PAPERS on Economics & Evolution

MAX-PLANCK-GESELLSCHAFT

# 1218

**Signalling to whom? Conspicuous spending and the local density of the social group income distribution**

**by**

**Andreas Chai**
**Wolfhard Kaus**

The *Papers on Economics and Evolution* are edited by the Evolutionary Economics Group, MPI Jena. For editorial correspondence, please contact: evopapers@econ.mpg.de

ISSN 1430-4716



Max Planck Institute of Economics
Evolutionary Economics Group
Kahlaische Str. 10
07745 Jena, Germany
Fax: ++49-3641-686868

# Signalling to whom? Conspicuous spending and the local density of the social group income distribution*

Andreas Chai†, Wolfhard Kaus‡

**Abstract**

We empirically evaluate two competing explanations about how the dispersion of income within social groups affects household spending on visible goods. Using South African household expenditure data, we find evidence that precisely the reverse of the effect predicted by Charles et al. (2009) takes place in that rich households tend to *reduce*, rather than increase, spending on visible goods as the dispersion of social group income increases. Our results instead support rank-based models of status competition (e.g. Hopkins and Kornienko, 2004) since the number of within-group peers who possess a similar income level is found to be positively correlated with household spending on visible goods. Moreover, we find that the effect of this 'local' density tends to be stronger in the tail regions of the distribution and performs better than other proxies for the overall income distribution used in recent studies (Brown et al., 2011). How the range of visible goods used to signal wealth expands as household income grows is also explored.

*Keywords*: Conspicuous consumption, Signaling, Status, South Africa, Income distribution

*JEL classification*: D12, D83, J15, O12

*We would like to thank Ori Heffetz, Paul Frijters, Ulrich Witt and Nicholas Rohde for suggestions and comments. The usual disclaimer applies.

†Department of Accounting, Finance and Economics, Griffith University, Australia. a.chai@griffith.edu.au

‡Max Planck Institute of Economics, Evolutionary Economics Group, Kahlaische Straße 10, 07743 Jena, Germany. kaus@econ.mpg.de.

# 1 Introduction

The desire of individuals to demonstrate their wealth to peers has been the subject of an intense and mainly theoretical debate in the recent literature (Frank, 1985; Solnick and Hemenway, 1998; Becker, Murphy and Wening, 2005; Grinblatt et al., 2008; Heffetz, 2011). In the presence of multiple social groups, the question of *whom* the household is signalling to is of particular interest given that agents may care about their social position within their social group, their position in society as a whole, or both. Recent empirical studies have uncovered important evidence that certain economic features of social groups do indeed shape conspicuous spending patterns in such settings: spending on visible goods among US and South African households is found to be negatively correlated with the average income of the social group that individuals belong to (Charles et al., 2009; Kaus, 2013). Specifically, both studies found that individuals who belong to a social group that possesses a relatively high average income tend to spend relatively less on visible goods compared to others who belong to a social group with a low average income. This pattern is consistent with models in which household status signalling behavior is orientated towards impressing impartial observers who use information about the individual's social group to make inferences about their unobserved level of wealth.

If average social group income *is* truly used by observers to judge household wealth, this begs the question of whether higher moments of the social group income distribution could also influence household spending on visible goods. Impartial observers may just as likely possess information about the income distribution of social groups as they would possess information about the group's average income. Such a question is pertinent given that income inequality tends to rise as economies grow and conspicuous consumption is thought to inhibit the accumulation of household savings among low income households (Moav and Neeman, 2012).

We empirically evaluate two opposing conjectures that have emerged in the recent literature about how the dispersion of social group income affects the consumption of conspicuous goods. On the one hand, the model by Charles et al. (2009) hypothesizes that a mean-preserving increase in the dispersion of group income will lead to an increase in spending by relatively rich households, while relatively poor household will reduce spending on visible goods. Using South African data, we find evidence that increasing the income distribution actually has the reverse effect: as the dispersion of income within a group increases, relatively wealthy households in the social group tend to *reduce* spending on visible goods, while relatively poor households in the social group show no particular effect.

To account for this result, we consider an alternative conjecture about the relationship between the dispersion of social group income and conspicuous behavior that is based on considering how it affects intra-group status competition. At its core, conspicuous consumption is based on the notion that individuals seeks differentiate themselves from peers who possess a similar level of wealth. Hence the greater the proportion of group peers who possess a similar level of income to a given household, which we dub 'local density', the greater is the household's incentive to engage in conspicuous spending (Frank, 1985; Hopkins and Kornienko, 2004). This suggest that increasing the density of the income distribution at a given income interval can stimulate -rather than inhibit- conspicuous spending if the number of peers at a given income interval increases.

Here Brown et al. (2011) uncovered some evidence that there indeed exists positive relationship between more dense income distributions and conspicuous expenditure when comparing spending patterns across rural Chinese villages. However, a weakness of their empirical method is that changes in the income distribution can have heterogenous effects on the number of peers across different regions of the income distribution. Moreover, we argue that any particular change in the overall income distribution will have different effects in the tail of the income distribution where local density is low and a small change in the absolute number of local peers will have a proportionately larger effect on the population of peers located in that region. Hence, the impact of a change in income dispersion on household spending on visible goods should be stronger in tail regions relative to the densely-populated mean income interval, where there exist a high number of peers with similar incomes.

To attain a more robust understanding of this relationship, we develop a micro level approach to examine how the dispersion of group income influences spending on visible goods. We do so by examining how 'local density' affects conspicuous consumption at the household level. This is defined as the share of households within a social group that possess a similar income level (within a range of five per cent) to a given household. The advantage of this household level variable is that it allows for the income distribution to have heterogenous effects on household visible spending across different income intervals. Our results show that local density has a strong and significant effect on conspicuous consumption and performs than group level proxies for changes in the income distribution used in previous studies (Brown et al., 2011). Moreover, we also find that changes in the income distribution appear to have a significant effect on conspicuous consumption in the tail regions of the income distribution and have a less significant effect around the mean group income. In this regard, our paper sheds new light on the relationship between the income distribution and conspicuous spending patterns and how it evolves as income inequality grows.

In addition, we study how the footprint of status signalling on the household spending patterns expands as household income rises in the that the range of visible goods used to signal wealth tends to increase as households become more affluent. At low income levels, we observe that most of these goods are mainly used for non-signaling purposes as household spending on these goods is not responsive to changes in the social group income distribution. At higher income levels, however, household spending on a wider range of visible goods becomes responsive to changes in the dispersion of social group income. We explore how these income-induced functional changes vary across different spending categories. These findings contribute to a better understanding of how positional concerns differ across spending categories, which is relevant for the design of a tax on status-related spending (Frank, 1999; Besharov, 2002; Solnick and Hemenway, 2005).

This paper is structured as follows. Section 2 discusses the various theoretical models of conspicuous spending that posit different conjectures about how the income distribution of social groups affects conspicuous spending and the new empirical approach taken to study the relationship between visible spending and the income distribution. Sections 3 discusses the data and reports results for how the overall 'global' group income distribution affects conspicuous spending. Section 4 presents results for the influence of local density. Section 5 presents disaggregated results across various visible goods and services, while Section 6 concludes.

# 2 Theoretical background and Empirical approach

Both the magnitude and manner in which household consumption patterns are driven by the desire of individuals to demonstrate their wealth has been the subject of a intense theoretical debate in the recent literature (see e.g., Frank, 1985; Becker, Murphy and Wening, 2005; Arrow and Dasgupta, 2009; Frijters and Leigh, 2008; Heffetz, 2011). However, it is only recently that empirical research has started to make a substantial contribution to this debate, which have focused on the extent to which different goods and services are visible to peers (Solnick and Hemenway, 2005), how the visibility of good affects income elasticities (Heffetz, 2011), how geographical proximity plays a role in visible spending (Grinblatt et al., 2008), as well as how household spending on visible goods is affected by business cycles (Kamakura and Du, 2012).

A question of perennial interest is how status signalling is affected by the actual income distribution in society. Many scholars, including Thorstein Veblen, Frank Knight and Simon Kuznets, have theorized how it links household consumption levels to the distribution of income (Hynes, 1998). More recently, several models have emerged that formally consider this relationship (Robson, 1992; Glazer and Konrad, 1996; Becker, Murphy and Wening, 2005; Arrow and Dasgupta, 2009). In the development literature others have pointed out that causality could run the other way in that status-related spending can inhibit the accumulation of household savings among the poor, leading to the emergence of poverty traps (Moav and Neeman, 2012). This echoes Frank's (1999) argument that status-related spending represents an inefficient transfer from household spending on healthcare, education and savings.

We seek to examine the relationship between conspicuous spending and the income distribution of social groups in multi-social group settings. In the context of the historic rise of global migration levels and the growing prevalence of multi-racial societies (Hatton and Williamson, 2005), a question of particular interest is how the economic characteristics of different social groups affect this type spending on visible goods. In these settings, agents face the issue of signalling both to fellow group member (insiders) as well as non-group members (outsiders), or both. Historically, it is thought that important differences exist in conspicuous spending patterns across racial groups. For example, in their seminal study of household savings in the US, Dorothy Brady and Rose Friedman note that emulative spending is different between blacks and whites in the US: "While the white families as a community may be independent of the expenditure patterns of the Negroes (*sic*), the converse is probably not true. The Negroes (*sic*) mode of living is doubtless influenced by the consumption patterns of the white community as well as by their own social world" (Brady and Friedman, 1947, p. 256). Here recent empirical studies of conspicuous spending across different racial groups in both developing and developed economies (US and South Africa) have in fact found no significant differences in how different racial groups signal their status in multi group setting (Charles et al., 2009; Kaus, 2013). However, both studies found that certain economic characteristics of social groups did have a considerable effect on how much group members spent on visible goods (Charles et al., 2009; Kaus, 2013). Individuals who belong to a social group that possesses a relatively high average income tend to spend less on visible goods compared to others who belong to a social group with a lower average income.

These results beg the question: If average social group income is truly used by observers to judge individual wealth, does the distribution of income *within* a group also influence conspicuous consumption? In this regard, it is worth noting that Charles et al. (2009) admit that there exists some theoretical ambiguity about how an increase in the dispersion of social group income may affect household spending on visible goods. Basing their approach on Glazer and Konrad (1996), they contend that the relationship between the income distribution and visible spending depends on how the shape of the Engel Curve for visible goods and how much households vary their spending on visible goods as their income grows. Consider an economy in which individuals belonging to a group $k$ have incomes $y_i^k$, which is drawn from the income distribution $f_k(y)$ on the interval $[y_{min}^k, y_{max}^k]$. Income is not publicly observed and is used to consume visible goods, $c$, and those goods which are not observed *(y-c)*. In the separating equilibrium each individual maximizes $\upsilon(y_i^k - c_i^k) + \varphi(c_i^k) + \omega(s_i^k)$ subject to their budget set and society's beliefs about each individuals income are correct $s_i(c_i^k(y_i^k)) = y_i^k$.

The model predicts that because $c_i^k$ is strictly with $y_i$, a mean-preserving increase in the dispersion of group income caused by a redistribution of income from a relatively poor household ($A$) to a relatively wealthy household ($B$) leads to an increase in the level of visible spending by wealthy households (Hypothesis 1). Whether increasing dispersion of income will lead to an overall increase or decrease in conspicuous consumption depends on whether increases in spending by $B$ outweigh the decreases in spending on visible goods by $A$. If $c_i^k$ increases with $y_i$ in a concave (convex) increasing dispersion would have a negative (positive) effect on average group spending on conspicuous consumption since the increase in $c_B^k$ is not as large as (larger than) the fall in $c_A^k$. Empirically, Charles et al. (2009) found that for white Americans higher dispersion in social group income has a negative and significant effect on visible spending, which suggests that $c_i^k$ increases with $y_i$ in concave fashion.

