

A Second look at measuring inequality in South Africa: A modified Gini coefficient

by
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1. Introduction

The distribution of income and wealth (and indeed the re-distribution thereof) in South Africa is core to political debate in the country. Government policies currently being debated within the ruling party, the tri-partite alliance and in the public domain (ranging from Black Economic Empowerment to nationalisation of the mining industry) are influenced by this key factor. At the heart of the debate is the Gini coefficient, which is the international standard for measuring the distribution (or dispersion) of income and wealth in a country.

Although it is seldom directly referred to in debate, the Gini coefficient which recently featured in the media in a series of articles and discussions shows that South Africa has one of the highest Gini coefficients in the world¹ in terms of both income and wealth (thus the greatest dispersion between the rich and the poor in terms of income and wealth distribution). The potential impact of income and wealth distribution on future political developments in the country is clear.

The objective of this research paper is to influence domestic political debate on income and wealth distribution by:

- (i) comparing the Gini coefficient calculated for South Africa with international best practice and comparing it with the coefficients calculated for other countries; and
- (ii) analysing specific government actions and policies that would reduce inequality by calculating a 'modified' Gini coefficient for South Africa.

* The views expressed are those of the author(s) and do not necessarily represent those of the South African Reserve Bank or Reserve Bank policy. While every precaution is taken to ensure the accuracy of information, neither the authors, nor the Reserve Bank shall be liable to any person for inaccurate information or opinions contained herein.

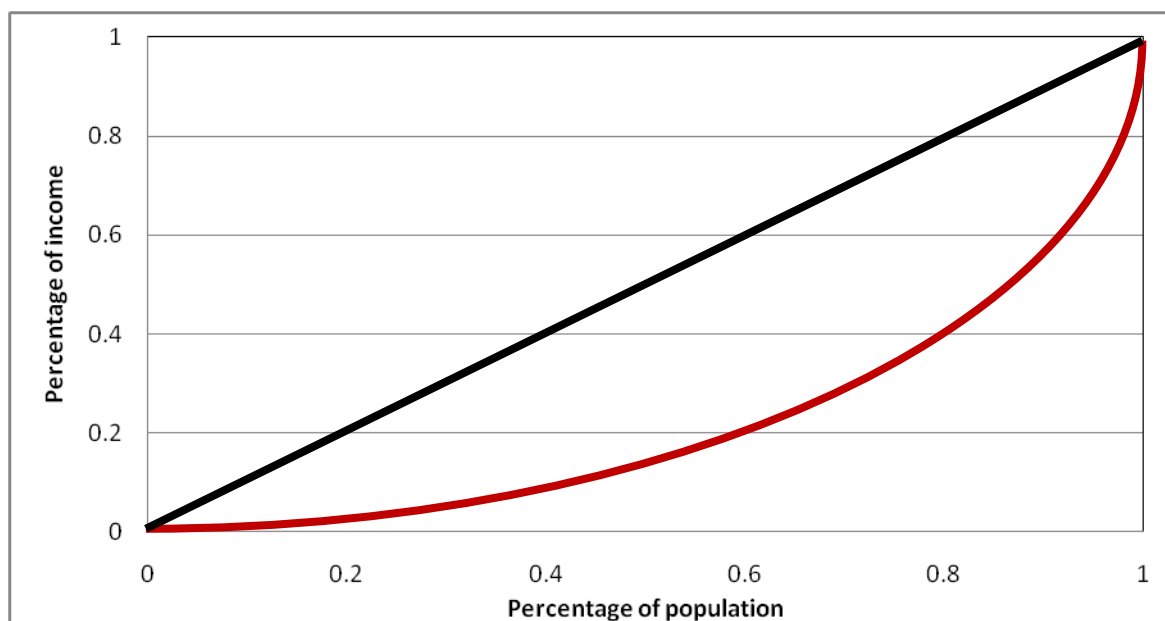
¹ Beeld, 2009. Al meer toelaes vir armes. Beeld. Friday 20 November, 2009. Beeld, 2010. Ongelykheid in inkomste ál erger. Sake24. Saturday, 6 February, 2010. Civil Engineering, 2009. Financial inequality in South Africa. October 2009. Civil Engineering vol 17 No 9.

The rest of this article is set out as follows: Section 2 reviews individual differences in methodology used to calculate Gini coefficients. The short third Section differentiates between income and wealth distribution in South Africa. Section 4 reviews the measurement and calculation of the Gini coefficient. Section 5 calculates a 'modified' Gini coefficient for South Africa. The conclusion follows in Section 6.

