PUTTING THE GINI BACK IN THE BOTTLE?

'THE PALMA' AS A POLICY-RELEVANT MEASURE OF INEQUALITY

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ABSTRACT

In this paper we explore a new, policy-relevant measure of inequality and compare it to the dominant indicator of inequality, the Gini coefficient. The 'Palma' as we have called it, is an alternative measure of inequality based on the work of Gabriel Palma (2006; 2011). The Palma is based on his observation that, for a snapshot of data covering countries at quite different income levels, the 'middle classes' or middle income groups between the 'rich' and the 'poor' (defined as the five 'middle' deciles, 5 to 9) tend to capture around 50% of national income. However, the other half of national income is shared between the richest 10% and the poorest 40% but varies considerably across countries. We argue that the Palma ratio – meaning the ratio of the top 10% of population's share of gross national income (GNI), divided by the poorest 40% of the population's share of GNI – could provide a more policy-relevant indicator of the extent of inequality in each country, and may be particularly relevant to poverty reduction policy.

In the paper we do four things to explore the Palma. First, we confirm the robustness of Palma's main results over time: the remarkable stability of the middle class capture across countries, coupled with much greater variation in the 10/40 ratio. Second, we compare the Palma and the most commonly used indicator of inequality, the Gini coefficient, and find a close fit. Third, we suggest that the Palma might be a better measure for policy makers to track as it is intuitively easier to understand for policy makers and for citizens, and in addition could be a more relevant measure of inequality to poverty reduction policy. For a given, high Palma value, it is clear what needs to change: to narrow the gap, by raising the share of national income of the poorest 40% and/or by reducing the share of the top 10%. Fourth, we present evidence of a link between countries' Palma and their rates of progress on the major Millennium Development Goal (MDG) poverty targets. While the results are - of course - tentative at this stage, their potential scale is striking: countries which reduced their Palma exhibit mean rates of progress which, compared to countries with rising Palmas, are three times higher in reducing extreme poverty and hunger, twice as high in reducing the proportion of people lacking access to improved water sources, and a third higher in reducing under-five mortality. The paper concludes with a set of questions arising for future exploration.

1. INTRODUCTION

In a 2011 paper, 'Homogeneous middles vs. heterogeneous tails, and the end of the 'Inverted-U'', Gabriel Palma observes a startling capture of half of GNI by the 'middle classes' – defined as the five 'middle' deciles (deciles 5 to 9) between the extremely poor (deciles 1 to 4) and the rich (decile 10, the richest decile).[2]

Using a World Bank *World Development Indicators* dataset that includes observations for 135 countries with information on Gini coefficients and income shares, Palma discusses differences in within-country income distribution. He draws a set of conclusions, of which we highlight three here.

First, Palma finds that about 80 per cent of the world's population now lives in regions whose median country has a Gini close to 40.[3] Second, 'outliers' to this 40 Gini (both higher and lower) are now only located among middle-income and high-income countries: that is, the 'upwards' (low-income) side of the 'Inverted-U' (the Kuznets Curve) between inequality and income per capita has evaporated. The implication is that the potentially consoling hypothesis that 'things have to get worse before they can get better' is not supported – as Palma puts it, "there is no evidence that the distributional deterioration that has been taken place so far in Latin America and Southern Africa is a necessary prelude to a later improvement — the age-old excuse used by many middle-income countries to justify their high inequality" (2011, p.13).

The third finding to emerge is that within global trends on inequality, there are two opposite forces at work (see also Palma, 2006). One force is 'centrifugal', leading to an increased diversity in the shares of the top 10 per cent and bottom 40 per cent, and the other is 'centripetal', leading to a growing uniformity in the income-share

[2] Palma here uses "middle class" to mean the middle income/consumption groups. One cannot, of course, conflate social identity and expenditure data in more than the most general sense and indeed in some countries the "poor" will be in the middle deciles. However, there is some basis in that the $2 poverty rate in the middle-income countries is around 40% of population (weighted mean all MICs) so in all but the remaining 36 LICs, the bottom four deciles is not an unreasonable proxy for the $2 poor (Sumner, 2012). Palma (2011: 102) argues that, in light of the observation that the share of GNI of those people in deciles D5–D9 is generally half of national income, the 'middle classes' should be renamed the 'median classes': 'Basically, it seems that a schoolteacher, a junior or mid-level civil servant, a young professional (other than economics graduates working in financial markets), a skilled worker, middle-manager or a taxi driver who owns his or her own car, all tend to earn the same income across the world — as long as their incomes are normalized by the income per capita of the respective country.' Palma also notes a clear difference between the GNI capture of D5-D6 versus D7-D9 and a very large difference between D9 versus D10 capture of GNI.

[3] This, by itself, is an argument against using the Gini as a useful indicator of inequality (see later).

appropriated by the 'middle' 50 per cent (deciles 5 to 9). Therefore, one could argue that half of the world's population (the middle and upper-middle classes) have acquired strong 'property rights' as Palma puts it, over half of their respective national incomes, while there may be more flexibility over the distribution of the other half of this income, between the 'rich' and the 'extremely poor'.

We focus our paper on developing countries (meaning low and middle income). An important caveat is that it is not as clear that the capture of the middle classes will always hold for higher-income countries. For example, the middle three quintiles (not Palma's middle five deciles) in the USA have seen their share of national income fall from 53.2% to 45.7% between 1968 and 2011 (Levine, 2012). In the UK, the share of the middle five deciles declined only very gradually: from 56.6% in 1977 to an average of 55.6% in the 1980s, 54.7% in the 1990s, 53.7% in the 2000s. Recent UK political discussion of a 'middle-class squeeze' is more likely to reflect shorter-term dynamics, with the financial crisis followed by a relatively sharp drop from 54.4% in 2008-09 to 52.9% in 2010-11 (our calculations from ONS data). Further research should consider whether there is evidence for longer-term 'middle class squeezes', in some high-income countries in particular. In general, however, globalization appears to be creating a distributional scenario in which what really matters is the income-share of the rich (because the rest 'follows' as Palma argues). If the findings are relatively robust over time as well as across income levels, the Palma ratio of income shares of the top 10% to the bottom 40% will capture substantial information about comparative income inequality in a single number that – we believe – is more readily understandable to a wider audience than the Gini.[4] This paper sets out to assess the robustness of the Palma and the 'middle class capture' over time, and further to explore the characteristics of each, with a view to assessing the Palma's relevance for use in policy in developing countries.[5]

[4] The Theil index, which is what many people use as an alternative for the Gini is refered to by Sen as follows: 'the fact remains that it is an arbitrary formula, and the average of the logarithms of the reciprocals of income shares weighted by income shares is not a measure that is exactly overflowing with intuitive sense.' (Sen, 1973: 36). For a short review of the range of inequality measures see Charles-Coll (2011).

[5] What we have called 'The Palma' is part of a family of inequality measures known as 'inter-decile ratios'of which the Palma is a peculiar specification. The most commonly used is possibly the 'bottom 20%/top 20%' or its inverse.

2. REVIEWING THE PALMA ACROSS COUNTRIES AND TIME

In the analysis that follows, we used decile data on income distribution from the World Bank's Povcal dataset (downloaded November 2012). We take data for the nearest dates to 1990 and 2010 for each of the 76 countries for which data is available for both points (see Annex I for list of countries and survey years). Around two-thirds of Povcal distribution data are consumption surveys. The remainder are income surveys (largely Latin America and the Caribbean). Because no means of adjustment (income vs consumption) is readily acceptable we do not adjust surveys, but in the final part of this section we provide additional supporting evidence using income data alone for Latin America and the Caribbean, and the UK.

2a. Income shares in 1990 and 2010

We confirm that Palma's finding of the stability of the middle 50% holds over time. Figures 1 and 2 show the income shares of the middle 50% (in green), the bottom 40% and the top 10%, for 1990 and 2010 respectively. The visual impression that the stability has increased over time is confirmed by the coefficients of variation, shown in table 1. The 'middle class' share varies consistently less across countries than do the shares of the top 10% and bottom 40%; all three are more stable across countries in 2010 than in 1990, but the middle class has a coefficient of variation which is consistently less than a third of that of the top 10%, and around a quarter of that of the bottom 40%.