This approach places much emphasis on the role of impartial spectators evaluating the individual's wealth based on their level of visible consumption and group membership. On the other hand, it is also plausible that households are more concerned about the judgement of social group insiders. This may be particularly true for societies in which there are relatively low levels of contact between social groups. In the case of South Africa, a representative survey of the Institute for Justice and Reconciliation shows that levels of interracial contact remains low IJR (2010). About one quarter of the respondents report to have no verbal contact with other groups in daily life and 50 per cent have reported to have never socialized with individuals from different groups.

Therefore an alternative view derives from thinking about how the social group income distribution affects *intra*group status. a basic intuition is that the greater are the number of peers who possess a similar income level to a households, the greater is the household's desire to differentiate itself from thee peers via conspicuous consumption. As shown by Hopkins and Kornienko (2004), if social status is determined by positional spending and there are relatively few other peers who possess a similar income, then the prospective status payoff from engaging in conspicuous consumption is relatively low. These scholars follow Frank (1985) and Robson (1992) by specifying the payoff from consuming the visible good $c$ as being a function of household rank in the distribution of conspicuous consumption $F(\cdot)$. The agent's status $S$ is $S(c, F(\cdot)) = \gamma F(c) + (1-\gamma)F^{-}(c) + \alpha$ where $F(c)$ being the number of consumers whose conspicuous spending is less than or equal to $c$, $F^{-}(c)$ is the number of individuals with strictly lower consumption of $c$ and $\gamma$ is a parameter that range in value between 0 and 1.[1] $F()$ is determined by the individual's utility maximization decision and agent's possess the utility function $U_i = V(c, y-c)S(c, F(\cdot))$. Increasing $c$ thereby involves a tradeoff between increased status and decrease consumption of the non-positional good $y - c$.

Using techniques from auction theory, the authors show a Nash equilibrium solution exists for the status game in which $c^*$ depends on the overall income distribution. They then go on to show that the more dense is the income distribution, the greater is the incentive of middle income households to engage in conspicuous consumption as the marginal return on conspicuous consumption rises.[2] This is because the greater are the number of group peers who possess a similar level of income to a given household, the greater is the household's incentive to engage in conspicuous spending (Hypothesis 2). Apart from middle income households, the authors also show that poor households are better off in situations where there is some income inequality because they face a lower payoff from consuming visible goods and thus tend to consume a greater amount of non-observable good $y-c$. Vice versa, the rich benefit from income equality as there are relatively fewer peers with their level of income Hopkins and Kornienko (2004).

In terms of verifying Hypothesis 2, Brown et al. (2011) have found some evidence for a positive correlation between the dispersion of income and conspicuous spending in rural Chinese villages. The scholars use a number of different group-level measures to capture the changes in the per capita household income distribution in the natural village, including: the Gini index, the skewness statistic, the kurtosis statistic and interaction term between skewness and kurtosis. While the Gini coefficient appears to have no significant effect on spending on visible goods - in their case funeral and wedding expenses - they do find that this spending increases among the poorest 25 per cent of households when the kurtosis of per capita income distribution rises.[3] However, in spite of finding some evidence that the income distribution affects conspicuous spending among the richest 25 per cent of household, the authors conclude that the rank-based model of status conspicuous consumption is only useful for describing the "poorest segment" of society, while the behavior of high income groups may be guided by other motives (Brown et al. 2011, p. 146). In the following we hope to show that the prediction set out by the rank-based model in fact holds among

[1] $F^{-}(c)$ is included to avoid the existence of multiple equilibria.

[2] see proposition 4 in Hopkins and Kornienko (2004).

[3] an interaction term combining the effects of kurtosis and skewness was also found to be significant for increasing conspicuous spending among the bottom 25 per cent as well the top 25 per cent.

wealthy households located in the upper tail of the income distribution.

## 2.1 Empirical approach

We devise a new approach to empirically studying the relationship between the dispersion of social group income and conspicuous consumption. This method involves creating a household level variable that measures the number of peers located in the immediate income vicinity of a household. It addresses two shortcomings of Brown et al. (2011): Firstly, their empirical estimation strategy is hampered by the fact that they use a group level proxy for studying changes in the *overall* dispersion of social group income. Changes in this 'global density' can have heterogenous effects on the number of peers across different intervals of the income distribution. To illustrate, consider a mean-preserving redistribution of income distribution that increases the dispersion of income, as illustrated in Figure 1 by a change from $A$ to $A'$. This income redistribution leads to a reduction in the density of households in region 1, but an increase in the density of households in region 2. As such, hypothesis 2 would predict that spending on visible goods would increase in region 2, but not in region 1. Hence, any specification that only examines the relationship between spending on visible goods and the global density of group income does not do proper justice to Hypothesis 2. Changes in the global income distribution, as captured by proxies such as the Gini coefficient, are not a useful proxy for measuring the number of peers who possess a similar income to any particular household. Even if this effect is studied for specific income deciles, it still assumes that any redistribution that increases the overall dispersion of income will have the same effect on the number of peers in a given income interval as any other redistribution that leads to an increase in the overall dispersion of group income. As there are many different possible redistributions through which the overall income dispersion increases, there is no *a priori* reason to assume that they will all change the number of peers within a particular income interval in a homogenous fashion.

***FIGURE 1 ABOUT HERE***

A second methodological issue in Brown et al. (2011) is that it appears to use measures of skewness and kurtosis as proxies for changes in the dispersion of income. However, the third and fourth order moments do not precisely capture the same effect as the second order moment. In particular, unlike the second order, both skewness and kurtosis are non-dimensional in nature in that their values purely describe the shape of the distribution (Press et al., 1992). This means that for these values to be meaningful, it is important to take into account *their* standard deviation which implies making assumption about the shape of the underlying distribution for the value and, rather critically, on the tail of this distribution.[4] Kurtosis in particular depends on such a high moment that there are many real-life distribution for which the standard deviation for kurtosis is effectively infinite Press et al. (1992, p. 607).

As a more tractable alternative, we adopt a more direct approach to verifying Hypothesis 2 by examining how the proportion of social group peers that possess a similar income range influences expenditure on visible goods. If this 'local' density increases, Hypothesis 2 predicts that conspicuous consumption would increase. Likewise, a decline in number of peers with similar income levels would lead to a decline in conspicuous consumption. An important part of this method involves defining reference groups and local density. We define the former by race and regional proximity, thereby assuming that these reference groups can be defined at a provincial level. This method follows previous studies which also define social groups by region and race (Charles et al., 2009; Kaus, 2013). As Kaus (2012) notes, this approach is justified in the South African case as race has shown to be an important factor in a range of social interactions such as the labour market, the education system and the

[4]measures of skewness and kurtosis tend to have very large standard deviations, which is problematic given that the sample size in (Brown et al., 2011) ranges between 129 to 346 (see Table 5–7C).

housing market (Moodley and Adam, 2000). To measure local density, we count the number of households within a bandwidth $b$ of income that are located in the same reference group $k$ that denotes households found in a particular province, social group unit and time period (e.g. black population in Western Cape province surveyed in 1995, see Table 2). We define the variable $RLD_{k,t}$ as this number divided by the total number of households in $k$. In terms of selecting an appropriate $b$, we choose to count all households that are within a five per cent income range of the household. The result is illustrated in Figure 2, which depicts the number of peers within the 5 per cent bandwidth for each particular income level. We judge this method to be satisfactory as the resulting local density variable resembles the group's kernel density distribution (a group level meta statistic). Both the kernel density and the local density variable have a similar shape in that they possess right skewed distribution.

Concerning how the income distribution actually changes, studies have found that income inequality typically rises in an asymmetric fashion through which the skewness of the distribution increases: a small segment of individuals become (very) wealthy, while the income of the rest of the population remains relatively stable (Chotikapanich et al., 2012). This is the case in the US data studied by Charles et al. (see figure 2, p. 444), as well as in our South African data (see Table 2). If Hypothesis 2 is correct, the question of whether or not such a typical redistribution leads to an increase in average spending on visible goods depends on how it affects local density in both the right hand tail region as well as the central region of the income distribution. In the case of the tail region, an increase in the dispersion of income does not necessarily imply that local density increases, since the tail may expand in such a way that it covers a larger income range. Table 1 indicates that this is the case for many social groups as the maximum household income observed in each social group has risen significantly over time. This expansion in the income range could lead to a lower local density in the tail region as the average income distance between households increases (i.e. after the redistribution households end up further apart from each other in the tail region). In such a scenario, spending on visible goods by relatively wealthy households would actually fall as the dispersion of income increases. On the other hand, if local density increases in the tail of the distribution, this would lead to an increase in spending on visible goods by relatively wealthy households. Finally, average spending on visible goods by a social group is also affected by how the income distribution reduces local density in the central region of the distribution. In that sense, basic stylized facts about the growth of income inequality over time do not suffice to make a prediction about how household spending on visible goods will increase or decrease as income inequality increases.

In terms of the second methodological issue identified with the use of skewness and kurtosis, using local density also enables to eschew the use of these statistics and directly examine whether any systematic differences exist in how local density affects conspicuous spending patterns across the dense and tail regions of the income distribution. There are two plausible reasons why this may the case. First, changes in the number of peer household with similar incomes would be more noticeable (and thereby have a larger effect on visible spending) in sparse income intervals situated in the tail region of the income distribution relative to the more densely populated mean income interval (e.g. region 2 in Figure 1). A small change in the number of peers in the tail region would represent a large percentage change in the local population of households. On the other hand, a small change in the number of peers in the dense region would only represent a small fractional change in the local population of households situated in that income interval. It is therefore worth examining whether changes in the income distribution have a weaker effect among relatively dense intervals of the income distribution (Hypothesis 3). This provides an alternative explanation for the findings that the income distribution appears to have no significant influence on middle income households (Brown et al., 2011).

## 3 Results on global density

We use data from the South African Income and Expenditure Survey (IES) conducted in 1995, 2000, and 2005. It covers a representative sample of South African households and consists of 29,582 households in 1995, 26,263 in 2000, and 21,144 in 2005, respectively. Table 1 reports the size of social groups across provinces, while Table 2 reports on the social income distribution for each $k$ reference group. In terms of constructing the dataset, two issues have to be confronted. Firstly, the structure of the IES 2005 series differs from preceding surveys (Yu, 2008). As a result, the 1995 and 2000 income and expenditure items were recategorized according to the the UN Statistics Division's Classification of Individual Consumption According to Purpose (COICOP). Furthermore, the 2005 values of income, *housing and utilities* as well as total expenditure had to corrected for the values of imputed rent to ensure that they are consistent with IES samples. Although the change of methods from recall to diary method may also diminish comparability, von Fintel (2007) finds no systematic change in estimating income elasticities of aggregated product categories that can be attributed to the change in this methodology. A second issue is that there exists some doubt about whether the IES of 2000 is representative of the SA population (Burger et al., 2004; van der Berg et al., 2008). Due to migration between the 1996 census and the collection of IES data for 2000, the survey is known to over-represent the Black population while under-representing the White population (Özler, 2007). To account for possible shortcomings, the 2000 sample was reweighted to match it up with the corresponding population shares reported in the 2001 census, as suggested by Özler (2007).