2. How the Gini coefficient is measured

Two fundamental monetary instruments that may be used to measure inequality are income and consumption. By analysing the statistical dispersion of either income or consumption, a Gini coefficient is calculated from a Lorenz curve to indicate the level of inequality in a country (Todaro and Smith, 2009²). The Gini coefficient measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line of perfect equality.

Figure 1 : Lorenz curve for South Africa



Source: Statistics South Africa, Income and Expenditure Survey (IES) 2005/6. Own calculations.

In this paper, the Gini coefficient for income from work includes the household's income from salaries and wages; self-employment and business; income from properties, royalties and dividends; pensions from previous employment; and income on own investment annuities. Household income is then adjusted for the household

² Todaro, M. P and Smith, S.C. (2009). *Economic Development*. Tenth edition. Addison-Wesley.

size by dividing the income by the number of people in the household. An adult equivalent adjustment can also be used to adjust for households with more adults or households with more children³. For the purpose of this paper, this method was not employed.

Per capita household income was ranked from lowest to highest, and the cumulative percentage of households calculated. The area under the Lorenz curve is then calculated. Perfect equality is presented by the 45 degree line. The Gini coefficient can then be written as (Slack and Rodrigue, 2009⁴):

$$G = 1 - \sum_{i=0}^z (\sigma Y_{z-1} + \sigma Y_z) (\sigma X_{z-1} - \sigma X_z)$$

Where σY is the cumulative distribution of the income variable, for $i = 0, \dots, z$ with $Y_0 = 0$ and $Y_1 = 1$; and

σX is the cumulative distribution of the population variable, for $i = 0, \dots, z$ with $X_0 = 0$ and $X_1 = 1$.

The Gini coefficient is a ratio between 0 and 1, where 0 implies that each individual receives the same 'income' and 1 imply that only one individual receives all the 'income' (Benson, 1970⁵). These are also sometimes reported as a Gini index, which lies between 0 and 100.

The same calculation was done for income from work (as explained above), but the income from social grants and pensions (old age, disability, family and other allowances and workmen's compensation) as well as other income transfers between individuals (alimony, palimony and other allowances and other income from individuals or stokvels) were added to the income variable. Similarly, in-kind income from free water, free sanitation and free electricity, as well as other free services

³ Simkins, C. (2004). What happened to the distribution of income in South Africa between 1995 and 2001? University of the Witwatersrand.

⁴ Slack, B. and Rodrigue, J. P. (2009). The Gini coefficient, in the Geography of transport equipment. New York: Routledge.

⁵ Benson, R. A. (1970). Gini Ratios: Some considerations affecting their interpretation. *American Journal of Agricultural Economics*, Vol. 52, No. 3 (Aug., 1970), pp. 444-447. Wiley- Blackwell.

were added to the calculation. The values for these services were partly imputed by Statistics South Africa and partly surveyed during the data collection period. Lastly, the impact of tax was calculated, by deducting tax from the collective income calculated in the preceding step.

The outcome will fundamentally be influenced by choosing either income or consumption as the target measure. The outcome will also be influenced by the choice of total income, per capita household income, or per equivalent adult income, as an indicator for income. Lastly, incomes can be weighted differently, and the outcome will be influenced by the selected weighting method. (The World Bank, for example, prefers to weight by household size and calculates the share held by individuals rather than households⁶).

3. Income and wealth distributions

Before proceeding with the analysis, it is necessary to indicate a distinction that impacts on the perceived equality or inequality in societies, namely the distinction between income and wealth distribution and redistribution. Income covers current (monthly) income received by households in the form of salaries and wages in exchange for labour services; interest and rent received on various forms of capital; and profits received for services rendered as entrepreneurs. Wealth covers households' capital assets, accumulated either by means of savings or transfers through preservation between generations. One may therefore find a country where the distribution of income is relatively equal but with vast inequalities of wealth distribution. The aim of this paper is to supplement income as described above with income from social pensions and grants to measure the effect that these have on the Gini coefficient. Furthermore, the impact of in-kind income from free basic services on the Gini coefficient is also calculated. All these wealth measures were surveyed in the 2005/6 IES.

⁶ Ravallion, M. and Chen, S. (1997). What can new survey data tell us about recent changes in distribution of poverty? *The World Bank Economic Review*, Vol. 11. No. 2 (May, 1997), pp. 357-382. Oxford University Press.