Table 1: Stability of income shares

		Highest 10%	Lowest 40%	Middle 50%
1990	Mean	31.67	16.97	51.35
	Standard deviation	9.80	5.95	4.58
	Coefficient of variation	0.31	0.35	0.09
2010	Mean	32.57	16.45	50.98
	Standard deviation	6.89	4.23	3.15
	Coefficient of variation	0.21	0.26	0.06
Combined	Mean	32.12	16.71	51.17
	Standard deviation	8.45	5.15	3.92
	Coefficient of variation	0.26	0.31	0.08

The middle class share ranges, among the 152 observations (76 for each period), between 30.7 and 61.9 (Namibia and Mexico, respectively, in 1990); but nine out of ten observations are within the range 45%-55%. The top 10% share in contrast ranges between 17% and 65%, and the lower 40% share between 4% and 28%.

2b. The Palma and the share of the middle classes

The Palma is closely correlated with the income share of the middle 50%, as figures 3-5 show. The linear fit shown exceeds 70% for the 1990 and 2010 data separately and combined (log-linear fits, not shown, are marginally better except in the case of 2010 where there is no significant difference). The 1990 positions of Namibia, Panama and Mexico are highlighted in figure 3 (and figure 5) because they each reflect a higher share of national income for the middle class than would otherwise be predicted by the Palma ratio – or, equivalently, that the income share of the poorest 40% is more tightly squeezed. As figure 4 shows, both – and Mexico in particular – have by 2010 moved back towards the common relationship.

Honduras, in contrast, moves away from the trend line: from a relatively standard relationship in 1990, to one in 2010 which squeezes the poorest 40% relatively hard. Klasen, Otter & Villalobos Barria (2012) use household survey data to detail the combination of domestic and international factors underpinning what they call the 'extraordinary labour earnings disequalization' (p.1) that makes the country an outlier from the broader pattern in Latin America. Although their data suggest the beginning of a reversal in 2005-2007, the 2009 data here suggest the long-term pattern remains. South Africa is also indicated, to highlight the country's shift along the line of the predicted relationship, in this case towards greater inequality.