We begin with the basic model of spending on conspicuous consumption (cf. specification (1) and (2) in Table 3) as used in Kaus (2013). In line with Charles et al. (2009) visible spending is defined as the sum of all household expenditures spent on personal care, clothing and footwear, jewelry, and cars. We note that the recent study by Heffetz (2011) confirmed that these goods are considered to be highly visible among US households.[5] Log spending on the pooled basket of visible goods $Vis_i$ is regressed on social group dummies which indicate whether a household Black $Bl_i$ or Coloured $Col_i$, the log of a household's permanent income $pInc_i$, a vector of demographic indicators $Dem_i$ as well as a vector of year dummies $Yr_i$. These include a dummies for education, the first for whether the head of the household has more than ten years education and the second for whether this includes a university degree. $Dem_i$ includes area type, age, age squared, and family size.

$$ln(Vis_i) = \beta_0 + \beta_1 Bl_i + \beta_2 Col_i + \gamma ln(pInc_i) + \delta Dem_i + \epsilon Yr_i + \varepsilon_i. \quad (1)$$

The log-log formulation of the regression equation allows us to interpret the coefficient $\gamma$ as the (permanent) income elasticity of visible consumption expenditure. Note that permanent income, measured by total expenditure, needs to be instrumented to alleviate endogeneity and measurement error problems. Tests of the statistical validity of different sets of instruments showed that a specification with the log of current income to be the best suited as a single instrument for permanent income.

As the Charles et al. (2009) hypothesis about the influence of the income distribution on conspicuous consumption is conditional on the shape of the Engel curve for visible goods, we begin our evaluation of Hypothesis 1 with an visual inspection of this curve. Figure 3 illustrates the Engel curve for visible goods for White South Africans in the year 2000. Relatively similar Engel curves can be drawn for Black and Coloured households in each year, respectively. While appearing to be close to linear, RESET tests reveal the best fit for this curve is a nonlinear and convex shape, irrespective of the chosen cut off point. Thus we infer from this result that a positive correlation between increasing income dispersion and conspicuous consumption should be found, as stated in the Charles et al. (2009) model).

To examine whether observed differences in conspicuous consumption between social groups can be accounted for by differences in group income levels, as suggested by Charles

[5]See Kaus (2013) for a discussion on the visible consumption item composition

et al. (2009), the following regression is estimated where the dummies $Bl_i$ and $Col_i$ are replaced with $Inc^{\mu}_{k,t}$ that denotes the average income of a social group in one of the nine provinces in a certain year $k$ (cf. specification (2) in Table 2):

$$ln(Vis_i) = \beta_0 + \alpha ln(Inc^{\mu}_{k,t}) + \gamma ln(pInc_i) + \delta Dem_i + \epsilon Yr_i + \zeta_i, \quad (2)$$

Specifications (3) to (5) in Table 3 introduce measures of income dispersion instead of mean group income of the social groups. There are a number of ways in which the dispersion of group income can be measured. To provide a robust investigation we consider the following three measures. Specification (3) begins with the log of the standard deviation ($\sigma$) of income of a certain group in one of the nine provinces in a certain year: $ln(Inc^{\sigma}_{k,t})$. Specification (4) introduces the coefficient of variation, which is a normalized variant of the standard deviation: $Inc^{\upsilon}_{k,t}$. Here $\upsilon$ is defined as $\sigma/\mu$ and denotes the coefficient of variation of income of a certain group in one of the nine provinces in a certain year. Specification (5) introduces the Gini coefficient ($\gamma$) of income of a certain group in one of the nine provinces in a certain year: $Inc^{\gamma}_{k,t}$. Specifications (6) to (8) introduce the former three variables alongside mean group income.

Results in Table 3 indicate that increasing dispersion has a negative and significant effect on household spending on visible consumption (see specifications 3 to 5). This is consistent with Charles et al. (2009) findings for White Americans. Specification (6) shows that joint inclusion of $ln(Inc^{\sigma}_{k,t})$ also reduces the magnitude of $Inc^{\mu}_{k,t}$. This reflects the fact that the correlation coefficient between these two variables is very high (greater than 0.9). The correlation coefficients between $Inc^{\mu}_{k,t}$ and the other two measures of dispersion are, however, relatively low (around 0.4). Despite still being negative, multicollinearity present in specification (6) induces both mean group income and the standard deviation to decrease in significance levels. In the absence of multicollinearity (specifications (7) and (8) show low variance inflation values), mean group income as well as the dispersion variables are negative and significant.

***TABLE 3 ABOUT HERE***

We proceed to examine how the effect of the dispersion of social group income on conspicuous consumption depends on whether households are below or above the average group income. According to Charles et al. (2009), regardless of the shape of the Engel curve, we expect to find that high income households increase their spending as the income dispersion grows, while low income household reduce their visible spending. Following the partition approach (Yip and Tsang, 2007), we create dummies within each group to separate between households above and below the average social group income, and then interact these dummies with the dispersion variable. The terms $Inc^{\upsilon}_{k,t}$ * LOW and $Inc^{\gamma}_{k,t}$ * LOW in Table 4 captures the effect of dispersion on conspicuous spending for households whose income is below their average group level (using $Inc^{\upsilon}_{k,t}$ in specifications (1-2) and $Inc^{\gamma}_{k,t}$ in specifications (3-4)). The terms $Inc^{\upsilon}_{k,t}$ * HIGH and $Inc^{\gamma}_{k,t}$ * HIGH do the same thing respectively for households that are above the average group income in their region.[6]

***TABLE 4 ABOUT HERE***

The results reveal the reverse of the expected sign: relatively rich households tend to reduce (rather than increase) spending on conspicuous consumption as the dispersion of social group income increases. Below mean group income households, however, show no effect of increasing dispersion on their spending on visible goods (rather than a negative). The interaction of income dispersion and $HIGH$ income is negative and significant in all four specifications. On the other hand, the interaction of income dispersion and $LOW$ income is not significant in any of the specifications (1-4). This suggests that the negative effect that

[6]The estimations allow also include the LOW dummy to allow for possible differences in the intercept terms.

the dispersion of income has on conspicuous consumption is mainly driven by the reduction in spending on visible goods by households that possess an above average group income.

Taken together, our results suggest that relatively wealthy households tend to reduce their spending on visible goods as dispersion of social income increases. The only way this could be accounted for within the Charles et al. (2009) model is if visible goods are in fact inferior goods. However, this is ruled out by the positive income coefficient present in Table 3. Hence these results cast some doubt on the proposed hypothesis by Charles et al. (2009) about how the income dispersion affects visible consumption in a multiple groups settings.

# 4 Results on local density

We now turn to examine Hypotheses 2 and 3 in which the effects of the income distribution is studied via the local density variable. If there is an increase in the proportion of peers in the same social group who possess a similar income level to a given household then its spending on visible goods is predicted to increase.

***TABLE 5 and 6 ABOUT HERE***

Results are reported in Table 5 and 6, where Table 5 uses the Gini coefficient ($Inc^{\gamma}_{k,t}$) to proxy the dispersion of social group income, while Table 6 uses the coefficient of variation ($Inc^{\upsilon}_{k,t}$). Specification 1 in these Tables shows how $RLD_{k,t}$ has a very strong effect on visible spending, which is found to be significant at the $\alpha = 0.01\%$ level of significance. The positive sign of this parameter supports Hypothesis 2 that household spending on visible goods increases as the number of peers with a similar income level grows. The magnitude of this parameter suggests that marginal changes in the influence of local density appear to have a relatively strong effect on visible spending. Comparing these results to specification 7 and specification 8 in Table 3 which are identical except for the absence of $RLD_{k,t}$, we observe that the inclusion of $RLD_{k,t}$ has somewhat reduced the magnitude and significance of $Inc^{\gamma}_{k,t}$ and $Inc^{\upsilon}_{k,t}$, although both remain significant at the $\alpha = 5\%$ level. This was to be expected given that both of these variables convey information about the dispersion of income, although there is low correlation between $RLD_{k,t}$ and both $Inc^{\gamma}_{k,t}$ (-0.0506) and $Inc^{\upsilon}_{k,t}$ (-0.0157). [7]

In specification 2 we proceed to examine how the effect of local density varies across above- and below mean group income households. Following the partition approach (Yip and Tsang, 2007), this is done by including a dummy intercept term for below mean income households ($DummyLOW$) and two interaction terms: $RLD_{k,t}$*HIGH for above mean income households and $RLD_{k,t} * LOW$ below mean income households. Similar to the results reported in the previous section, we find that only $RLD_{k,t} * HIGH$ is has a significant effect on household spending on visible goods. This result suggests that it is high income households which tend to alter their spending on visible goods in response to changes in local density. As such, it supports the notion that rank-based model of conspicuous consumption is relevant for studying the consumption patterns of affluent households. Indeed, compared to specification (1), the size of the parameter estimate for $RLD_{k,t}$*HIGH is much larger than the parameter estimate of $RLD_{k,t}$. In the case of Table 5, the parameter for $RLD_{k,t}$*HIGH in specification (2) is four times higher than the parameter estimates for $RLD_{k,t}$. This value dwarves the effect of any other variable in the specification and its inclusion renders the parameter estimate for $Inc^{\gamma}_{k,t}$ insignificant.

In addition, this result suggests that the effect of income dispersion on visible spending is better captured by $RLD_{k,t}$ relative to $Inc^{\gamma}_{k,t}$. Concerning relatively low income households, while $RLD_{k,t} * LOW$ appears to be insignificant it should be noted that the large and significant value of the parameter estimate for ($DummyLOW$) suggests that relatively below

[7] This low correlation is chiefly because $RLD_{k,t}$ is defined at household level, while $Inc^{\gamma}_{k,t}$ and $Inc^{\upsilon}_{k,t}$ are defined at the $k$ unite level.

mean group income households tend to spend more on visible goods than above mean group income households, which supports existing evidence about status concerns being an important influence among relatively poor households (Brown et al., 2011; Moav and Neeman, 2012).[8]

Given the overlap of households that are relatively affluent and those that are located in relatively sparse (tail) regions of the income distribution, it is not clear whether this strong result for $RLD_{k,t}{*}HIGH$ can be attributed to relative income effects or whether any change in $RLD_{k,t}$ may have systematically different effects across dense and sparse (tail) regions of the income distribution. To answer this question, it is important to contrast visible spending patterns of above- and below income household *within* the sparse (tail) regions of the income distribution. We do so in two steps. First, in specification 3 we partition the population according to whether the households is located in either a sparse ($RLD_{k,t}{*}SMALL$) or dense income intervals ($RLD_{k,t}{*}BIG$), as well as a dummy intercept term for households located in sparse income intervals ($DummySMALL$). We define a 'small' neighborhood as the situation in which the share of households with similar income is less than or equal to two per cent of the total reference group population in $k$. The choice of a two percent cut off might seem arbitrary. Figure 3 illustrates how the number of sparse, or *small*, income neighborhoods vary by the chosen cut off point. Increasing (decreasing) the cut off point inevitably leads to a rising (decreasing) number of observations with a small income neighborhood. To properly capture the left *and* the right tail of the distribution, the cut off point should thus not be too high. We conclude that two per cent appears to be a good choice. This value includes a reasonable number of observations (18,683), which is a suitable choice for the purpose of this study. In terms of how robust these results are to our choice of cut-off point, Figure 6 depicts how the effect of relative local density on visible consumption varies with the choice of the cut off point. Although the magnitude changes, the effects are consistent. [9]

The results of specification 3 show that the effect of a change in local density on visible spending is very strong in sparse (tail) intervals of the income distribution, but weak among relatively dense intervals of the income distribution. This is reflected in the significant and large value of the parameter estimate for $RLD_{k,t}{*}SMALL$. It is interesting to note that the intercept term $DummySMALL$ is negative, which suggests that households in sparse (tail) intervals tend to spend less on visible goods than households in dense regions of the income interval. However, any incremental increase in the number of peers leads to a large increase in spending on visible goods (as the parameter value for $RLD_{k,t}{*}SMALL$ suggests). Taken together, these results provide strong evidence for Hypothesis 3 that changes in the income distribution have a stronger effect among the tail intervals of the income distribution.