4. Different methodologies for calculating Gini coefficients lead to confusion

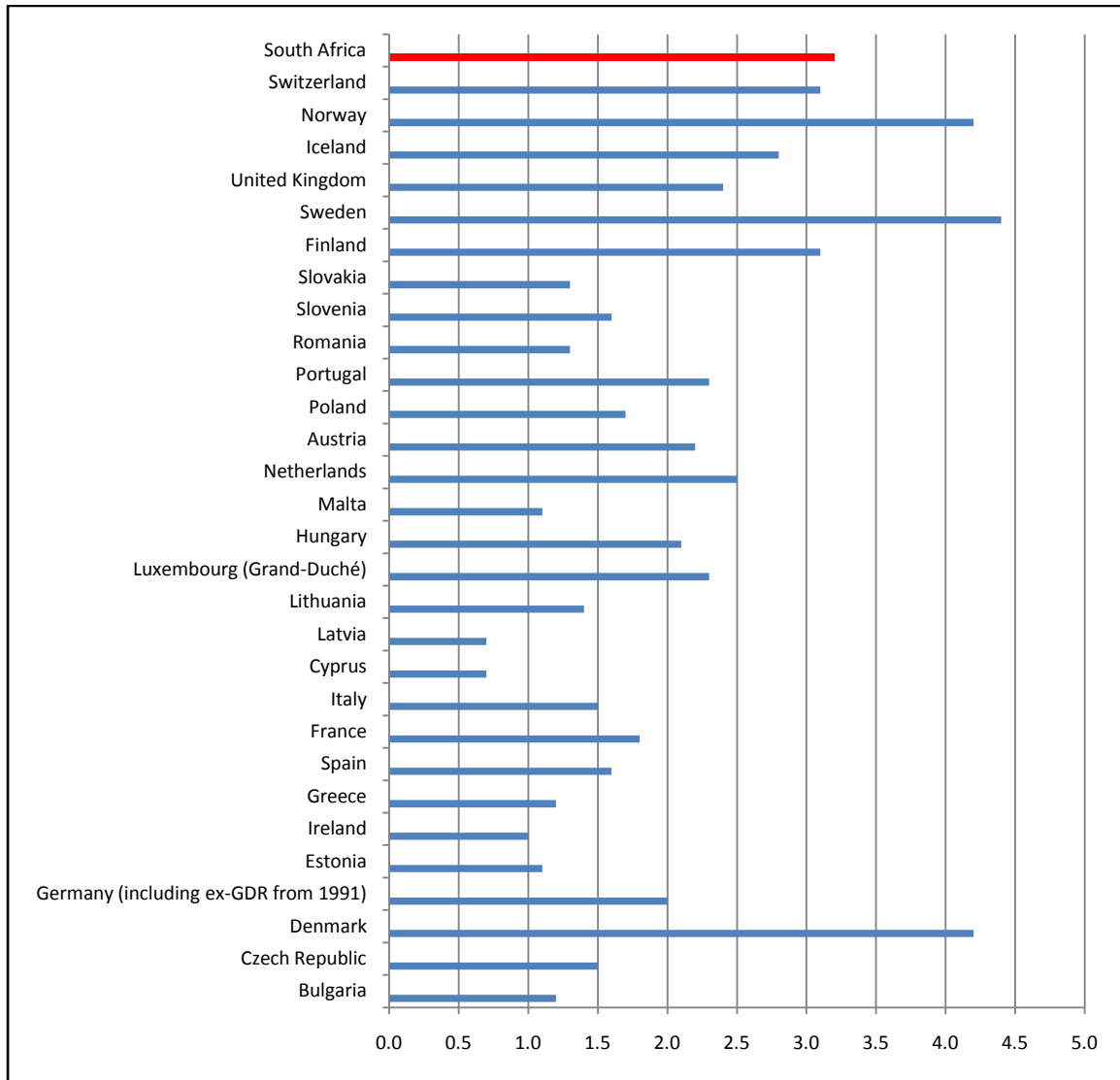
It seems that various countries and international institutions employ different methodologies and standards to calculate Gini coefficients for income and wealth distribution. This may yield significant differences between the Gini coefficient for South Africa and those of its peers. Of particular interest is the fact that the Gini coefficient, reflecting income distribution in South Africa, as calculated by Statistics South Africa (Stats SA), specifically excludes the impact of certain government policies such as the provision of free housing and free basic services to poor households. These policies were specifically designed as measures to address income and wealth distribution in South Africa, therefore it is critical that ongoing policy debates should be informed adequately of the impact of such government policies on income and wealth redistribution.