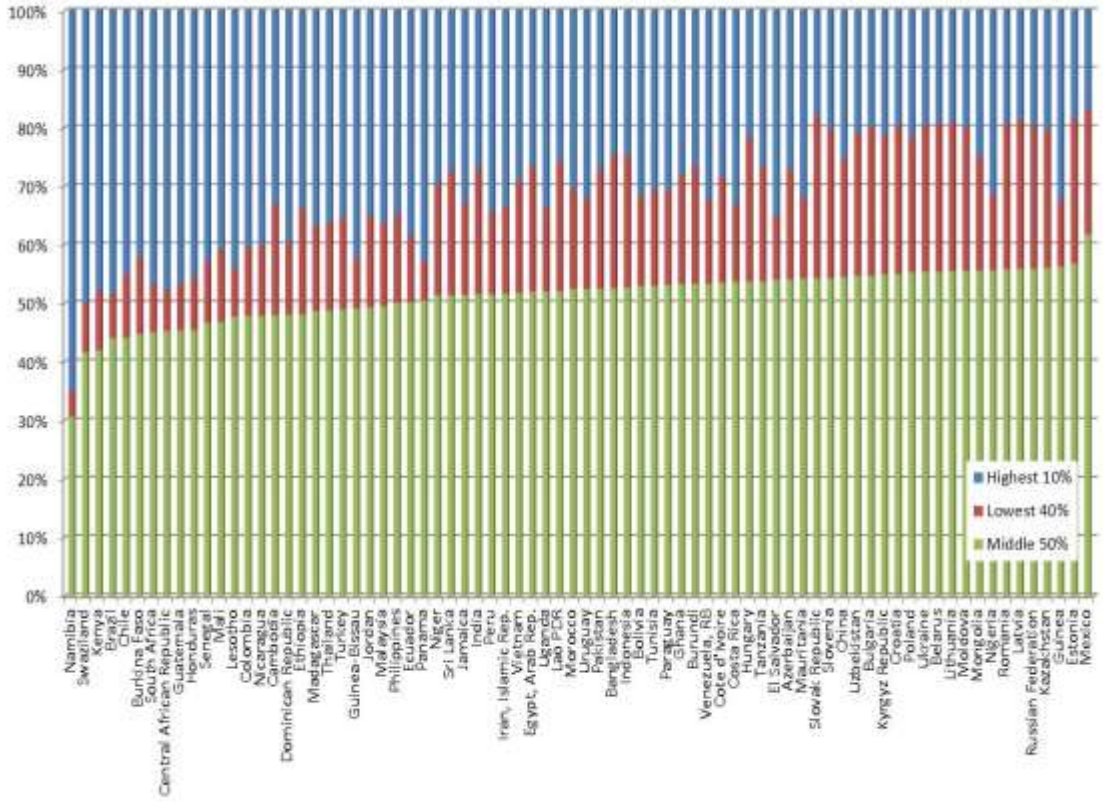


Figure 1: Income shares, 1990

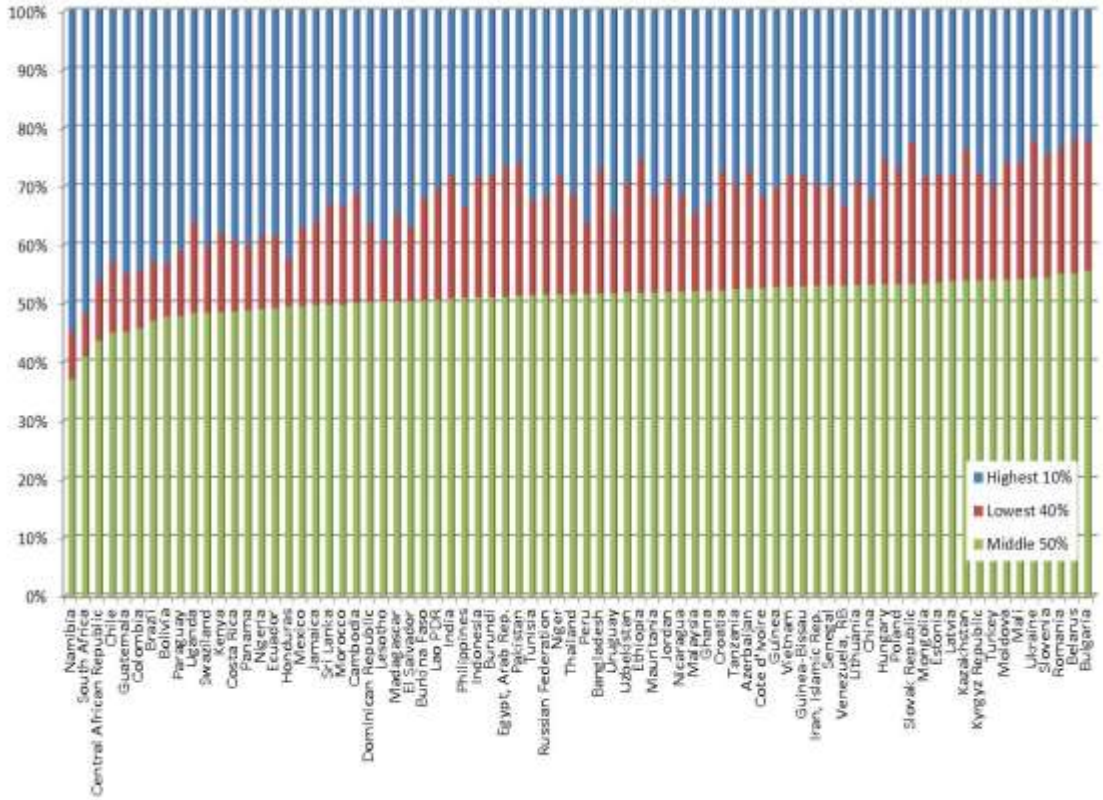


Figure 2: Income shares, 2010

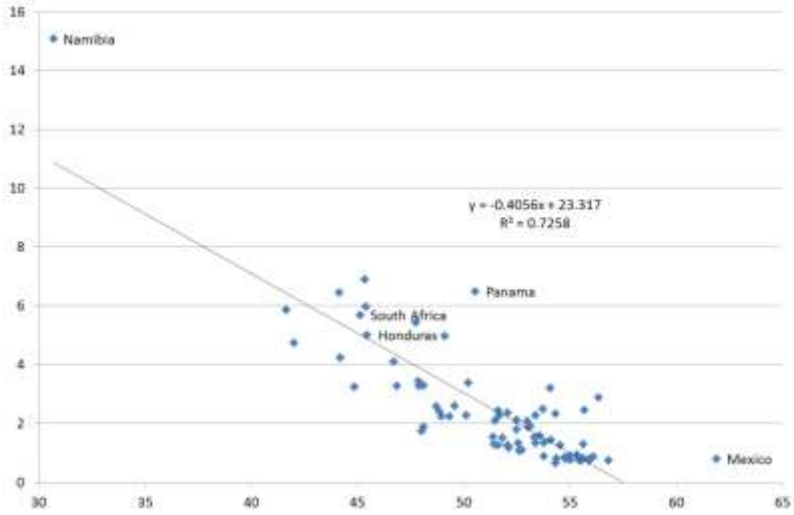


Figure 3: The Palma and middle 50% income share, 1990

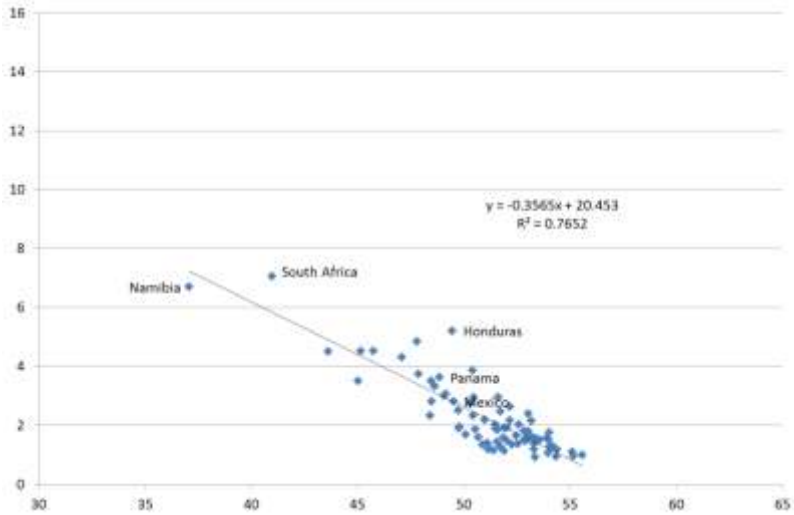


Figure 4: The Palma and middle 50% income share, 2010

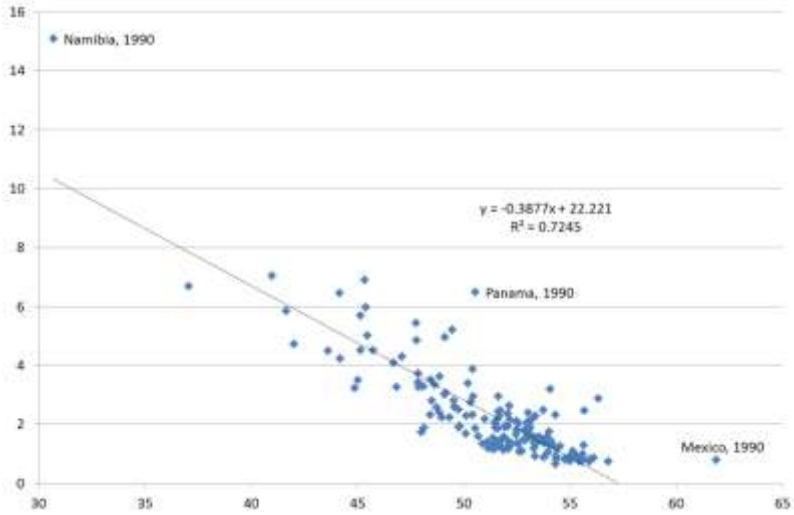


Figure 5: The Palma and middle 50% income share, 1990 and 2010 pooled

2c. The Palma: Shifting quartiles of 10/40 ratio over time

To consider the shifting patterns over time, we look at the inter-quartile movement of countries' Palma scores from 1990 to 2010. Table 2 shows the transition between quartiles over the period, with darker shading indicating deteriorating inequality, and lighter shading the reverse. Individual countries were able to move from the quartile of countries with lowest inequality (Q1) in 1990 to the highest (Q4) in 2010 (Mexico), as well as the reverse (Mali), but overall the graphic suggests significant 'stickiness' in inequality, despite the presence of mobility in each direction. Around a quarter of the sample saw an improvement in inequality (18 countries out of 76), and the same a deterioration (19 countries), but just over half of the sample (39 countries) remained in the same quartile.

Within the latter group, it may be surprising to see the failure of Brazil to exit the highest inequality quartile, given the plaudits received. This is consistent, however, with Palma's (2011) view and the analysis of Espey et al. (2012), which shows that Brazil's achievement in reducing inequality has been to move from an extreme outlier position among countries, back towards the pack – but still with one of the highest inequalities of any major nation.

The cut-off points between quartiles have bunched up somewhat over the period. At the low end, a Palma of less than 1.09 was required for a country to be in the least unequal quartile in 1990, but by 2010 a Palma below 1.39 would suffice. At the high end, a Palma exceeding 3.21 was required to be in the most unequal quartile in 1990, but by 2010 a Palma above 2.81 was sufficient. At the centre there was negligible movement, with the cut-off between the second and third quartile was 1.89 in 1990 and 1.86 in 2010.

The changing Palma is shown in figures 6 and 7 also, which show the relationships between the 1990 Palma and the subsequent change in its value – both the absolute change (figure 6, with the Palma 'explaining' 68% of the variation in the change) and the proportional change (figure 7, 'explaining' 44%). The implication is to confirm the 'stickiness' of inequality: the initial Palma appears to exert a strong influence on the same ratio two decades later.

Table 2: Transition between Palma quartiles

		2010			
		Q1 (Palma<1.39)	Q2 (P<1.86)	Q3 (P<2.81)	Q4 (P>2.81)
1990	Q1 P<1.09	Bangladesh Belarus Bulgaria Croatia Hungary Kazakhstan Moldova, Rep. Poland Romania Slovak Rep. Slovenia Ukraine	Estonia Kyrgyz Republic Latvia Lithuania Uzbekistan	Russian Federation	Mexico
	Q2 P<1.89	Azerbaijan Burundi Egypt, Arab Rep. Ethiopia India Pakistan	Cambodia Indonesia Lao PDR Mongolia Niger Tanzania Vietnam	China Cote d'Ivoire Ghana Morocco Sri Lanka Tunisia	
	Q3 P<3.21		Guinea Iran, Islamic Rep. Jordan Thailand Turkey	Jamaica Madagascar Malaysia Mauritania Philippines Uganda Uruguay Venezuela, RB	Bolivia Costa Rica El Salvador Nigeria Paraguay Peru
	Q4 P>3.21	Mali	Guinea-Bissau Senegal	Burkina Faso Dominican Rep. Kenya Nicaragua	Brazil C.A.R. Chile Colombia Ecuador Guatemala Honduras Lesotho Namibia Panama South Africa Swaziland

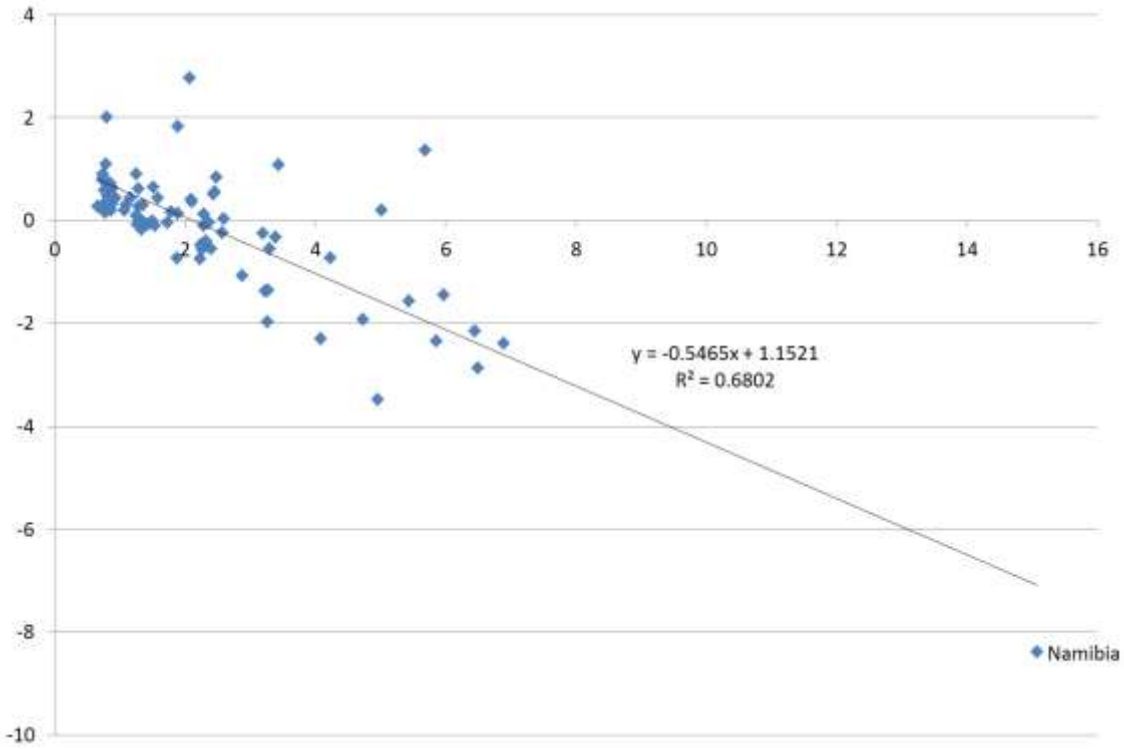


Figure 6: Palma (1990) and absolute change, 1990-2010 (linear)