In the second step, we proceed with combining interaction terms defined in specification (2) and (3) to partition the population into four groups across both above and below mean group income households, as well as sparse and dense regions of the income distribution in specification 4. A dummy intercept term for households located in sparse income intervals ($DummySMALL$) and above-average income households ($DummyHiGH$) is included. The parameter estimates for relatively poor and rich households within the tail regions of the distribution shows that the effect of local density on visible spending is consistently significant across both of these groups. This contrasts strongly with specification 2 where a significant positive effect was found for relatively wealthy households, but not for relatively poor households. We conclude that this absence of a significant results for poor households ($RLD_{k,t}{*}LOW$) was probably due to the fact that most low income households are situated

[8] The effect of relative income should not be confused with the income elasticity (reported as *Household Income*, which shows that visible goods are luxury goods - as their personal income increases, budget share dedicated to visible goods will increase. The parameter estimate of $DummyLOW$, on the other hand, shows that spending on visible good is significantly higher if the household income is below the average income of the social group in particular regions and year ($k$ unit).

[9] However, with a very low cut off point, e.g. 1 per cent or 0.05 per cent, the number of households located in small income neighborhoods is comparatively small, which results in a large confidence range.

in relatively dense regions of the income distribution. Among those that are located in the lower tail region, it is worth noting that these appear to be more responsive to changes in local density than wealthy households located in the upper tail regions: The parameter estimate for $RLD_{k,t}*LOW*SMALL$ is relatively larger than $RLD_{k,t}*HIGH*SMALL$ in both Tables 5 and Table 6. Within dense regions of the income interval, no effect of relative local density is found among relatively wealthy or poor households. Thus, we can conclude that local density has a very strong influence on visible spending in the sparse tail intervals of the income distribution, irrespective of the relative income level of households. In dense income neighborhoods, however, no strong effect of relative local density can be found. As such, this finding confirms the observation by Brown et al. (2011) that changes in the income distribution have little influence on visible spending by households located in the relatively dense regions of the income distribution.

Finally, specification 5 reports the same specification but also includes the proxy for the global income distribution, partitioned across relatively low and high income household, as described previously. Looking at the results for the coefficient of variation (Table 6), these show up as negative, small and not significant when considered jointly with the local density variable. However, if dispersion is measured with the Gini coefficient (Table 5), the effect of global density is significant and strong as before in large groups but insignificant in small groups. On the whole, these results underline how the local density variable provides a better method for studying how changes in the social group income distribution influences household spending on visible goods.

# 5 Disaggregated Results

One aspect worth investigating further from the initial results on global density in Section 3 is why the income distribution has an insignificant effect on visible spending among low income households. In contrast, Brown et al. (2011) found that spending on visible goods by the poorest segment of society responds strongly to the dispersion of income. The results in the previous suggest that one possible answer is that there are few low income households situated in income intervals that possess a relatively small number of social group peers. Given that the effect of a change on income distribution on conspicuous spending is particulary strong in such circumstances, this could explain why visible spending among low income household does not appear to respond to changes in the income distribution. A second explanation for this result concerns the manner in which households actually use visible goods and services and how this functionality is dependent on household income. Visible goods are typically composed of automobiles, clothing and footwear, as well as jewelery (Charles et al., 2009; Kaus, 2013). Many of these can be used for purposes other than status signalling. While there is little doubt that they are highly visible to others (as recently verified by Heffetz (2011), there is a subtle yet important difference between consuming visible goods and using them to signal status. It can be argued that affluent households, having satisfied their basic needs such as hunger and thirst, tend to dedicate a larger share of their expenditure to harder to satiate wants, such as the need to signal status (Witt, 2001).[10] Hence producers catering to affluent consumers tend to modify the characteristics of goods in such a way so that make them more visible, thereby satisfying harder-to-satiate wants (Scitovsky, 1976; Frank, 1999; Witt, 2001). Witt gives the example generic pens are normally used for writing, but can be modified to signal status via ornamental decoration and the use of expensive. Another good example is the 5,000 Viking-Frontgate Professional barbecue grill mentioned by Frank (1999): a cooking device that appears to possess an excessive amount of features and qualities designed to impress guests. Thus it is plausible that this expansion of spending on status also leads to an increase in the range of goods being used to signal status. As

[10] Although our results above suggest that this tendency also depends on the shape of the social group income distribution

such, we examine whether the footprint of status signalling on household spending patterns tends to expand across a wider range of goods as household income rises.

We empirically examine whether any differences exist between low and high income consumers in the range of visible goods and services they use to signal status. We do so by determining whether or not a good is used to signal status by examining the extent to which household spending levels on the goods is sensitive to changes in the income distribution. This represents an alternative approach to measuring the visibility of good, which is typically done via survey work (see e.g. Heffetz, 2011). The possibility that low income households use a relatively limited number of visible goods may therefore account for why the income distribution has an insignificant effect on the aggregated level of visible spending among low income households in Table 4. For this exercise we focus on the visible spending pattern of the black population, which represents the largest group in South Africa. We do so as it is the only social group in which within-group tests confirmed that mean group income had a negative impact on visible spending (Kaus 2012, p. 69). We therefore run specification (3) from Table 3 separately for the black population and for each subcategory of visible goods, which includes *clothing*, *footwear*, *automobiles* and *jewelry*.

The results are shown in Table 7. They confirm that the range of goods and services used for status signalling tends to grow as household rises. In relation to low income households, only *jewelry* appears to have a significant negative correlation (at the $\alpha = 0.5$ level) with the dispersion of social group income among the four types of visible goods. This suggests that *jewelery* is indeed being used to signal status among low income households, while other goods, including *automobiles*, *clothing* and *footwear*, are being primarily used for non-signaling purposes. In contrast, among high income households, all four categories have a negative and significant correlation with the dispersion of income, which suggests they are all used for the purposes of status signalling by high income households. In this sense, the results support the view that the footprint of status signalling on household spending patterns tends to grow as the budget constraint becomes more relaxed, resulting in more observable goods being used by households to signal status.

# 6 Discussion and conclusions

This study has contributed towards developing a better understanding of how the economic characteristics of social groups shape household spending patterns in developing, multi-social group settings as found in contemporary South Africa. Whereas previously the main focus of research was on how the average income level of social groups influences household spending on visible goods (Charles et al., 2009; Kaus, 2013), our results show that the dispersion of social group income also has a strong influence on visible spending. In particular, we have found that increasing the number of peers who possess a similar income level to a given household increases its spending on visible goods. This result supports models of status competition in which households consume visible goods in order to gain intra-group status among fellow peers, rather than signalling status to impartial observers. In addition, it was found that an increase in the global dispersion of social group income leads to a decrease the consumption of visible goods by relatively wealthy households (Charles et al., 2009). This suggests that growing income inequality has generally lead to a decline in local density within the expanding tail region of the income distribution.

In the context of the post-apartheid South Africa, our results suggest that although there has been a decline in geographical segregation between groups (Christopher, 2001), a predominant share of spending on visible goods still appears to be mainly orientated towards signalling wealth towards fellow group members, rather than society as a whole. A question for future research is whether this situation will change as segregation between groups continues to decline, and how this would effect spending on visible low income households. In addition, it would be worth comparing the extent to which local density influence visible spending in other multiracial societies in which the size of the social groups are more balanced.

Concerning behavioral differences between rich and poor, an important feature of our results is that we find, irrespective of their income level, households tend to respond to change in local density in the same way: As local density increases, spending on visible goods also increases. This casts doubt on the idea that rank-based model of status conspicuous consumption is only useful for describing the "poorest segment" of society (Brown et al. 2011, p. 146). Rather, it suggest that such models are highly relevant for understanding the consumption patterns of relatively affluent households. Beyond household income, what also appears to be relevant in this debate is the changing shape of income distribution as local density appears to have a relatively strong influence on visible spending among households located in the tail regions of the income distribution, relative to households located in the more dense central region of the income distribution.

Finally, an important issue for policymakers is to understand the extent to which positional concerns vary across different spending categories (Solnick and Hemenway, 2005; Besharov, 2002). Here most studies have conducted survey work to examine which categories are perceived to be the most visible among households (Solnick and Hemenway, 2005; Charles et al., 2009; Heffetz, 2011). These have yielded relatively robust results, in that spending on jewelry, automobiles and housing are consistently found to be viewed by respondents as the most visible type of household spending activity. Yet a somewhat neglected dimension has been the question of whether the *range* of visible goods that are actually used to signal status may depend on household income. Many visible goods serve other purposes beyond than status signalling. It is likely that the use of good tends to be conditional on household income as the underlying needs that motivate consumption change as households become more affluent (Witt 2001).

In this regard, our findings show that for the largest social group in the sample, black South Africans, *jewelry* appears to be the only visible good that is used by low income households to signal status. In contrast, among high income households, the expenditure categories of *clothing*, *footwear*, *automobiles*, as well as *jewelry* all appear to be used for status signaling as they are correlated to the distribution of social group income. In terms of policy implications, this suggests that any tax of on status-signalling activities (Frank, 1999) can not simply impose a tax on a fixed set of visible goods without taking into account how this set is conditional on the household income level. This is particularly important for understanding the substitution effects that result from a tax on status-related spending.

## References

Arrow, J. K., Dasgupta, P., 2009. Conspicuous Consumption, Inconspicuous Leisure. *The Economic Journal* 119: 497–516.

Becker, G.S., K.M. Murphy and I. Werning 2005. The Equilibrium Distriubiton of Income and the Market for Status. *Journal of Political Economy* 113(2): 282–310.

Besharov, G., 2002. Three Questions about the Economics of Relative Position: A Response to Frank and Sunstein. *Boston University Law Review* 82(5): 1241–61.

Brady, D. S., and Friedman, R. D. 1947. PART IV: Savings and the Income Distribution. In Studies in income and wealth (pp. 247-265). UMI

Brown, P. H., Bulte, E., and Zhang, X. 2011. Positional spending and status seeking in rural China. Journal of Development Economics, 96(1), 139-149.

Brown, A., Deaton, A., 1972. Surveys in Applied Economics: Models of Consumer Behaviour, *The Economic Journal* 82: 1145–1236.

Burger, R., van der Berg, S., Nieftagodien, S., 2004. Consumption Patterns of South Africa's Rising Middle-class: Correcting for Measurement Errors. Paper presented at the conference of the Center for the Study of African Economies on Poverty Reduction, Growth and Human Development in Africa, Oxford.

Christopher, A. J. 2001. Urban segregation in post-apartheid South Africa. Urban Studies, 38(3), 449-466.

Clark, A., Oswald, A., 1998. Comparison-concave Utility and Following Behaviour in Social and Economic Setting. *Journal of Public Economics* 70(1): 133–155.

Clark, A. E., Frijters, P., and Shields, M. A. 2008. Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. Journal of Economic Literature 46(1): 95-144.

Chai, A., Moneta, A., 2012. Some Empirical Evidence on the Hierarchy of Wants. *Journal of Evolutionary Economics* 22: 649–676.

Chao, A., Schor, J. B., 1998. Empirical Tests of Status Consumption: Evidence from Women's Cosmetics. *Journal of Economic Psychology* 19(1): 107–131.

Charles, K. K., Hurst, E., Roussanov, N., 2009. Conspicuous Consumption and Race. The Quarterly Journal of Economics 124(2): 425–467.

Chotikapanich, D., Griffiths, W. E., Prasada Rao, D. S., and Valencia, V. 2012. Global Income Distributions and Inequality, 1993 and 2000: Incorporating Country-Level Inequality Modeled with Beta Distributions. Review of Economics and Statistics, 94(1), 52-73.

Frank, R. H., 1999. Luxury Fever: Why Money Fails to Satisfy in an Era of Excess. New York: The Free Press.