5. A 'modified' Gini coefficient for South Africa

Some government policies are geared towards addressing income inequalities, while others address wealth redistribution. According to economist Mike Schüssler, South Africa is the biggest welfare state in the world (after the release of the 2010 Budget on 17 February 2010 (Mail and Guardian, 18 February 2010)). Figure 2 shows that in 2007, South Africa was among the countries spending the largest part of their GDP on social grants and social assistance (around 3,2 per cent). It is budgeted that in 2010, this share will increase to around 3,5 per cent of the GDP.

Such grants specifically address inequalities in income distribution. It is necessary to point out that communities usually accept income redistribution more easily than wealth redistribution, as wealth is accumulated over time through reduced consumption. To put it simply: people who consumed all their income have no accumulated wealth distribution. Without accumulated assets or savings, people cannot contribute to wealth redistribution. Such people have accumulated, at best, memories that cannot be redistributed.

Figure 2: Public expenditure on social grants and assistance as a percentage of GDP for selected countries, 2007



Source: Own calculations; National Treasury (2009)⁷.

⁷ National Treasury (2009) *Budget review*; Eurostat.
 (<http://nui.epp.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do>).

Table 1: Social grants values and number of recipients per month

Type of grant	Number of recipients	Value per month	Total expenditure	Number of recipients projected	Value per month	Total projected expenditure
	09-Mar	09-Oct	2009	10-Mar	10-Nov	2010
State old age pension	2 343 995	1 010	2 367 434 950	2 534 082	1 080	2 736 808 560
Disability grant	1 371 712	1 010	1 385 429 120	1 310 761	1 080	1 415 621 880
Child support grant	8 765 354	240	2 103 684 960	9 424 281	250	2 356 070 250
Foster care grant	476 394	680	323 947 920	569 215	710	404 142 650
Care dependency grant	107 065	1 010	108 135 650	119 307	1 080	128 851 560
War veterans grant	1 599	1 030	1 646 970	1 248	1 100	1 372 800
Grant-in-aid	*	240		*	250	
Total	13 066 119		6 290 281 579	13 958 894		7 042 869 710

* grant-in-aid is an additional grant awarded to persons who are in receipt of an old age grant, disability grant or war veteran's grant, and needs fulltime care from someone else. A grant-in-aid cannot stand alone, and recipients are therefore included in the total. (Department of Social Development. http://www.dsd.gov.za/index.php?option=com_content&task=view&id=111)

In addition to the social grants mentioned above that address income redistribution, poor households also receive welfare grants (not reflected in social grants). For purposes of receiving such grants, households have to apply at their local municipality to gain access to:

- Free basic water: 6kl (6 000l) per month per household. Although the value of this service differs from municipality to municipality its value is estimated to average around R31 per month (taken at R5,12 per kilolitre for the 6 kilolitres to 20 kilolitres household block pricing), based on the 2008/9 DWAF annual report⁸. Data from the 2005/6 Income and Expenditure Survey (IES) estimate this value per household at R 33,72 per month.
- Free electricity: 50kWh per month per household for a grid energy system. The value of this is estimated as R35 per month (taken at the average of R0,70 per kWh, depending on the city in which recipients live). Data from the 2005/6 IES estimate this value at R27,01 per month.
- Free sanitation: 100% of rate/charge, with an estimated value of R28,08 per month, based on the 2005/6 IES.
- Housing subsidies: The 2005/6 IES does not include information regarding housing subsidies. These subsidies contribute to lessening the skewness in wealth distribution. Table 2 reflects the South African housing subsidy scheme for the period 2008/09. It should be noted that the figures presented in Table 2 only concern the value of subsidies towards a top structure (i.e. a dwelling). In urban

⁸ DWAF, 2009. *Annual Report*. 1 April 2008 to 31 March 2009.

environments construction of a top structure will require a proclaimed and serviced (or at least partially serviced) stand which is typically funded/subsidised from other government sources or subsidies. The cost of such a stand in urban environments typically ranges between R50 000 and R70 000. The value of the asset in the hands of the relevant beneficiary is thus substantially more than the pure housing subsidy of R55 706. It could be argued that at an interest rate of 12,0 per cent per annum (2,0 percentage points above the current prime overdraft rate), on a loan amount of R55 706 (the subsidy amount), over a period of 20 years, this benefit will translate into an income subsidy of R613,37 per month. Since 1994, more than 2,3 million housing units have been made available for nearly 11 million people⁹.