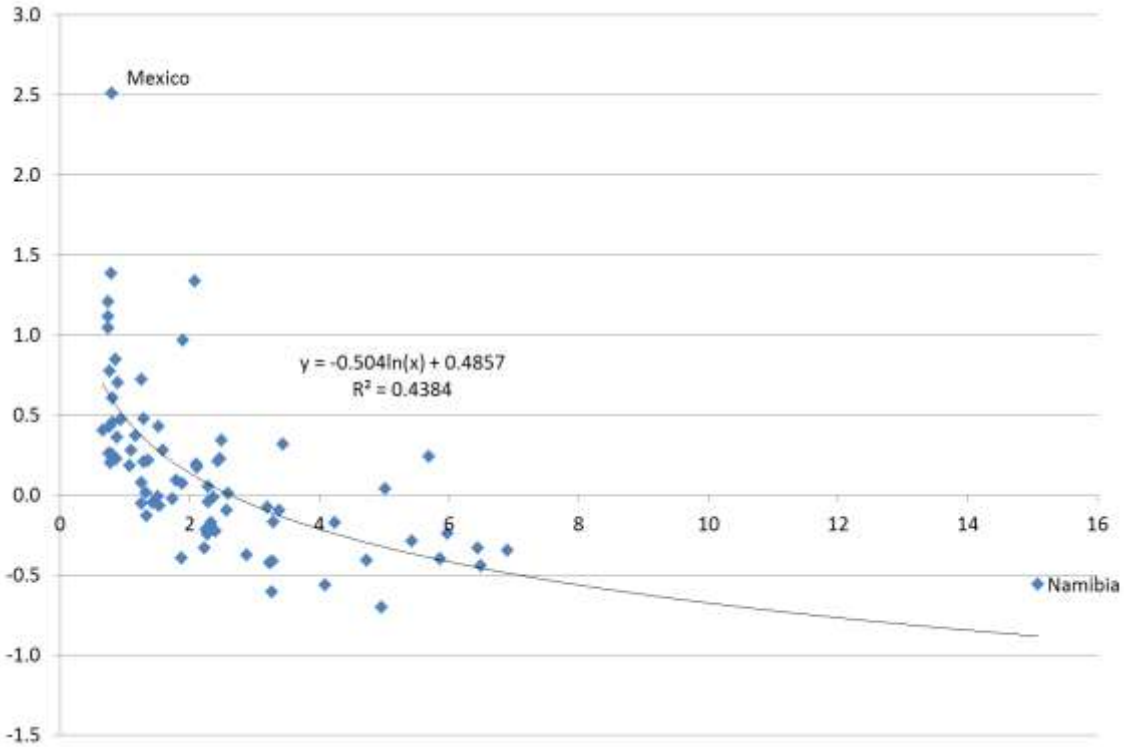


Figure 7: Palma (1990) and proportional change, 1990-2010 (log-linear)

2d. The stability of the middle 50% in countries with income surveys

Here we present additional evidence using income (rather than consumption) distribution data for countries in Latin American and the Caribbean, drawn from SEDLAC (compiled by CEDLAS and the World Bank), and for the UK (from the Office of National Statistics).

First, table 3 shows the UK and the 14 Latin American countries for which there are ten or more observations for national income distribution in SEDLAC, between 1981 and 2011. For the most part these are annual data, although in some cases they are more frequent (e.g. in Argentina they are six-monthly for some of the period).

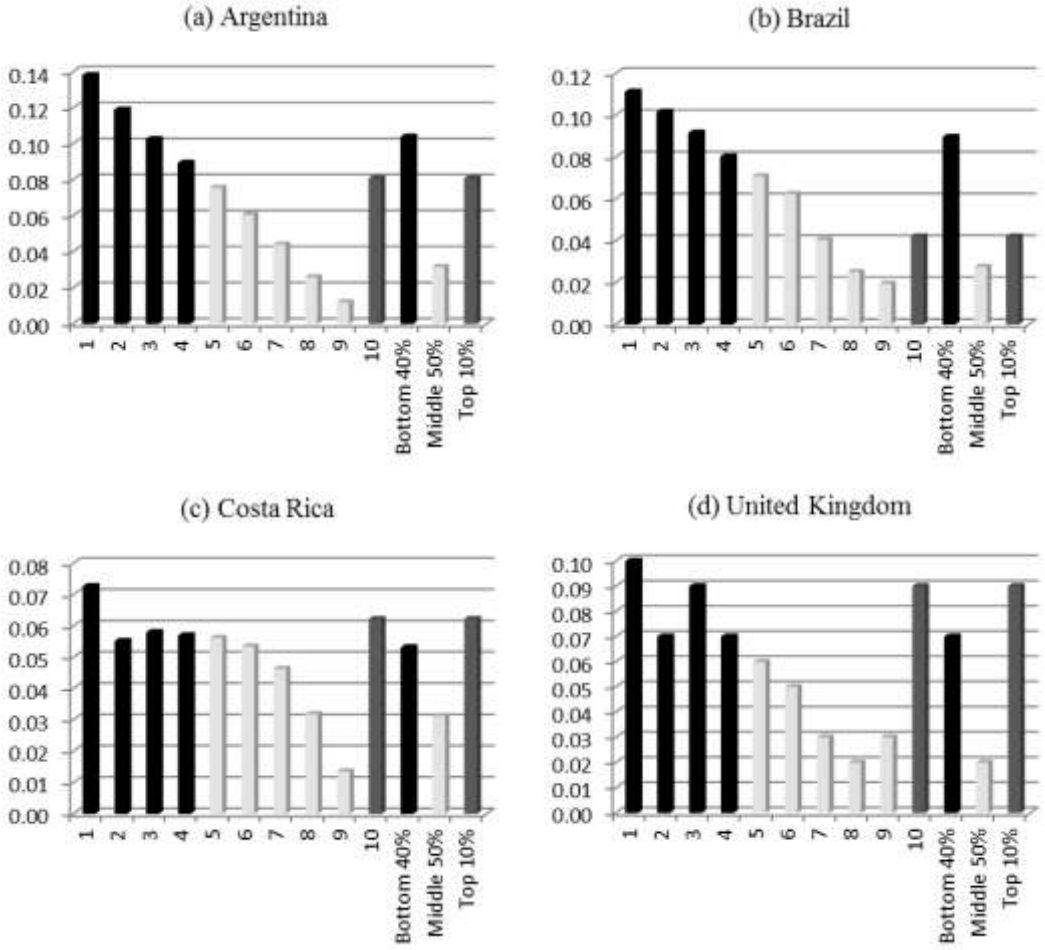
We use again the coefficient of variation (the ratio of the standard deviation to the mean) as a measure of the stability of series. For each country individually, and across the pooled country averages, a clear pattern emerges: the income share of the middle 50% is consistently much more stable than the rest of the distribution. In general (though not without exception) as figure 8 shows graphically, this reflects an underlying pattern that the stability of decile shares is higher for each of deciles 5-9 than for deciles 1-4 or 10.

We can also look at the stability of the income distribution as policy measures take effect. Here we combine data from Lustig et al. (2012), who analyse the effects of taxes and transfers for a number of Latin American countries, and the UK data which also shows this.

Table 4 shows in summary the evolution of the shares of national income of the bottom 40%, top 10% and middle 50% for Argentina, Brazil, Mexico, Peru and the UK, at three stages: market (or 'original') income, disposable income (i.e. market income after deductions of income tax and employees' social security contributions, and the receipt of direct transfers) and final income (i.e. disposable income after deductions of indirect taxes, co-payments and user fees – for e.g. healthcare, and receipt of indirect subsidies and in-kind benefits such as public health and education).