Frank, R. H. 1985. The demand for unobservable and other nonpositional goods. The American Economic Review 75(1): 101-116.

Frijters, P., Leigh, A., 2008. Materialism on the March: From Conspicuous Leisure to Conspicuous Consumption? The Journal of Socio-Economics 37: 1937–1945.

Glazer, A., Konrad, K., 1996. A Signaling Explanation for Charity. American Economic Review 86(4): 1019–1028.

Grinblatt, M., Keloharju, M., Ikäheimo, S., 2008. Social Influence and Consumption: Evidence from the Automobile Purchases of Neighbors. The Review of Economics and Statistics 90(4): 735–753.

Hatton, T. J., and Williamson, J. G. 2005. Global migration and the world economy: Two centuries of policy and performance. Cambridge, MA: MIT Press.

Heffetz, O., 2011. A Test of Conspicuous Consumption: Visibility and Income Elasticities. The Review of Economics and Statistics 93(4): 1101–1117.

Hopkins, E., Kornienko, T., 2004. Running to Keep in the Same Place: Consumer Choice as a Game of Status. American Economic Review 94(4): 1085–1107.

Hynes, J. A. 1998. The Emergence of the Neoclassical Consumption Function: The Formative Years, 1940-1952. Journal of the History of Economic Thought, 20(1), 25.

Kamakura, W. A., and Du, R. Y. 2012. How Economic Contractions and Expansions Affect Expenditure Patterns. The Journal of Consumer Research 39(2), 229-247.

IJR, 2010. South African reconciliation barometer: 2009 report. http://www.ijr.org.za/political-analysis-SARB.php (accessed 7 Feburary 2012).

IMF, 2011. International financial statistics. http://www.imfstatistics.org/imf/ (accessed 17 January 2011).

Kaus, W., 2013. Conspicuous Consumption and "Race": Evidence from South Africa. Journal of Development Economics 100(1): 63–73.

Moav, O. and Neeman, Z. 2012. Saving Rates and Poverty: The Role of Conspicuous Consumption and Human Capital. The Economic Journal 122(563):933-956.

Moneta, A., Chai, A., 2010. The Evolution of Engel Curves and Its Implications for Structural Change. Discussion Paper, Griffith University.

Moodley, K., and Adam, H. (2000). Race and nation in post-apartheid South Africa. Current Sociology, 48(3), 51-69.

Özler, B., 2007. Not Separate, not Equal: Poverty and Inequality in Post-apartheid South Africa. Economic Development and Cultural Change 55: 487–529.

Press, W. H., Flannery, B. P., Teukolsky, S. A., and Vetterling, W. T. (1992). Numerical Recipes in FORTRAN 77: Volume 1, Volume 1 of Fortran Numerical Recipes: The Art of Scientific Computing (Vol. 1). Cambridge University press.

Robson, A. J. (1992). Status, the distribution of wealth, private and social attitudes to risk. Econometrica 60(4):837-857.

Scitovsky, T. (1976). The joyless economy: The psychology of human satisfaction. Oxford University Press, USA.

Solnick, S. J., Hemenway, D., 1998. Is More Always Better?: A Survey on Positional Concerns. Journal of Economic Behavior & Organization 37(3): 373–383.

Solnick, S. J., Hemenway, D., 2005. Are Positional Concerns Stronger in Some Domains Than in Others? American Economic Review 95(2): 147–151.

StatsSA, 2009. Digital census atlas. Census 2001. http://www.statssa.gov.za/census2001/digiAtlas/index.html (accessed 12.03.2009).

von Fintel, D., 2007. An intermporal comparison of expenditure elasticities in South Africa - what do estimates from income and expenditure surveys reveal about diary and recall renumeration? Unpublished report for Statistics South Africa.

van der Berg, S., Louw, M., Yu, D., 2008. Post-transition Poverty Trends based on an Alternative Data Source. South African Journal of Economics 76(1), 58–76.

Witt, U., 2001. Learning to Consume - A Theory of Wants and the Growth of Demand. Journal of Evolutionary Economics 11 (1), 23-36.

Yip, P. S. L., Tsang, E. W. K., 2007. Interpreting Dummy Variables and their Interaction Effects in Strategy Research. Strategic Organization 5(1), 13–30.

Yu, D., 2008. The Comparability of Income and Expenditure Surveys 1995, 2000 and 2005/2006. Stellenbosch Economic Working Papers 11/2008.

# Tables and Figures

Table 1: Population Statistics in South African Provinces

| | Population share | Share Black | Share Coloured | Share White |
|---|---|---|---|---|
| Eastern Cape | 0.14 | 0.88/0.84 | 0.07/0.07 | 0.05/0.09 |
| Free State | 0.06 | 0.88/0.81 | 0.03/0.03 | 0.09/0.16 |
| Gauteng | 0.20 | 0.74/0.71 | 0.04/0.03 | 0.20/0.26 |
| KwaZulu-Natal | 0.21 | 0.85/0.87 | 0.02/0.02 | 0.05/0.10 |
| Limpopo | 0.12 | 0.97/0.97 | 0.00/0.00 | 0.02/0.03 |
| Mpumalanga | 0.07 | 0.92/0.89 | 0.01/0.01 | 0.07/0.11 |
| Northern Cape | 0.02 | 0.36/0.41 | 0.52/0.42 | 0.12/0.17 |
| North West | 0.08 | 0.92/0.88 | 0.02/0.02 | 0.07/0.10 |
| Western Cape | 0.10 | 0.27/0.24 | 0.54/0.47 | 0.18/0.30 |
| National | 1 | 0.79/0.76 | 0.09/0.08 | 0.10/0.15 |

*Notes:* The figures before the slash denote official 2001 census numbers (StatsSA, 2009). The figures after the slash refer to survey weighted statistics form the pooled sample.

Table 2: Income distribution by social group, province and year

| | Black | | | Coloured | | | White | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1995 | 2000 | 2005 | 1995 | 2000 | 2005 | 1995 | 2000 | 2005 |
| *Province 1* | | | | | | | | | |
| Mean | 32,729 | 26,349 | 30,400 | 49,805 | 47,918 | 51,395 | 147,165 | 146,419 | 192,179 |
| SD | 26,441 | 24,088 | 22,871 | 43,178 | 47,026 | 51,855 | 136,600 | 138,250 | 21,2239 |
| Min | 353.20 | 0 | 0 | 3602.65 | 0 | 0 | 7629.14 | 0 | 1399.73 |
| Max | 188,609 | 203,520 | 141,735 | 270,198 | 276,480 | 303,883 | 1,058,525 | 729,600 | 1,913,720 |
| Kurtosis | 4.55 | 13.88 | 6.43 | 7.20 | 7.90 | 8.08 | 13.10 | 5.93 | 22.23 |
| Skewness | 2.11 | 2.73 | 1.70 | 1.85 | 2.10 | 2.17 | 2.60 | 1.65 | 3.51 |
| Median | 24,849 | 19,507 | 24,807 | 36,026 | 31,642 | 33,107 | 113,642 | 107,238 | 129,118 |
| Obs. | 525 | 575 | 484 | 1,578 | 1,473 | 1,357 | 1,017 | 393 | 505 |
| *Province 2* | | | | | | | | | |
| Mean | 25,781 | 19,024 | 25,826 | 39,182 | 35,561 | 48,395 | 144,265 | 130,238 | 143,887 |
| SD | 29,425 | 24,075 | 31,895 | 38,471 | 43,422 | 54,007 | 150,017 | 107,392 | 128,442 |
| Min | 0 | 0 | 10 | 2,119 | 0 | 918 | 848 | 0 | 753 |
| Max | 212,652 | 161,879 | 205,527 | 216,774 | 294,646 | 336,476 | 1,010,155 | 538,240 | 707,177 |
| Kurtosis | 12.11 | 11.97 | 11.71 | 7.00 | 15.49 | 9.69 | 10.81 | 5.02 | 7.13 |
| Skewness | 2.81 | 2.82 | 2.81 | 1.93 | 3.17 | 2.33 | 2.52 | 1.41 | 1.86 |
| Median | 16,530 | 9,927 | 14,625 | 25,107 | 20,314 | 28,232 | 97,211 | 94,348 | 111,309 |
| Obs. | 3,945 | 2,892 | 2,234 | 622 | 264 | 271 | 536 | 194 | 235 |
| *Province 3* | | | | | | | | | |
| Mean | 20,222 | 23,279 | 26,681 | 29,132 | 28,643 | 37,628 | 118,314 | 157,165 | 152,355 |
| SD | 18,933 | 26,104 | 29,714 | 27,145 | 34,780 | 46,974 | 116,566 | 170,789 | 132,463 |
| Min | 706 | 0 | 0 | 2,331 | 0 | 0 | 5,298 | 0 | 49.63 |
| Max | 103,693 | 181,760 | 185,638 | 178,013 | 193,920 | 305,225 | 863,053 | 1,024,000 | 583,561 |
| Kurtosis | 8.09 | 12.74 | 10.40 | 8.84 | 8.67 | 11.74 | 13.48 | 11.48 | 4.10 |
| Skewness | 2.13 | 2.73 | 2.54 | 2.19 | 2.37 | 2.76 | 2.74 | 2.69 | 1.25 |
| Median | 13,637 | 13,609 | 16,723 | 20,267 | 15,360 | 19,992 | 86,534 | 111,309 | 106,882 |
| Obs. | 393 | 474 | 759 | 614 | 603 | 756 | 373 | 187 | 168 |
| *Province 4* | | | | | | | | | |
| Mean | 21,451 | 20,553 | 29,893 | 23,399 | 36,653 | 48,926 | 106,351 | 134,024 | 160,872 |
| SD | 23,331 | 23,218 | 35,377 | 22,025 | 52,606 | 59,511 | 86,831 | 157,271 | 158,188 |
| Min | 0 | 0 | 0 | 3,108 | 3,840 | 786 | 2,525 | 0 | 7,214 |
| Max | 153,641 | 177,037 | 209,435 | 121,854 | 267,882 | 265,617 | 535,099 | 1,275,520 | 849,357 |
| Kurtosis | 9.34 | 14.27 | 9.63 | 8.32 | 12.13 | 5.82 | 6.79 | 21.63 | 7.52 |
| Skewness | 2.35 | 2.93 | 2.51 | 2.15 | 2.92 | 1.83 | 1.69 | 3.65 | 1.97 |
| Median | 12,857 | 12,791 | 16,967 | 16,742 | 16,589 | 20,060 | 84,768 | 93,440 | 119,645 |
| Obs. | 2,267 | 1,989 | 1,428 | 198 | 39 | 95 | 589 | 199 | 189 |
| *Province 5* | | | | | | | | | |
| Mean | 36,429 | 21,119 | 24,360 | 69,648 | 53,954 | 60,460 | 159,609 | 146,533 | 195,856 |
| SD | 33,018 | 22,830 | 26,069 | 56,989 | 47,738 | 62,577 | 161,426 | 119,583 | 174,105 |
| Min | 0 | 0 | 0 | 8,477 | 2,304 | 503 | 0 | 1,605 | 168 |
| Max | 205,563 | 161,280 | 180,966 | 339,073 | 194,514 | 332,675 | 1,245,362 | 768,000 | 918,191 |
| Kurtosis | 8.25 | 12.53 | 11.98 | 7.21 | 4.68 | 9.64 | 17.68 | 7.44 | 7.55 |
| Skewness | 2.10 | 2.78 | 2.73 | 1.79 | 1.50 | 2.34 | 3.29 | 1.75 | 1.97 |
| Median | 25,430 | 13,670 | 15,890 | 53,969 | 40,832 | 42,650 | 125,210 | 115,200 | 153,258 |
| Obs. | 3,437 | 3,654 | 4,172 | 192 | 37 | 51 | 625 | 251 | 154 |
| *Province 6* | | | | | | | | | |
| Mean | 32,753 | 25,668 | 29,437 | 45,434 | 43,830 | 33,614 | 161,482 | 119,135 | 160,103 |
| SD | 36,836 | 26,451 | 34,041 | 41,482 | 45,773 | 32,085 | 238,247 | 109,173 | 135,002 |
| Min | 0 | 0 | 0 | 4,945 | 0 | 2,212 | 3,857 | 0 | 4,299 |
| Max | 233,070 | 192,000 | 204,198 | 190,012 | 161,480 | 156,427 | 2,609,913 | 697,600 | 630,291 |
| Kurtosis | 9.41 | 10.22 | 9.07 | 4.41 | 3.84 | 6.30 | 44.67 | 12.01 | 5.15 |
| Skewness | 2.37 | 2.37 | 2.37 | 1.42 | 1.36 | 1.81 | 5.40 | 2.48 | 1.59 |
| Median | 19,073 | 16,896 | 16,966 | 28,821 | 24,064 | 22,044 | 105,960 | 98,304 | 120,424 |
| Obs. | 1,897 | 2,473 | 1,351 | 118 | 38 | 52 | 337 | 172 | 112 |
| *Province 7* | | | | | | | | | |
| Mean | 54,926 | 32,686 | 44,299 | 86,689 | 60,281 | 145,346 | 177,866 | 162,569 | 230,073 |
| SD | 50,223 | 33,420 | 49,538 | 64,666 | 64,356 | 160,736 | 143,335 | 145,843 | 226,921 |
| Min | 2,296 | 0 | 0 | 4,662 | 0 | 3,216 | 3,758 | 0 | 334 |
| Max | 307,285 | 230,400 | 306,666 | 328,300 | 360,832 | 588,497 | 974,834 | 988,160 | 1,452,604 |
| Kurtosis | 7.03 | 11.60 | 9.45 | 4.05 | 9.37 | 3.93 | 9.53 | 7.62 | 8.94 |
| Skewness | 1.88 | 2.62 | 2.36 | 1.18 | 2.39 | 1.43 | 2.17 | 1.77 | 2.17 |
| Median | 38,135 | 23,040 | 27,366 | 72,376 | 39,014 | 77,601 | 146,449 | 122,880 | 162,930 |
| Obs. | 1,686 | 3,141 | 1,935 | 250 | 143 | 48 | 1,052 | 481 | 402 |
| *Province 8* | | | | | | | | | |
| Mean | 30,410 | 24,828 | 29,752 | 63,656 | 40,312 | 29,770 | 135,927 | 120,581 | 203,050 |
| SD | 24,910 | 26,090 | 34,762 | 44,594 | 36,489 | 38,089 | 104,587 | 108,834 | 169,671 |
| Min | 2,296 | 0 | 0 | 8,265 | 2,227 | 2,837 | 7,883 | 0 | 10,512 |
| Max | 154,702 | 187,649 | 274,019 | 166,887 | 154,061 | 156,703 | 646,357.6 | 1,017,472 | 813,093 |
| Kurtosis | 7.13 | 12.47 | 14.47 | 2.32 | 5.71 | 1 | 6.11 | 5.28 | 4.84 |
| Skewness | 1.84 | 2.78 | 2.98 | 0.73 | 1.72 | 0 | 1.58 | 1.21 | 1.37 |
| Median | 23,837 | 16,000 | 18,550.71 | 49,801 | 27,648 | 29,770 | 110,676 | 101,747 | 140,047 |
| Obs. | 1,844 | 2,075 | 1,540 | 56 | 23 | 2 | 378 | 95 | 98 |
| *Province 9* | | | | | | | | | |
| Mean | 41,964 | 23,427 | 25,777 | 76,779 | 11,469 | 37,776 | 164,174 | 159,769 | 143,576 |
| SD | 52,122 | 31,694 | 30,109 | 60,256 | 3,285 | 36,100 | 159,548 | 154,549 | 107,997 |
| Min | 0 | 0 | 0 | 7,064 | 7,680 | 9,305 | 3,179 | 0 | 22,002 |
| Max | 363,463 | 217,600 | 211,358 | 199,576 | 13,517 | 100,251 | 1,147,947 | 858,880 | 609,599 |
| Kurtosis | 11.19 | 14.02 | 12.19 | 2.39 | 1.5 | 2.95 | 17.83 | 8.36 | 8.33 |
| Skewness | 2.64 | 3.12 | 2.81 | 0.72 | -0.70 | 1.26 | 3.32 | 2.11 | 2.06 |
| Median | 21,282 | 12,288 | 15,576 | 65,918 | 13,210 | 23,927 | 124,327 | 113,600 | 105,591 |
| Obs. | 2,310 | 2,870 | 1,809 | 14 | 3 | 5 | 184 | 86 | 63 |

