household	8%	1%	4%	5%	11%	13%	13%	18%	17%	9%
	Operator, land owner 0,5-1 ha agriculture household	5%	6%	9%	11%	8%	7%	6%	5%	5%	5%
	Operator, land owner >1 ha agriculture household	48%	38%	31%	27%	13%	14%	13%	8%	7%	5%
non-agriculture	Non agricultural lower level rural household	8%	8%	9%	9%	10%	14%	9%	7%	6%	12%
	Non labour force rural household	12%	14%	12%	10%	2%	3%	4%	2%	2%	5%
	Non agricultural higher level rural household	5%	5%	5%	5%	5%	6%	10%	16%	19%	13%
	Non agricultural lower level urban household	1%	5%	8%	10%	12%	16%	16%	12%	10%	19%
	Non labour force urban household	2%	2%	2%	2%	2%	3%	5%	3%	3%	5%
	Non agricultural higher level urban household	6%	13%	15%	16%	14%	14%	17%	25%	28%	21%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total consumption (accounts) (billion)		17,5	27,6	81,1	1087,3	8.744,5	27.502,9	56.857,9	106.312,3	158.342,7	838.097,2

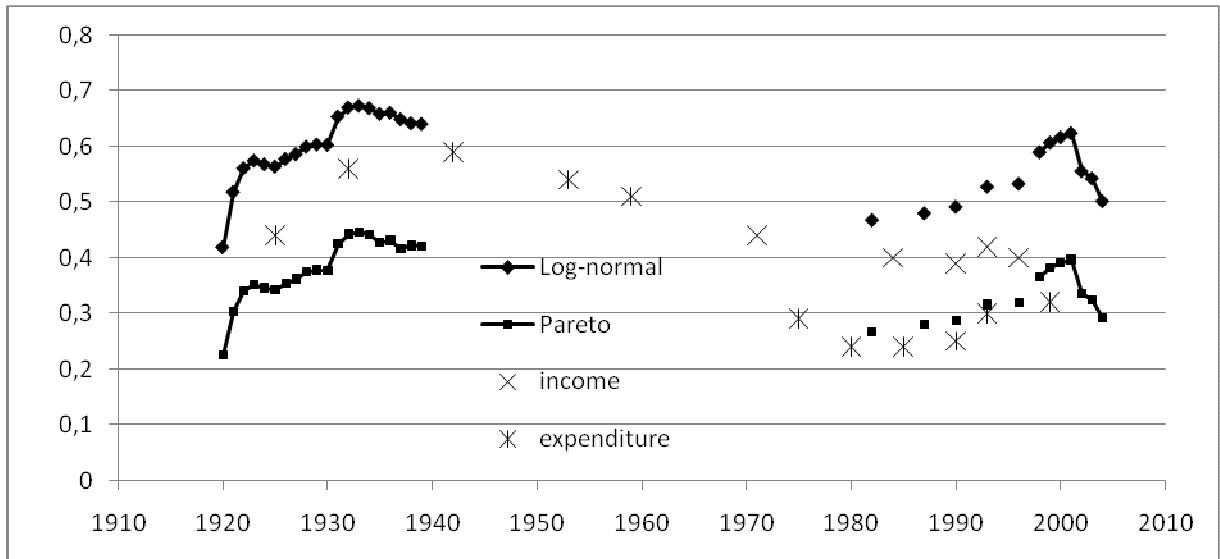
Source: See text; National accounts statistics; Social Accounting Matrix.

Table A.1.3: Share of household category in total population

(non-)agriculture	household category	1960	1975	1980	1985	1990	1993	1999
Agriculture	Agricultural employee household	14%	12%	11%	7%	9%	10%	14%
	Operator, land owner 0,0-0,5 ha agriculture household	25%	22%	21%	24%	28%	26%	18%
	Operator, land owner 0,5-1 ha agriculture household	14%	12%	11%	8%	6%	6%	6%
	Operator, land owner >1 ha agriculture household	14%	14%	15%	10%	7%	6%	5%
Non-agricultural	Non agricultural lower level rural household	17%	17%	15%	14%	9%	9%	14%
	Non labour force rural household	2%	3%	4%	5%	2%	2%	5%
	Non agricultural higher level rural household	2%	3%	4%	8%	13%	12%	6%
	Non agricultural lower level urban household	8%	11%	12%	13%	13%	12%	14%
	Non labour force urban household	1%	2%	3%	4%	3%	3%	5%
	Non agricultural higher level urban household	3%	5%	6%	9%	12%	11%	8%
Total		100%	100%	100%	100%	100%	100%	100%
Total population ('000s)		95,254	130,485	147,490	164,047	179,248	188,359	207,429

Source: National accounts statistics; Sistem neraca social ekonomi Indonesia (Social Accounting Matrix), various issues.

Figure A.2.1: Gini coefficients in Indonesia, 1920-2000



Note: Log-normal and Pareto calculated from Leigh and Van der Eng (2007) as indicated above; income Gini is derived from the WIID2b, and expenditure Gini as estimated in this text (table 2).