It is clear that, even in very different countries the middle 50% share of national income is relatively untouched by systems of taxation and transfers – while the top 10%, and above all the bottom 40% are significantly affected, as is the Palma ratio. Though less relevant here, it is interesting to note that there is also strong

support for the view that Latin American countries have, as yet, been unable to achieve significant redistribution through direct taxation and transfers – whereas in the UK this is responsible for the majority of redistribution.



Source: calculations from CEDLAS and from ONS (UK), downloaded 8 March 2013.

Figure 8: Relative stability of income deciles' share of national income

Table 3: Stability of the 'middle' 50% income share in Latin America

		Year		Average values				Coefficient of variation			
	Observations	Earliest	Latest	Bottom 40%	Middle 50%	Top 10%	Palma ratio	Bottom 40%	Middle 50%	Top 10%	Palma ratio
Argentina	18	2003	2011	12.2	52.5	35.2	2.93	10.4%	3.2%	8.1%	19.2%
Brazil	26	1981	2009	11.0	44.6	44.4	4.05	9.0%	2.8%	4.2%	13.1%
Chile	10	1987	2009	9.7	44.2	46.0	4.77	6.1%	1.4%	2.6%	8.0%
Colombia	13	1996	2010	13.2	51.1	35.7	2.72	4.9%	2.1%	2.4%	7.2%
Costa Rica	23	1989	2010	12.3	48.5	39.2	3.20	5.3%	3.1%	6.2%	11.4%
Dominican Rep.	14	1996	2010	10.7	46.7	42.6	4.07	5.3%	2.4%	4.3%	9.2%
Ecuador	13	1995	2010	11.8	50.5	37.7	3.26	12.1%	4.3%	7.0%	18.0%
El Salvador	16	1991	2010	9.5	47.3	43.1	4.58	11.5%	2.2%	5.0%	15.6%
Honduras	19	1991	2010	11.7	47.4	40.8	3.53	14.0%	2.8%	3.9%	16.4%
Mexico	12	1989	2010	9.5	48.8	41.7	4.43	7.9%	2.3%	4.7%	12.2%
Panama	16	1989	2010	11.2	49.0	39.8	3.61	8.8%	1.6%	2.7%	10.2%
Paraguay	13	1995	2010	13.4	51.3	35.4	2.65	11.0%	3.0%	4.5%	14.6%
Peru	15	1997	2010	14.1	52.4	33.4	2.41	9.8%	4.4%	8.0%	18.1%
Venezuela	16	1989	2010	6.7	46.8	46.4	7.26	9.2%	2.2%	7.1%	15.4%
Memo: UK	34	1977	2010-11	22.6	54.8	22.6	1.01	6.5%	2.0%	9.4%	15.0%
		Excluding UK:	Min	6.7	44.2	33.4	2.4				
			Max	14.1	52.5	46.4	7.3				
			Mean	11.2	48.7	40.1	3.8				
			Coeff. Var.	17.1%	5.5%	10.5%	32.5%				
		Including UK:	Coeff. Var.	29.0%	6.2%	15.6%	38.5%				

Source: calculations from CEDLAS and from ONS (UK), downloaded 8 March 2013.

Table 4: Stability of the 'middle' 50% income share through taxes and transfers

		Bottom 40%	Top 10%	Middle 50%	Palma
Argentina	Market income	0.11	0.36	0.53	3.36
	Disposable income	0.13	0.34	0.53	2.51
	Final income	0.19	0.30	0.52	1.62
	Total change	*73%*	*-17%*	*-3%*	*-52%*
Brazil	Market income	0.09	0.45	0.46	5.10
	Disposable income	0.11	0.42	0.47	3.84
	Final income	0.16	0.37	0.47	2.23
	Total change	*86%*	*-18%*	*1%*	*-56%*
Mexico	Market income	0.11	0.41	0.48	3.80
	Disposable income	0.12	0.40	0.49	3.36
	Final income	0.15	0.36	0.49	2.35
	Total change	*42%*	*-12%*	*1%*	*-38%*
Peru	Market income	0.11	0.38	0.50	3.36
	Disposable income	0.12	0.37	0.51	3.17
	Final income	0.13	0.36	0.51	2.73
	Total change	*16%*	*-6%*	*1%*	*-19%*
UK	Market income	0.11	0.33	0.57	3.13
	Disposable income	0.19	0.27	0.54	1.44
	Final income	0.23	0.24	0.53	1.07
	Total change	*117%*	*-26%*	*-7%*	*-66%*

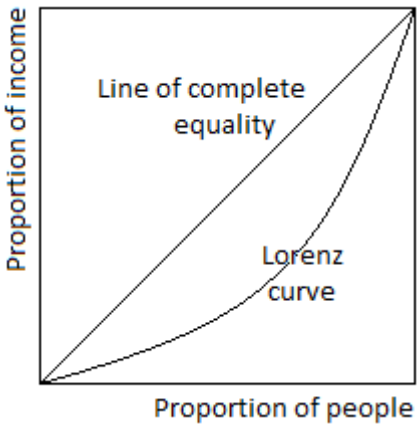
Source: calculations on data from Lustig et al. (2012) and from ONS (UK), downloaded 8 March 2013. Latin American data are for 2008 and 2009, UK data for 2010-11. 'Final' income data for Argentina do not include the effects of indirect subsidies and indirect taxes.

3. THE PALMA VERSUS THE GINI: WHICH INEQUALITY MEASURE?

> The conventional approach in nearly all empirical work [to compare distributions] is to adopt some summary statistic of inequality such as…
> the Gini coefficient – with no very explicit reason being given for preferring one measure rather than another.
>
> …without introducing [judgments about the level of inequality considered 'fair'] it is impossible to measure the degree of inequality. That no such decision has to be made with the conventional measures simply obscures the fact that they embody quite arbitrary values about the distribution of income.
>
> Atkinson (1973, p.46 and pp.67-68).

Given that the Gini coefficient is commonly used by economists and in other disciplines as a single indicator for income inequality, it is not clear – despite its limitations – that we would want to propose a measure that produced results completely at odds with it. Here we discuss briefly the major criticisms of the Gini, examine its relationship with the Palma and explain why the latter might be preferred and consider the relationship between the Gini and the Palma.

A Lorenz curve shows the income distribution in a population. If we imagine the population is lined up from left to right, with those on lowest incomes to the left, the curve shows at any given point what proportion of the total income is earned by any given (lowest-income) proportion of the population. The Gini coefficient reflects the size of the gap between the Lorenz curve and the line of complete equality of incomes, which would be a 45-degree line in the same space.



There are a range of more technical critiques of the Gini, and a substantial literature exists dedicated to finding technically superior measures of the frequency of distributions (see e.g. Duro, 2008; Frosini, 2012; and Greselin et al., 2013).

There is, however, just one, long-standing criticism that we focus on here. Atkinson (1973) in the quote above, makes clear the shortcoming of many inequality measures, including the Gini: that they are not explicit about their underlying, effectively *normative* assumptions about inequality. For Sen (1973) too writing at the same time, inequality measurement could be objective or normative.

In the specific case of the Gini, these assumptions include a relatively greater emphasis being put on the incomes of those in the middle of the distribution. The Gini is very sensitive to changes in the middle — where there is (ironically) little change — and not to changes in the extreme of the distribution — where changes do happen. Atkinson (1973) demonstrates just why this matters, and ensures that the Gini is far from a 'neutral' measure of inequality. He first highlights that, in comparing two countries where the Lorenz curves do not intersect, we can say – and the Gini will suffice to do so – that the country with the curve closer to the line of complete equality is more equal than the other. When Lorenz curves cross, however, things become less clear.

Atkinson presents the case of the United Kingdom and West Germany, for which the Lorenz curves then crossed at around 50% of the population. The income share of the lowest-income 50% is higher (closer to the 45-degree line) in West Germany, while that of the highest-income 50% is closer to the line in the UK – but the Gini coefficient shows the UK to be less unequal. Atkinson concludes:

> Summary measures such as the Gini coefficient are often presented as purely 'scientific', but in fact they explicitly embody values about a desirable distribution of income (p.66).

From this basis, Atkinson goes on to derive an elegant mechanism to make explicit the actual preferences about inequality that are inherent in any given judgment on the comparison of two distributions. At a level of theory there is not much to add to this. However, the complexity of Atkinson's 'equally distributed equivalent measure' approach may explains its broad absence from policy discussions in the subsequent four decades.