*Notes:* All amount are reported in 2005 South African Rand. Due to limited sample size, Asians, Indians and other minorities have been excluded.

Table 3: The effect of group income dispersion on the household consumption of conspicuous goods and services

| Variables | Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *Social group variables* | | | | | | | | |
| Black | 0.56*** | 0.09 | 0.13 | 0.57*** | 0.59*** | 0.09 | 0.09 | 0.12 |
| | (0.04) | (0.09) | (0.08) | (0.04) | (0.04) | (0.09) | (0.09) | (0.09) |
| Coloured | 0.37*** | 0.04 | 0.06 | 0.38*** | 0.39*** | 0.03 | 0.03 | 0.05 |
| | (0.04) | (0.07) | (0.06) | (0.04) | (0.04) | (0.07) | (0.07) | (0.07) |
| *Moments of the income distribution* | | | | | | | | |
| $Inc^{\mu}_{k,t}$ | | -0.30*** | | | | -0.13 | -0.32*** | -0.30*** |
| | | (0.05) | | | | (0.09) | (0.05) | (0.05) |
| $ln(Inc^{\sigma}_{k,t})$ | | | -0.30*** | | | -0.18* | | |
| | | | (0.05) | | | (0.09) | | |
| $Inc^{\upsilon}_{k,t}$ | | | | -0.05 | | | -0.16* | |
| | | | | (0.08) | | | (0.08) | |
| $Inc^{\gamma}_{k,t}$ | | | | | -0.75** | | | -0.76** |
| | | | | | (0.28) | | | (0.28) |
| *Household controls* | | | | | | | | |
| Household income | 1.32*** | 1.34*** | 1.34*** | 1.32*** | 1.32*** | 1.34*** | 1.34*** | 1.34*** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Year1995 | -0.21*** | -0.19*** | -0.22*** | -0.22*** | -0.24*** | -0.21*** | -0.21*** | -0.21*** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Year2000 | 0.24*** | 0.18*** | 0.17*** | 0.24*** | 0.23*** | 0.17*** | 0.17*** | 0.17*** |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Age | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** | -0.03*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| $Age^2$ | 0.0002*** | 0.0002*** | 0.0002*** | 0.0002*** | 0.0002*** | 0.0002*** | 0.0002*** | 0.0002*** |
| | (0.00002) | (0.00002) | (0.00002) | (0.00002) | (0.00002) | (0.00002) | (0.00002) | (0.00002) |
| Family size (various dummies) | (+)*** | (+)*** | (+)*** | (+)*** | (+)*** | (+)*** | (+)*** | (+)*** |
| Area type (urban) | -0.01 | 0.03 | 0.01 | -0.01 | -0.02 | 0.02 | 0.02 | 0.02 |
| | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) | (0.02) |
| Education>10 years | -0.08** | -0.08** | -0.08** | -0.08** | -0.07** | -0.08** | -0.08** | -0.08** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| Education (university degree) | -0.10* | -0.11* | -0.10* | -0.10* | -0.09+ | -0.10* | -0.10* | -0.10* |
| | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) | (0.05) |
| Constant | -5.41*** | -2.04*** | -2.04*** | -5.34*** | -5.02*** | -1.83** | -1.67** | -1.65** |
| | (0.22) | (0.59) | (0.58) | (0.24) | (0.27) | (0.61) | (0.64) | (0.63) |
| Prob>F | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $R^2$ (centered) | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Obs. | 72163 | 72163 | 72163 | 72163 | 72163 | 72163 | 72163 | 72163 |

*Notes:* The regressions use the full sample described in Table 1 in Kaus (2013). Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *, +) Significant at the 0.1% (1%, 5%, 10%) level.

Table 4: The interaction of income dispersion and group income

| Variables | Specifications | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *Social group variables* | | | | |
| Black | 0.755*** | 0.103 | 0.778*** | 0.129 |
| | (0.0543) | (0.0897) | (0.0546) | (0.0878) |
| Coloured | 0.521*** | 0.0470 | 0.538*** | 0.0711 |
| | (0.0452) | (0.0674) | (0.0453) | (0.0656) |
| *Moments of the income distribution* | | | | |
| $Inc^{\mu}_{k,t}$ | | -0.473*** | | -0.461*** |
| | | (0.0592) | | (0.0581) |
| *Interaction effects - partitioning approach* | | | | |
| $Inc^{\upsilon}_{k,t}$ * LOW | 0.152 | 0.0267 | | |
| | (0.0944) | (0.0951) | | |
| $Inc^{\upsilon}_{k,t}$ * HIGH | -0.308** | -0.491*** | | |
| | (0.109) | (0.109) | | |
| $Inc^{\gamma}_{k,t}$ * LOW | | | -0.118 | -0.0364 |
| | | | (0.338) | (0.335) |
| $Inc^{\gamma}_{k,t}$ * HIGH | | | -1.817*** | -1.932*** |
| | | | (0.351) | (0.352) |
| *Household controls* | | | | |
| Household Income | 1.459*** | 1.539*** | 1.457*** | 1.539*** |
| | (0.0350) | (0.0397) | (0.0349) | (0.0399) |
| Year1995 | -0.213*** | -0.195*** | -0.236*** | -0.203*** |
| | (0.0282) | (0.0276) | (0.0289) | (0.0279) |
| Year2000 | 0.271*** | 0.183*** | 0.266*** | 0.183*** |
| | (0.0211) | (0.0216) | (0.0212) | (0.0216) |
| Age | -0.0265*** | -0.0256*** | -0.0264*** | -0.0256*** |
| | (0.00238) | (0.00240) | (0.00238) | (0.00241) |
| $Age^2$ | 0.000153*** | 0.000142*** | 0.000153*** | 0.000142*** |
| | (0.0000224) | (0.0000226) | (0.0000224) | (0.0000227) |
| Family size (various dummies) | (+)*** | (+)*** | (+)*** | (+)*** |
| Area type (urban) | -0.0234 | 0.0133 | -0.0342+ | 0.00944 |
| | (0.0203) | (0.0201) | (0.0205) | (0.0201) |
| Education>10 years | -0.0948*** | -0.108*** | -0.0919*** | -0.108*** |
| | (0.0276) | (0.0282) | (0.0276) | (0.0283) |
| Education (university degree) | -0.144** | -0.162** | -0.136** | -0.158** |
| | (0.0495) | (0.0505) | (0.0494) | (0.0503) |
| Constant | -6.750*** | -1.851** | -6.185*** | -1.592** |
| | (0.401) | (0.631) | (0.407) | (0.616) |
| Dummy LOW | -0.260* | -0.238+ | -0.597** | -0.607** |
| | (0.127) | (0.127) | (0.194) | (0.194) |
| Prob>F | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| $R^2$ (centered) | 0.491 | 0.490 | 0.491 | 0.490 |
| *Obs.* | 72163 | 72163 | 72163 | 72163 |

*Notes:* The regressions use the full sample described in Table 1 in Kaus (2013). Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *, +) Significant at the 0.1% (1%, 5%, 10%) level.