Table 2: The South African housing subsidy scheme subsidy amounts for the 2009/2010 financial year for a 40m² house.

Subsidy Programme	Top structure funding	Own contribution	Product price
Project linked (IRDP) Subsidies:			
R0 to R1 500	55,706.00	None	55,706.00
R1 501 to R3 500	53,227.00	2,479.00	55,706.00
Indigent: Aged, disabled and health stricken R0 to R3 500	55,706.00	None	55,706.00
Consolidation Subsidies:			
R0 to R1 500	54,650.00	None	54,650.00
R1 501 to R3 500	52,471.00	2,479.00	54,950.00
Indigent: Aged, disabled and health stricken R0 to R3 500	54,650.00	None	54,650.00
Institutional subsidies:			
R0 to R3 500	52,471.00	Institution must add capital	At least 54,650.00
Individual Subsidies:			
R0 to R1 500	55,706.00	None	55,706.00
R1 501 to R3 500	53,227.00	2,479.00	
Indigent: Aged, disabled and health stricken R1 501 to R3 500	55,706.00	None	55,706.00
Rural subsidies:			
R0 to R3 500	55,706.00	None	55,706.00
People's Housing Process:			
R0 to R3 500	55,706.00	None	55,706.00

Source: Department of Housing. Reference NB10/3/3.

In South Africa, Gini coefficients are measured in terms of per capita income, and

⁹ Address by the Minister of Human Settlements, Tokyo Sexwale, MP, on the occasion of the Human Settlements Budget Vote, National Assembly, Cape Town, 21 April 2010.

are weighted by the household size multiplied by the household weight¹⁰ which results in the Gini coefficient often being higher compared to other countries¹¹. The World Bank calculates Gini coefficients for countries where data are available, and estimate income distribution for countries where there are no or little information available. In some instances no adjustment is made for spatial differences, as this information is often not available¹². Estimates of Gini coefficients often depend on the type of data available (European Statistical Laboratory¹³). Some researchers include other measures of inequality such as skills, education, health, life expectancy, welfare, assets and access to social infrastructure in their calculation of skewness between households (Heshmati, 2006¹⁴). Other measures of inequality include, among others, dispersion, skewness, variance and the Theil's T statistic. (See Hale (2008)¹⁵ for a more detailed discussion on each.)

Table 3 in appendix 1 reports the latest Gini indices as published by the World Bank. These measures, however, only look at the distribution of income or consumption expenditure and Gini coefficients are estimated in an attempt to control for the differences in surveys between different countries. Being one of the biggest welfare states in the world, it is important to determine the impact of welfare and income policies on income and welfare distribution in South Africa. Leibbrandt et al (1996)¹⁶ found that the biggest change in the Gini coefficient was due to income from transfer payments from the government to households, remittances and wages. The authors found that the Gini coefficient increased with wage increases, whereas increased remittances and welfare payments resulted in a decline in the Gini coefficient. Furthermore, Leibbrandt, Woolard and Woolard (2008)¹⁷ found that social assistance grants also play an important role in poverty and inequality reduction in South Africa.

¹⁰ Household weights are used to adjust a sample to represent an entire population's households. Weight calculations consider several factors to ensure representivity, such as original selection probabilities, adjustment for non-response, and benchmarking to known population estimates (Stats SA. 2008. Guide to the quarterly labour force survey. Pretoria: Statistics South Africa).

¹¹ Stats SA. (2008) *Income and Expenditure of households 2005/2006: Analysis of results*. Pretoria: Statistics South Africa.

¹² World Bank (2010). *World Development Indicators 2010*. Washington, United States.

¹³ European Statistical Laboratory. (http://esl.jrc.it/envind/un_meths/UN_ME015.htm)

¹⁴ Heshmati, A. (2006) The World Distribution of Income and Income inequality: A review of the economics literature. *Journal of World-systems research*, XII, I, July 2006,61-107.