At an analytical level, it is clearly important to make underlying judgments about inequality explicit. For policymakers and for public discussion of inequality, it is also neccesary that the chosen measure/s of inequality be easily understood and

intuitively clear, as well as having straightforward implications for policy. As is argued below, the Palma meets these criteria.

First, we can show that the correlation between the Palma and the Gini is near perfect. Figures 9-11 show, for 1990 data, 2010 data and the pooled combination respectively, that log-linear relationships consistently 'explain' in excess of 90% of the variation.[6] At one level this finding would support continuing with the Gini as the established common inequality measure. As discussed, however, the Gini puts greater weight on incomes in the middle of the distribution. As we saw in section 2, the relative stability of the 'middle class' income share implies that we should be looking elsewhere to understand the development of inequality.

While the Gini and the Palma are closely correlated then, we would argue that the Palma should be strongly preferred as being 'over'-sensitive to changes in the distribution at the extremes, rather than in the relatively inert middle, since this is what matters to policymakers. It is important to note that one would not necessarily argue for the complete rejection of the Gini, nor for its immediate retirement from analysis. However, the differences in sensitivity, combined with the relative stability of the intermediate deciles' income share, militate in favour of the Palma over the Gini. In addition, the clarity of the Palma favours its use for policy targets where popular engagement may be important for accountability.

A further concern can be raised here. The strength of the correlation will be due in substantial part to the fact that Gini coefficients generated by PovCal are the product of synthetic Lorenz curves based on the same distribution data we use to create the Palma (see eg Shorrocks & Wan, 2008). This points to another criticism of the Gini, namely that it is presented as a representation of the whole income distribution when often it draws on data that reflects only group shares. In this respect, we find the Palma will often be a more 'honest' reflection of the actual extent of distribution data. Further research to compare the Palma and the Gini, where both are generated from full microdata, would be valuable to explore.

We can consider the relative Palma and Gini values for a stylised set of household decile income distributions (see table 5). We fix the income share of the middle deciles (5-9) at 50% of national income, then calculate the shares of the

[6] As seen in the graphs, one advantage of the Palma over the Gini is that whereas the Gini is typically a value between 0.25 and 0.65, the Palma can range from anywhere below 1 to 8 or more (Namibia) providing a slightly higher specificity in inequality which can be advantageous when correlating it with other indicators.

bottom 40% and top 10% that are necessary to yield values of the Palma from one to ten. We then construct the synthetic Lorenz curve and calculate the associated Gini coefficients, using an adapted version of Hain (2005).

Table 5: Comparison of Palma and synthetic Gini values

Decile	Income shares (%)									
1	6.25	4.17	3.13	2.50	2.08	1.79	1.56	1.39	1.25	1.14
2	6.25	4.17	3.13	2.50	2.08	1.79	1.56	1.39	1.25	1.14
3	6.25	4.17	3.13	2.50	2.08	1.79	1.56	1.39	1.25	1.14
4	6.25	4.17	3.13	2.50	2.08	1.79	1.56	1.39	1.25	1.14
5	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10
7	10	10	10	10	10	10	10	10	10	10
8	10	10	10	10	10	10	10	10	10	10
9	10	10	10	10	10	10	10	10	10	10
10	25.00	33.33	37.50	40.00	41.67	42.86	43.75	44.44	45.00	45.45
Palma	1	2	3	4	5	6	7	8	9	10
Gini	0.225	0.350	0.413	0.450	0.475	0.493	0.506	0.517	0.525	0.532

For simplicity, we hold equal the shares of deciles 5-9 and of deciles 1-4. This biases the reported Gini downwards, but to a limited extent only. For example, instead of holding the income shares of deciles 5-9 equal at 10% each, we can allow these to vary to be 6%, 8%, 10%, 12% and 14%. This simply adds 0.04 to each reported Gini in table 5. Similarly, we can allow the income shares of deciles 1-4 to vary in each case - so that, for example, decile 1's share is 0.5% of national income less than that of decile 2, which in turn is 1% less than decile 3, which in turn is 0.5% less than decile 4. This adds 0.007 to each reported Gini. To give a specific example, the decile income shares for a Palma of 4 in table 5 are 2.5% for deciles 1-4, 10% for deciles 5-9 and 40% for the top decile. We could arbitrarily vary these as discussed so the respective income shares are 1.5%, 2%, 3%, 3.5%, 6%, 8%, 10%, 12%, 14% and 40%. This would have the effect of changing the reported Gini from 0.450 to 0.497.

What is striking in our findings is the insensitivity of the Gini above a certain level of inequality between the top 10% and the bottom 40%. If the Palma increases from one to five, the Gini rises from 0.225 to 0.475; but if the Palma rises from five to ten, the Gini only increases from 0.475 to 0.532. Note that, as discussed, allowing for consistent variation within deciles 1-4 and deciles 5-9 would result in a somewhat higher Gini, but importantly no greater variation over this range. The Palma exhibits greater sensitivity to distributional changes (at the extremes rather than at the centre),

resulting in higher specificity to inequality which may be valuable, for example, in regression analysis.

Finally, it is worth considering a more fundamental difference between the Gini and the Palma. As discussed, the Gini is intended to capture the entire income distribution – and as Atkinson has demonstrated, such summary statistics hide "*the fact that they embody quite arbitrary values about the distribution*" (1973, p.67). While the Palma is an alternative measure of income distribution, one would not want to over-claim its ability to capture the entire distribution. That is, if the stability of the income share of deciles 5 to 9 was absolute, the Palma would indeed capture the entire distribution – as, indeed, would either component, the income share of the top 10% or that of the bottom 40% (because all else would follow if the middle 50% share was fixed and known). There is considerable stability indeed to the middle 50% share of income; but it is not absolute. Importantly, even had it been so up to the most recent data, it could still not be assumed.

Income distribution is ultimately, and fundamentally, political: the result both of long-term institutional, social and economic systems and structures, as well as of more immediate policy shifts and economic conditions. The stability of the income share of the middle 50% should be assumed, or ignored, and hence we do not present the Palma as a reflection of the full income distribution in the same way that the Gini is intended nor as having some of the mathematical properties for such a summary statistic that are long established for the Gini.

Indeed, Litchfield (1999) lists five common axioms for inequality measures: (1) the Pigou-Dalton transfer principle rules out counter-intuitive responses to transfers, e.g. the measure should not rise after a transfer from a rich person to a poor one; (2) income scale independence, so the measure should not respond to proportional changes in each person's income; (3) Dalton's principle of population, so the measure should not respond to a merging of identical populations; (4) anonymity or symmetry, so the measure is independent of any non-income characteristic of individuals; and (5) decomposability, so that (broadly) overall inequality is related consistently to inequality among sub-groups. The Gini meets the first four of these; and the fifth only under certain conditions. The Palma does not meet the fifth either,

and further analysis would be required to consider the first four (and indeed other axioms which have been proposed, since this list is not universally agreed).[7]

The Palma should be seen as a measure of group inequality, much like measures of gender or spatial inequality, or of the inequalities facing people living with disability or in different ethno-linguistic groups (see e.g. Stewart, 2002; Cobham & Hogg, 2010; and Kabeer, 2010). As the UN's synthesis report on the global consultation on inequalities in the post-2015 framework (UNICEF/UNWomen, 2013) has made clear, there is a powerful consensus that targets and indicators reflecting disparities in poverty rates by groups.[8]

A remaining question with the Palma – given the quote at the top of this section – is whether the ratio includes an implicit statement about the 'right' amount of inequality. One can argue that this is not necessary: While other group inequalities may tend to the implicit or explicit goal of equality between groups there is nothing particularly attractive about a situation in which the top 10% has the same income share as the bottom 40% per se or that each has a share of GNI proportion close to their population share *rather* than their respective shares of population and GNI ought to not to be so drastically different that economic growth becomes hindered. Indeed, the Gini does not provide such a target either (a target of a Gini of zero, for example, would have few defenders).

[7] Charles-Coll (2011, p. 46) notes that, 'perhaps the most important advantage of the Gini coefficient is that it satisfies… a. The transfer principle, also known as the Pigou-Dalton principle (Dalton, 1920 and Pigou, 1912), where a transfers from a poor individual to a richer one should translate into an increase in the measure of inequality, no matter the size of the transfer or the relative position of the poor regarding the rich. b. The scale independence, which states that if the general income level increases by a fixed amount, then the overall value of the inequality measure should not change at all. c. The anonymity principle, by which the identity of the income recipients does not matter for the value determination of the inequality measure. d. The population independence, which means that the inequality measure should not be influenced by the size of the population… The main disadvantage of the Gini measure of inequality… is that the value for the Gini can be the same for different sets of distributions… this can be a serious disadvantage for someone interested in analyzing and perhaps comparing the structure of the income distribution in the different population quantiles.