Table 5: The influence of local density measure and social group income dispersion (Gini cofficient) on visible spending

| Variables | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Specifications | | | | |
| *Social group variables* | | | | | |
| Black | 0.138 | 0.139 | 0.104 | 0.107 | 0.109 |
| | (0.0870) | (0.0879) | (0.0869) | (0.0872) | (0.0870) |
| Coloured | 0.0678 | 0.0758 | 0.0338 | 0.0434 | 0.0460 |
| | (0.0649) | (0.0663) | (0.0649) | (0.0651) | (0.0648) |
| *Moments of the income distribution* | | | | | |
| $Inc^{\mu}_{k,t}$ | -0.287*** | -0.543*** | -0.294*** | -0.407*** | -0.405*** |
| | (0.0508) | (0.0696) | (0.0519) | (0.0615) | (0.0613) |
| $Inc^{\gamma}_{k,t}$ | -0.683* | -0.314 | -0.714* | -0.586* | |
| | (0.281) | (0.293) | (0.283) | (0.288) | |
| $RLD_{k,t}$ | 2.309*** | | | | |
| | (0.344) | | | | |
| *Interaction effects - partitioning approach* | | | | | |
| $RLD_{k,t}$ * LOW | | -0.583 | | | |
| | | (0.467) | | | |
| $RLD_{k,t}$ * HIGH | | 9.353*** | | | |
| | | (1.899) | | | |
| $RLD_{k,t}$ * SMALL | | | 10.96*** | | |
| | | | (3.030) | | |
| $RLD_{k,t}$ * BIG | | | -0.000164 | | |
| | | | (0.000114) | | |
| $RLD_{k,t}$ * HIGH * SMALL | | | | 9.401** | 9.265** |
| | | | | (2.973) | (3.001) |
| $RLD_{k,t}$ * LOW * SMALL | | | | 14.55*** | 14.49*** |
| | | | | (3.902) | (3.909) |
| $RLD_{k,t}$ * LOW * BIG | | | | -0.000269* | -0.000257* |
| | | | | (0.000118) | (0.000118) |
| $RLD_{k,t}$ * HIGH * BIG | | | | 0.000511 | 0.000529 |
| | | | | (0.000399) | (0.000401) |
| $Inc^{\gamma}_{k,t}$ * SMALL | | | | | -0.148 |
| | | | | | (0.530) |
| $Inc^{\gamma}_{k,t}$ * BIG | | | | | -0.718* |
| | | | | | (0.292) |
| *Household controls* | | | | | |
| Household Income | 1.330*** | 1.616*** | 1.286*** | 1.426*** | 1.427*** |
| | (0.0214) | (0.0547) | (0.0218) | (0.0457) | (0.0458) |
| Year1995 | -0.219*** | -0.197*** | -0.218*** | -0.210*** | -0.210*** |
| | (0.0278) | (0.0280) | (0.0280) | (0.0281) | (0.0280) |
| Year2000 | 0.168*** | 0.182*** | 0.163*** | 0.173*** | 0.173*** |
| | (0.0210) | (0.0218) | (0.0208) | (0.0214) | (0.0214) |
| Age | -0.0259*** | -0.0252*** | -0.0245*** | -0.0241*** | -0.0241*** |
| | (0.00238) | (0.00242) | (0.00238) | (0.00238) | (0.00239) |
| $Age^2$ | 0.000142*** | 0.000140*** | 0.000132*** | 0.000128*** | 0.000129*** |
| | (0.0000224) | (0.0000228) | (0.0000224) | (0.0000224) | (0.0000225) |
| Family size (various dummies) | (+)*** | (+)*** | (+)*** | (+)*** | (+)*** |
| Area type (urban) | 0.0298 | 0.00289 | 0.0383* | 0.0265 | 0.0263 |
| | (0.0195) | (0.0208) | (0.0195) | (0.0202) | (0.0202) |
| Education>10 years | -0.0630* | -0.110*** | -0.0198 | -0.0454 | -0.0463 |
| | (0.0264) | (0.0296) | (0.0272) | (0.0290) | (0.0291) |
| Education (university degree) | -0.0665 | -0.146** | 0.0174 | -0.0261 | -0.0267 |
| | (0.0475) | (0.0518) | (0.0478) | (0.0499) | (0.0499) |
| Constant | -1.869** | -2.556*** | -1.229* | -1.424* | -1.386* |
| | (0.624) | (0.639) | (0.626) | (0.630) | (0.635) |
| Dummy LOW | | 0.641*** | | | |
| | | (0.100) | | | |
| Dummy SMALL | | | -0.308*** | -0.280*** | -0.557* |
| | | | (0.0388) | (0.0407) | (0.250) |
| Dummy HIGH | | | | -0.210*** | -0.212*** |
| | | | | (0.0536) | (0.0538) |
| Prob>F | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| *Obs.* | 72136 | 72136 | 72136 | 72136 | 72136 |
| $R^2$ (centered) | 0.497 | 0.485 | 0.499 | 0.497 | 0.497 |

*Notes:* The regressions use the full sample described in Kaus (2013). Columns 1 to 5 successively disaggregate the effect of group income dispersion on the household consumption of conspicuous goods and services among above and below group average income households and small and big groups of similar household income. Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *, +) Significant at the 0.1% (1%, 5%, 10%) level.

Table 6: The influence of local density measure and social group income dispersion(coefficient of variation) on visible spending

| Variables | Specifications | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| *Social group variables* | | | | | |
| Black | 0.111 | 0.128 | 0.0748 | 0.0837 | 0.0856 |
| | (0.0887) | (0.0896) | (0.0886) | (0.0888) | (0.0884) |
| Coloured | 0.0436 | 0.0676 | 0.00946 | 0.0246 | 0.0268 |
| | (0.0665) | (0.0680) | (0.0663) | (0.0664) | (0.0661) |
| *Moments of the income distribution* | | | | | |
| $Inc^{\mu}_{k,t}$ | -0.301*** | -0.548*** | -0.307*** | -0.420*** | -0.417*** |
| | (0.0523) | (0.0693) | (0.0530) | (0.0619) | (0.0614) |
| $Inc^{v}_{k,t}$ | -0.150 | -0.0235 | -0.143 | -0.104 | |
| | (0.0822) | (0.0871) | (0.0834) | (0.0844) | |
| $RLD_{k,t}$ | 2.350*** | | | | |
| | (0.343) | | | | |
| *Interaction effects - partitioning approach* | | | | | |
| $RLD_{k,t}$ * LOW | | -0.590 | | | |
| | | (0.469) | | | |
| $RLD_{k,t}$ * HIGH | | 9.539*** | | | |
| | | (1.916) | | | |
| $RLD_{k,t}$ * SMALL | | | 10.86*** | | |
| | | | (3.027) | | |
| $RLD_{k,t}$ * BIG | | | -0.000147 | | |
| | | | (0.000115) | | |
| $RLD_{k,t}$ * HIGH * SMALL | | | | 9.249** | 9.184** |
| | | | | (2.973) | (2.990) |
| $RLD_{k,t}$ * LOW * SMALL | | | | 14.59*** | 14.50*** |
| | | | | (3.900) | (3.921) |
| $RLD_{k,t}$ * LOW * BIG | | | | -0.000258* | -0.000241* |
| | | | | (0.000119) | (0.000118) |
| $RLD_{k,t}$ * HIGH * BIG | | | | 0.000588 | 0.000616 |
| | | | | (0.000397) | (0.000400) |
| $Inc^{v}_{k,t}$ * SMALL | | | | | -0.00524 |
| | | | | | (0.152) |
| $Inc^{v}_{k,t}$ * BIG | | | | | -0.136 |
| | | | | | (0.0862) |
| *Household controls* | | | | | |
| Household Income | 1.332*** | 1.620*** | 1.288*** | 1.432*** | 1.431*** |
| | (0.0214) | (0.0548) | (0.0218) | (0.0455) | (0.0455) |
| Year1995 | -0.212*** | -0.189*** | -0.210*** | -0.201*** | -0.202*** |
| | (0.0275) | (0.0277) | (0.0277) | (0.0278) | (0.0278) |
| Year2000 | 0.169*** | 0.184*** | 0.163*** | 0.174*** | 0.174*** |
| | (0.0211) | (0.0219) | (0.0210) | (0.0215) | (0.0215) |
| Age | -0.0260*** | -0.0252*** | -0.0246*** | -0.0241*** | -0.0242*** |
| | (0.00238) | (0.00242) | (0.00238) | (0.00238) | (0.00239) |
| $Age^2$ | 0.000143*** | 0.000140*** | 0.000133*** | 0.000129*** | 0.000129*** |
| | (0.0000224) | (0.0000228) | (0.0000224) | (0.0000224) | (0.0000225) |
| Family size (various dummies) | (+)*** | (+)*** | (+)*** | (+)*** | (+)*** |
| Area type (urban) | 0.0322 | 0.00584 | 0.0414* | 0.0291 | 0.0291 |
| | (0.0196) | (0.0209) | (0.0196) | (0.0203) | (0.0203) |
| Education>10 years | -0.0639* | -0.111*** | -0.0213 | -0.0474 | -0.0477 |
| | (0.0264) | (0.0296) | (0.0272) | (0.0290) | (0.0290) |
| Education (university degree) | -0.0699 | -0.149** | 0.0127 | -0.0313 | -0.0310 |
| | (0.0475) | (0.0518) | (0.0477) | (0.0498) | (0.0498) |
| Constant | -1.882** | -2.670*** | -1.280* | -1.499* | -1.488* |
| | (0.634) | (0.651) | (0.635) | (0.638) | (0.640) |
| Dummy LOW | | 0.649*** | | | |
| | | (0.101) | | | |
| Dummy SMALL | | | -0.307*** | -0.277*** | -0.416** |
| | | | (0.0388) | (0.0407) | (0.159) |
| Dummy HIGH | | | | -0.217*** | -0.218*** |
| | | | | (0.0532) | (0.0535) |
| Prob>F | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| *Obs.* | 72136 | 72136 | 72136 | 72136 | 72136 |
| $R^2$ (centered) | 0.497 | 0.485 | 0.499 | 0.496 | 0.496 |

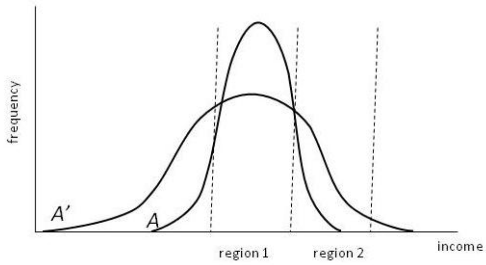
*Notes:* The regressions use the full sample described in Kaus (2013). Columns 1 to 5 successively disaggregate the effect of group income dispersion on the household consumption of conspicuous goods and services among above and below group average income households and small and big groups of similar household income. Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *, +) Significant at the 0.1% (1%, 5%, 10%) level.