¹⁵ Hale, T. (2008) The theoretical basics of popular inequality measures. (http://utip.gov.utexas.edu/tutorials/theo_basic_ineq_measures.doc)

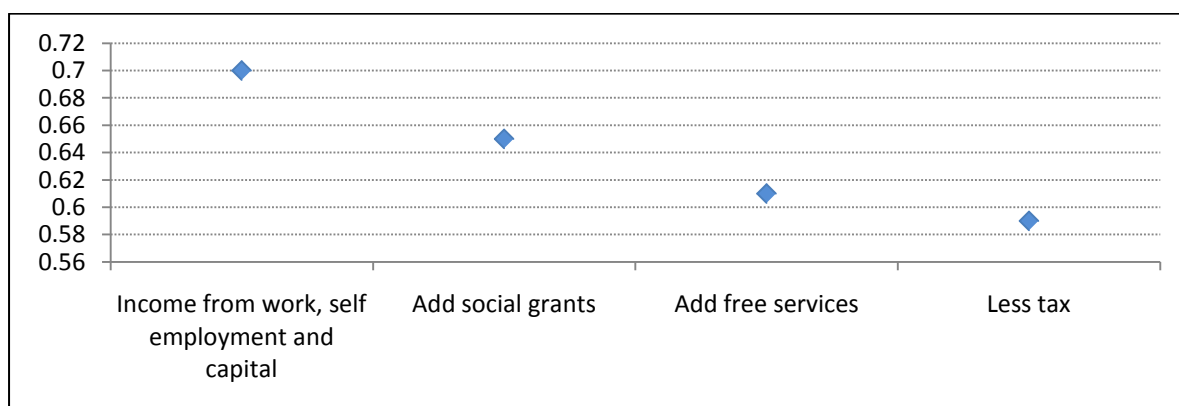
¹⁶ Leibbrandt, M., Woolard, C. D. and Woolard, I. (1996). The contribution of income components to income inequality in South Africa : a decomposable Gini analysis. World Bank.

¹⁷ Leibbrandt, M; Woolard I and Woolard C.(2008). *Poverty and inequality dynamics in South Africa: Post-apartheid development in the light of the long-run legacy*. Draft book chapter. Mimeo. Saldru: Cape Town.

Officially, Stats SA reports a Gini coefficient from income from work at 0,80 in 2005/6. This coefficient declines quite significantly to 0,73 when social grants are added to income. However, by subtracting tax from income no significant difference is shown on the Gini coefficient. According to Stats SA, the reason for this could be related to the poor capturing of personal income tax data in the IES 2005/6. As mentioned earlier these coefficients are not directly comparable to those usually published internationally, for instance by the World Bank, as Stats SA uses the household size multiplied by the household weight to weigh per capita income¹⁸.

The South African Gini coefficient is calculated to be 0,70 (see figure 3), when income from work, pensions from previous employment, and annuities from own investments are included. When adding social grants income (i.e. old age pensions, disability grants, family and other allowances, workmen's compensation funds, alimony and other income from individuals) the Gini coefficient declines to 0,65. By further including free water, free sanitation, free electricity and other free services, the Gini coefficient declines to 0,61. And by adjusting incomes for direct personal income tax, the Gini coefficient declines to 0,59. These values are similar to those reported by Borat and van der Westhuizen (2008)¹⁹. No adjustment was made for housing subsidies, although it could be assumed that the inclusion of housing subsidies would have reduced the Gini coefficient even further (see for instance Meth and Dias (2004)).

Figure 3: Gini coefficients based on the World Bank definition 2006



Source: Statistics South Africa, Income and Expenditure Survey (IES) 2005/6. Own calculations.

¹⁸ Stats SA. (2008) *Income and Expenditure of households 2005/2006: Analysis of results*. Pretoria: Statistics South Africa

¹⁹ Borat, H and van der Westhuizen, C. (2008). *Economic Growth, Poverty and Inequality in South Africa: The First Decade of Democracy*. DPRU (www.commerce.uct.ac.za/.../Carlene1995_2005%20growth%20&_poverty_28march_updated.pdf)

6. Conclusion

The research shows that the true Gini coefficient for South Africa resides at much lower levels of inequality than generally reported. The reason for this is that the impact of government social policies on inequality is substantial, but unfortunately often overlooked. Our conclusion of a 0,59 Gini coefficient as compared to 0,7 implies that the Government's redistribution initiatives have achieved considerably more success over time than is immediately evident. For future research it might be useful to consider additional income surveys such as the National Income Dynamic Study (NIDS). The NIDS is a panel-data set, tracking respondents over time. Such income data could provide useful information regarding changes in poverty and the distribution of income over time.