[8] The Palma looks, of course, at the groups at the top and bottom of the income distribution. In this way it offers the potential for consistency in the treatment of the many dimensions of inequality which, it is widely held, were overlooked in the original Millennium Development Goals. And as the synthesis report (to the consultations for which we both contributed) notes, "The idea of, for example, a ratio between deciles, the top decile (10%) and the bottom four deciles (40%) would be relatively simple and could also broaden the focus on the bottom of the distribution away from the bottom 20% (and so away from narrow targeting, and recognize that inequalities affect more than the bottom fifth)" (p.129).

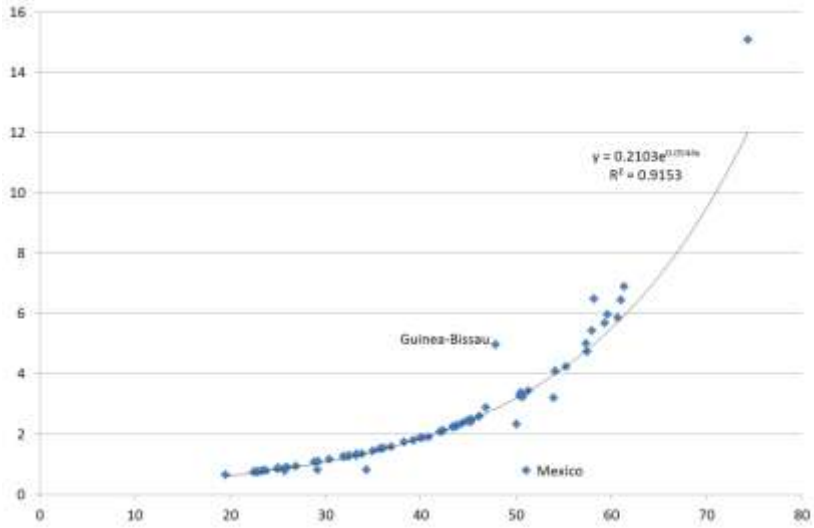


Figure 9: Palma and Gini, 1990

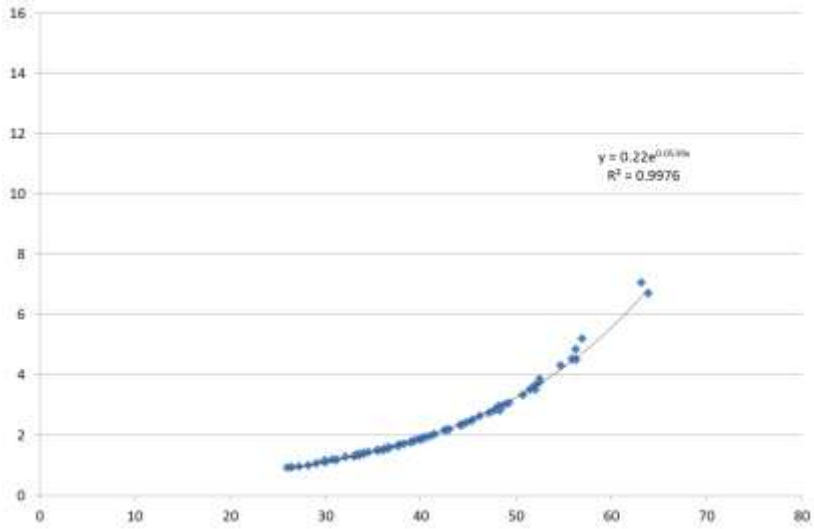


Figure 10: Palma and Gini, 2010

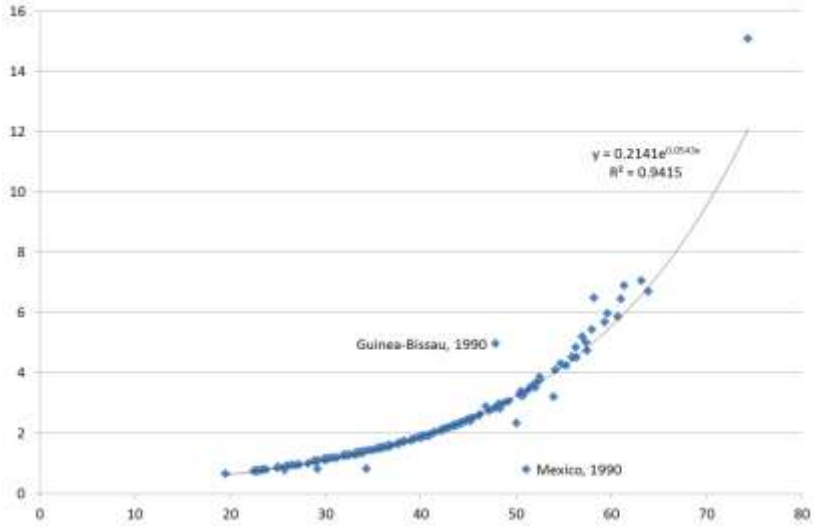


Figure 11: Palma and Gini, pooled

4. EXPLORING THE RELATIONSHIP BETWEEN THE PALMA AND POVERTY REDUCTION

In this section, we present evidence of a link to countries' progress on poverty reduction by using the Millennium Development Goals, and asking whether countries' Palma measure of inequality is rising or falling. We explore, tentatively, the relationship between the Palma and poverty reduction. We use the rates of change in MDG targets calculated by the Center for Global Development in their MDG Progress Index (released September 2011), and test whether there are significant differences in the means for countries which had experienced a rising Palma from 1990 to 2010, and those which had experienced a falling Palma in the same period. (Given the findings of section 3, it follows that similar results are likely for the Gini also.)

The CGD MDG index tracks progress on eight major targets in the MDGs. We find, *for each target*, stronger mean rates of progress among the group of 33 countries with falling Palma inequality than among the group of 43 countries with rising Palma inequality (Note that in some cases progress is measured as a positive number, for others a negative, according to the wording of the target). As Table 6 shows, the results are significant at the 1% level for two targets (reducing absolute income poverty and the proportion of people without access to water), and for a further one each at the 5% and the 10% level (reducing hunger and under-five mortality rates, respectively).

These results are only *indicative* but are thought provoking as the potential scale is striking: countries which reduced their Palma exhibit mean rates of progress which, compared to countries with rising Palmas, are three times higher in reducing dollar a day poverty and hunger, twice as high in reducing the proportion of people lacking access to improved water sources, and a third higher in reducing under-five mortality. Further research is clearly required to confirm or reject these findings. Inter alia it will be necessary to work with consistent distribution data (ideally based on income rather than consumption), and to consider carefully our linking of national accounts and household survey data (see e.g the discussion in Milanovic, 2005, on the risks of introducing systematic downward bias in recorded inequality).

Table 6: Independent samples t-test results

MDG	Target	Mean progress (%) when Palma is: Falling	Rising	t stat	P value	
1A	**Halve the proportion of people living on less than $1 a day**	**-14.6**	**-5.04**	**-2.83**	**0.006**	*******
1C	**Halve the proportion of people who suffer from hunger**	**-6.45**	**-2.21**	**-2.23**	**0.03**	******
2	Achieve universal primary education (100% completion rate)	16.2	11.77	1.34	0.185	
3	Eliminate gender disparity in primary and secondary education	8.03	3.78	1.58	0.119	
4	**Reduce by two-thirds the under-five mortality rate**	**-43.29**	**-31.58**	**-1.68**	**0.098**	*****
5A	Reduce by three quarters the maternal mortality ratio	-77.21	-72.84	-0.1	0.924	
6A	Have halted and begun to reverse the spread of HIV/AIDS	1.95	0.7	1.11	0.273	
7C(i)	**Halve the proportion of people without sustainable access to safe drinking water**	**-14.24**	**-7.71**	**-2.96**	**0.004**	*******

Note: t-tests on independent samples with unequal variance. P values are for tests of equality of means, significant at the 1% (***), 5% (**) or 10% (*) levels.

5. CONCLUSIONS AND FUTURE QUESTIONS

'The Palma' is an alternative measure of inequality based on the work of Gabriel Palma. It is based on the observation that the middle classes tend to capture around 50% of national income, so that politics can be thought of, simplistically, as determining the split of the other half of national income between the richest 10% and the poorest 40%.

In this paper we do the following: First, we demonstrate the remarkable stability of the observation or the middle class capture across countries and time and that the ratio of 10/40 top/bottom does change over time in some countries. Second, we compare the Palma and the Gini and find a close fit – so that much of the same information is captured by the two measures. However, we argue that the Palma would be a better measure for policy makers to track as it is intuitively easier to understand for policy makers and citizens; it is a more policy-relevant measure of inequality because, given the observed stability of the middle income deciles, it is clear what needs to change - albeit that is to take a normative position - to close the gap between the poorest 40% and the richest 10%; and it is explicit about the assumed preferences in regard to inequality, while these are not only somewhat hidden in the Gini but also (potentially) less likely to be shared by public and policymakers alike. Finally, we link countries' progress on the Palma inequality measure since 1990 to their progress on poverty reduction targets in the Millennium Development Goals.

Further research is required of course. We think that there is a compelling case for considering the greater adoption of the Palma ratio into national level inequality analysis and policy debate related to poverty reduction and in particular any new, post-2015 Millennium Development Goals in preference to the Gini - based on the fact alone that the Palma is intuitively easier to understand for policy makers and citizens alike than the relatively obscure Gini coefficient; and, further, that the Palma is a more policy-relevant measure of inequality because it makes clear where change is needed if poverty reduction is the goal.

Of course there are numerous questions arising, as we have touched on throughout this paper. For example, there are - of course - important questions about the data coverage and richer groups in society; the use of income and consumption surveys in the same analysis; the use of different (market and final) income measures; interpolation/extrapolation of data years; the fact that Povcal does not represent the

'true' Palma as it uses a fitted Lorenz Curve; and whether the Palma has the appropriate mathematical qualities, in terms of ordering and so forth.

One could also ask how useful is Palma at the micro-level. We would want to know 'why' unequal distributions were different and where they differed, how far inequality of earnings rather than other income sources drove total inequality and how between and within sub-group inequalities differed, for example. To do so we need to know if Palma has the full set of properties of more well established alternatives to Gini (including Theil indices, Concentration Index and the Atkinson Index, for example). Of course, there is (probably) no perfect measure of inequality, but it is useful to know more about the Palma's (and the Gini's) imperfections.

Further avenues for future research should include exploring whether panel regressions show a consistent relationship between the Palma and development outcomes, as indicated in section 4. It would be of interest also to explore whether the relationship is more or less powerful above or below certain per capita income levels, and whether it differs above and below certain cut-off Palma levels (i.e. is there a 'danger' level for the Palma, above which inequality starts to undermine development outcomes)? In each case, it would be valuable to compare results with the Gini which has been linked to slower economic growth at certain levels for example (Birdsall, 2007; Cornia et al., 2004). One could also go beyond poverty indicators and consider the relationships between the Palma ratio and economic growth and structural economic transformation with reference to the low and middle-income 'traps' literature for example; and between the Palma ratio and indicators of governance and democratic participation. Again, it would be useful to see how the Palma ratio compares to the Gini in each case.

Finally, on a more political point, it is worth noting the Palma does directly expose the top decile somewhat – which in many countries may not be appreciated. However, it is the Palma's simplicity which we would argue is its greatest strength. A Gini coefficient of 0.5 implies serious inequality but yields no intuitive statement for a non-technical audience. In contrast, the equivalent Palma of 5.0 can be directly translated into the statement that the richest 10 per cent earn five times the income of the poorest 40 per cent of the nation.[9]

[9] Per table 5, a Palma ratio of 5.0 is equivalent to a Gini coefficient of 0.475 – but this would be increased to 0.5 or a little beyond by allowing a more realistic distribution among the bottom 40% and middle 50% groupings.

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Annex: Palma ratio and actual year of data

Country	Palma ratio (1990)	Actual year of data	Palma ratio (2010)	Actual year of data
Azerbaijan	1.433	1995	1.363	2008
Bangladesh	1.078	1988.5	1.272	2010
Belarus	0.757	1988	0.955	2008
Bolivia	2.077	1990.5	4.847	2008
Brazil	6.447	1990	4.302	2009
Bulgaria	0.795	1989	0.997	2007
Burkina Faso	3.231	1994	1.859	2009
Burundi	1.328	1992	1.347	2006
Cambodia	1.736	1994	1.691	2008
Central African Republic	6.897	1992.4	4.505	2008
Chile	4.235	1990	3.506	2009
China	1.252	1990	2.154	2005
Colombia	3.437	1992	4.52	2010
Costa Rica	2.486	1990	3.333	2009
Cote d'Ivoire	1.585	1988	2.026	2008
Croatia	0.765	1988	1.356	2008
Dominican Republic	3.296	1989	2.746	2010
Ecuador	3.387	1987	3.061	2010
Egypt, Arab Rep.	1.261	1990.5	1.194	2008.3
El Salvador	3.197	1989	2.951	2009
Estonia	0.743	1988	1.517	2004
Ethiopia	1.876	1995	1.14	2005
Ghana	1.519	1988.5	2.172	2005.5
Guatemala	5.974	1989	4.524	2006
Guinea	2.884	1991	1.805	2007
Guinea-Bissau	4.965	1991	1.487	2002
Honduras	5.013	1990	5.209	2009
Hungary	0.88	1989	1.197	2007
India	1.259	1987.5	1.355	2004.5
Indonesia	1.093	1990	1.4	2005
Iran, Islamic Rep.	2.271	1990	1.709	2005
Jamaica	2.1	1990	2.503	2004
Jordan	2.232	1992	1.489	2010
Kazakhstan	0.871	1988	1.066	2009
Kenya	4.735	1992	2.81	2005.4
Kyrgyz Republic	0.896	1988	1.525	2009
Lao PDR	1.169	1992.2	1.599	2008
Latvia	0.739	1988	1.561	2008
Lesotho	5.433	1993	3.87	2002.5
Lithuania	0.744	1988	1.64	2008

Country	Palma ratio (1990)	Actual year of data	Palma ratio (2010)	Actual year of data
Madagascar	2.572	1993	2.329	2010
Malaysia	2.597	1989	2.627	2009
Mali	3.268	1994	1.294	2010
Mauritania	2.328	1987	1.921	2008
Mexico	0.801	1989	2.812	2010
Moldova, Rep.	0.81	1988	1.299	2010
Mongolia	1.287	1995	1.555	2007.5
Morocco	1.791	1990.5	1.958	2007
Namibia	15.081	1993	6.693	2003.7
Nicaragua	3.275	1993	1.918	2005
Niger	1.536	1992	1.431	2007.5
Nigeria	2.463	1992.3	3.015	2009.8
Pakistan	1.332	1990.5	1.156	2007.5
Panama	6.494	1989	3.627	2010
Paraguay	1.896	1990	3.73	2010
Peru	2.435	1994	2.948	2010
Philippines	2.284	1991	2.183	2009
Poland	0.936	1989	1.378	2009
Romania	0.771	1989	1.099	2009
Russian Federation	0.79	1988	1.885	2009
Senegal	4.09	1991	1.791	2005
Slovak Republic	0.659	1988	0.925	2009
Slovenia	0.809	1987	1.175	2004
South Africa	5.69	1993	7.052	2008.7
Sri Lanka	1.292	1990.5	1.905	2006.5
Swaziland	5.858	1994.5	3.513	2009.5
Tanzania	1.357	1991.9	1.653	2007
Thailand	2.405	1990	1.855	2009
Tunisia	1.886	1990	2.021	2005
Turkey	2.246	1987	1.765	2008
Uganda	2.37	1989	2.332	2009.3
Ukraine	0.778	1988	0.933	2009
Uruguay	2.109	1989	2.47	2010
Uzbekistan	0.855	1988	1.579	2003
Venezuela, RB	2.285	1989	2.404	2006
Vietnam	1.508	1992.7	1.489	2008

Source: World Bank PovCalNet (Downloaded 29 November 2012). Note: For broader coverage, data include distributions based on both income and consumption (See discussion in text). Most countries are consumption surveys. Countries with income surveys are as follows: Bolivia, Brazil, Chile, China, Colombia, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, El Salvador, Estonia, Guatemala, Guyana, Honduras, Malaysia, Mexico, Moldova, Rep., Nicaragua, Panama, Paraguay, Poland, Russian Federation, Slovak Republic, Slovenia, Trinidad and Tobago, Turkmenistan, Ukraine, Uruguay, Uzbekistan and Venezuela.