Appendix 1

Table 3 : World Bank Gini index by country 2000-2007

Country		2000-2007
Albania	ALB	33
Angola	AGO	58.6
Argentina	ARG	50
Armenia	ARM	33.8
Austria	AUT	29.1
Azerbaijan	AZE	36.5
Bangladesh	BGD	31
Belarus	BLR	27.9
Belgium	BEL	33
Benin	BEN	38.6
Bhutan	BTN	46.8
Bolivia	BOL	58.2
Bosnia and Herzegovina	BIH	35.8
Brazil	BRA	55
Bulgaria	BGR	29.2
Burkina Faso	BFA	39.6
Burundi	BDI	33.3
Cambodia	KHM	40.7
Cameroon	CMR	44.6
Canada	CAN	32.6
Cape Verde	CPV	50.5
Côte d'Ivoire	CIV	48.4
Central African Rep	CAF	43.6
Chad	TCD	39.8
Chile	CHL	52
China	CHN	41.5
Colombia	COL	58.5
Comoros	COM	64.3
Congo	COG	47.3
Congo, Dem Rep	COD	44.4
Costa Rica	CRI	47.2
Croatia	HRV	29
Djibouti	DJI	40
Dominican Rep	DOM	50
Ecuador	ECU	54.4
Egypt	EGY	32.1
El Salvador	SLV	49.7
Estonia	EST	36
Ethiopia	ETH	29.8
Finland	FIN	26.9
Gabon	GAB	41.5
Gambia	GMB	47.3
Georgia	GEO	40.8
Germany	DEU	28.3
Ghana	GHA	42.8
Greece	GRC	34.3
Guatemala	GTM	53.7
Guinea	GIN	43.3
Guinea-Bissau	GNB	35.5
Haiti	HTI	59.5
Honduras	HND	55.3
Hungary	HUN	30
India	IND	36.8
Indonesia	IDN	39.4
Iran, Islamic Rep	IRN	38.3
Ireland	IRL	34.3
Israel	ISR	39.2
Italy	ITA	36
Jamaica	JAM	45.5
Jordan	JOR	37.7
Kazakhstan	KAZ	33.9
Kenya	KEN	47.7
Kyrgyzstan	KGZ	32.9
Lao People's Dem Rep	LAO	32.6
Latvia	LVA	35.7

Lesotho	LSO	52.5
Liberia	LBR	52.6
Lithuania	LTU	35.8
Luxembourg	LUX	30.8
Macedonia, FYR	MKD	39
Madagascar	MDG	47.2
Malawi	MWI	39
Malaysia	MYS	37.9
Mali	MLI	39
Mauritania	MRT	39
Mexico	MEX	48.1
Moldova, Rep	MDA	35.6
Mongolia	MNG	33
Morocco	MAR	40.9
Mozambique	MOZ	47.1
Nepal	NPL	47.3
Nicaragua	NIC	52.3
Niger	NER	43.9
Nigeria	NGA	42.9
Norway	NOR	25.8
Pakistan	PAK	31.2
Panama	PAN	54.9
Paraguay	PRY	53.2
Peru	PER	49.6
Philippines	PHL	44
Poland	POL	34.9
Romania	ROU	31.5
Russian Federation	RUS	37.5
Rwanda	RWA	46.7
Senegal	SEN	39.2
Sierra Leone	SLE	42.5
Slovenia	SVN	31.2
South Africa	ZAF	57.8
Spain	ESP	34.7
Sri Lanka	LKA	41.1
Swaziland	SWZ	50.7
Sweden	SWE	25
Switzerland	CHE	33.7
Tajikistan	TJK	33.6
Tanzania	TZA	34.6
Thailand	THA	42.5
Timor-Leste	TMP	39.5
Togo	TGO	34.4
Tunisia	TUN	40.8
Turkey	TUR	43.2
Uganda	UGA	42.6
Ukraine	UKR	28.2
United States	USA	40.8
Uruguay	URY	46.2
Uzbekistan	UZB	36.7
Venezuela	VEN	43.4
Viet Nam	VNM	37.8
Yemen	YEM	37.7
Zambia	ZMB	50.7

Source: Development Data Group, The World Bank. 2009. 2009 World Development Indicators Online. Washington, DC: The World Bank. Available at: <http://go.worldbank.org/U0FSM7AQ40>.