Table 7: Disaggregating the effect of group income dispersion on the household consumption of conspicuous goods and services

| Variables | Specifications | | | |
|---|---|---|---|---|
| | (Clothing) | (Footwear) | (Cars) | (Jewelry) |
| *Moments of the income distribution* | | | | |
| $Inc^{\mu}_{k,t}$ | -0.812*** | -0.893*** | -0.011** | -0.252*** |
| | (0.106) | (0.118) | (0.004) | (0.065) |
| *interaction effects - partitioning approach* | | | | |
| $Inc^{\gamma}_{k,t}$ * LOW | -0.194 | -0.460 | -0.034 | -0.903* |
| | (0.608) | (0.638) | (0.047) | (0.391) |
| $Inc^{\gamma}_{k,t}$ * HIGH | -2.601*** | -4.709*** | -0.044+ | -1.116* |
| | (0.745) | (0.858) | (0.026) | (0.449) |
| *Household controls* | | | | |
| Household Income | 2.049*** | 1.802*** | 0.049*** | 0.829*** |
| | (0.0691) | (0.0800) | (0.007) | (0.049) |
| Year1995 | -0.765*** | -1.307*** | -0.011*** | -0.190*** |
| | (0.0489) | (0.0536) | (0.002) | (0.027) |
| Year2000 | -1.028*** | -0.856*** | -0.006* | -0.126*** |
| | (0.0475) | (0.0530) | (0.002) | (0.025) |
| Age | -0.0457*** | -0.0471*** | 0.0003 | -0.025*** |
| | (0.00450) | (0.00493) | (0.0003) | (0.003) |
| $Age^2$ | 0.000277*** | 0.000318*** | -4.79e-06 | 0.0002*** |
| | (0.0000424) | (0.0000458) | (0.0000) | (0.0003) |
| Family size (various dummies) | (+)*** | (+)*** | (+)*** | (+)*** |
| Area type (urban) | -0.177*** | -0.131** | -0.005* | -0.201*** |
| | (0.0410) | (0.0433) | (0.002) | (0.025) |
| Education>10 years | -0.318*** | -0.339*** | -0.003+ | -0.199*** |
| | (0.0488) | (0.0542) | (0.002) | (0.026) |
| Education (university degree) | -1.173*** | -1.221*** | 0.0005 | -0.297*** |
| | (0.185) | (0.183) | (0.004) | (0.046) |
| Dummy LOW | -0.672+ | -1.727*** | -0.003 | 0.006 |
| | (0.399) | (0.468) | (0.025) | (0.245) |
| Constant | -2.821** | 0.610 | | |
| | (1.034) | (1.172) | | |
| $R^2$ (centered) | 0.264 | 0.217 | | |
| Prob>F | 0.0000 | 0.0000 | | |
| *Obs.* | 54159 | 54159 | 54159 | 54159 |

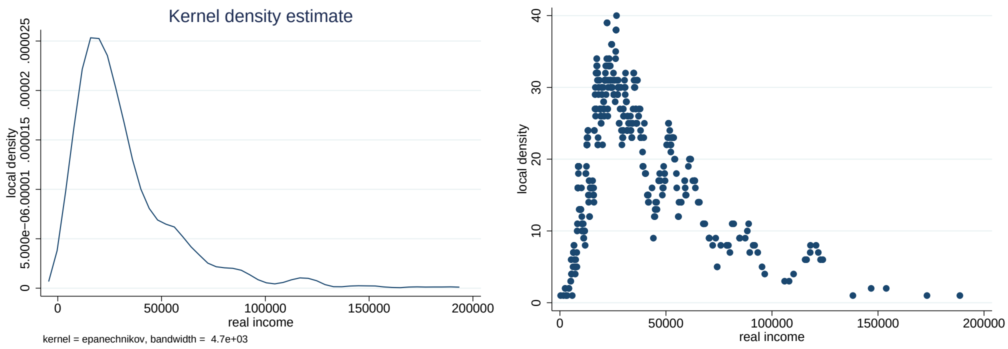
*Notes:* The regressions use the sample of the Black population described in Kaus (2013). Columns 1 to 4 disaggregate the dependent variable $ln(Vis_i)$. Each specification uses only one subcategory as the dependent variable. Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *, +) Significant at the 0.1% (1%, 5%, 10%) level.

Figure 1: Changes in the income distribution and local density



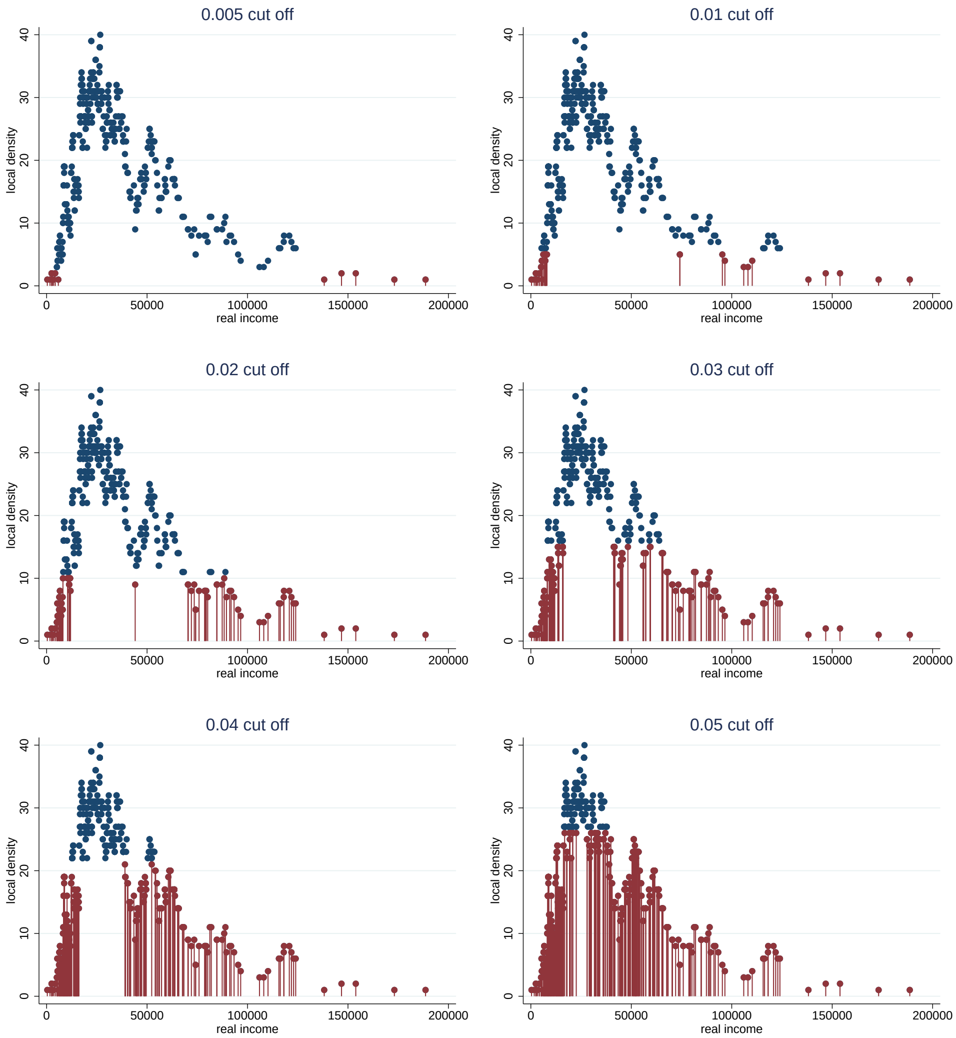

*Notes:* The figure illustrates how a mean preserving increase in the overall dispersion of income from $A$ to $A'$ has a non-homogenous effects on local density since local density falls in region 1 and rises in region 2.

Figure 2: The local density and the distribution of group income



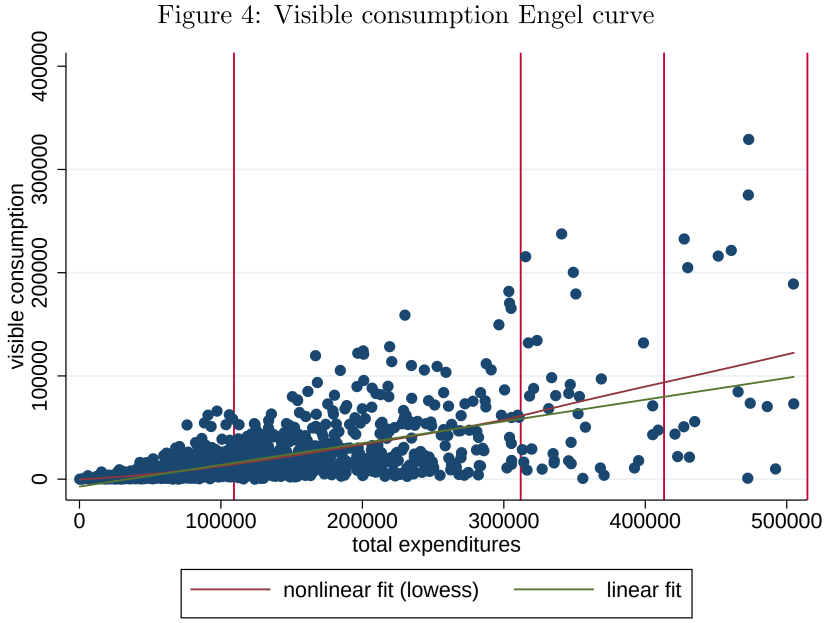

*Notes:* The left hand side chart depicts the kernel density distribution of household income of the Black population in 1995 within the Western Cape province. The right hand side chart displays a scatter plot of the corresponding local density variable. The resemblance of the charts illustrates the skewness of the household's income distribution on the one hand and the appropriateness of the newly introduced local density variable on the other hand. Note, however, that the local density plot relies on household level data, while the first plot expresses a meta statistic at the social group level. All amounts are given in 2005 South African Rand. The average exchange rate in 2005 was 6.36 South African Rand per U.S. Dollar (IMF, 2011).

Figure 3: Group size depending on the cut off point



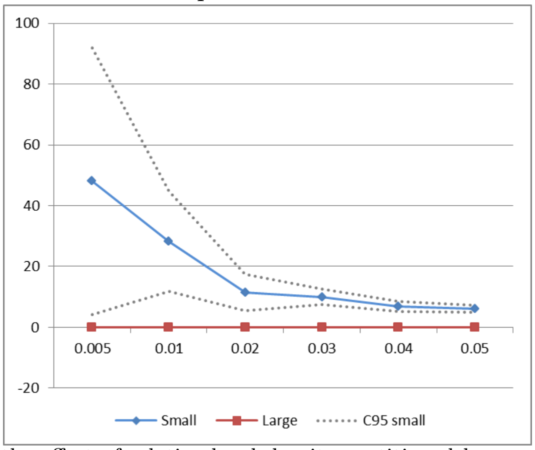

*Notes:* Each chart depicts a scatter plot of the local density variable of the Black population in 1995 within the Western Cape province. The charts vary with respect to cut off point. The red labeled observations signify households that belong to a comparatively small income neighborhood. Depending on the chosen cut off point, more or less households are signed as *small*. The local density variable counts the number of households within each household´s 5% income range. To create the relative neighborhood variable, local density is divided by the number of observations within the social group. The cut off point between small and large income neighborhoods determines which level of the relative neighborhood variable is perceived as being either small or large. The six charts above illustrates, that increasing (decreasing) the cut off point inevitable leads to a rising (decreasing) number of observations with a small income neighborhood. To properly capture the left *and* the right tail of the distribution, the cut off point should thus not be too high. All amounts are given in 2005 South African Rand. The average exchange rate in 2005 was 6.36 South African Rand per U.S. Dollar (IMF, 2011).

Figure 4: Visible consumption Engel curve




*Notes:* The chart depicts the linearly and non-parametrically fitted visible consumption Engel curve of White South Africans in the year 2000. The vertical lines mark the mean, mean plus 2 (3, 4) standard deviations as potential cut off points. Within the mean plus 2 standard deviation range, the nonparametric fit seems to sufficiently resemble the linear fit. Beyond that point, higher powers of the explanatory variable can visibly already be judged to superbly describe the shape of the curve. A convex shape results. RESET tests on the model, using each of the different cut off points (mean plus 2, 3, 4 SDs), reject the null hypothesis that the model has no omitted variables. A nonlinear and convex fit is thus supported in all cases. All amounts are given in 2005 South African Rand. The average exchange rate in 2005 was 6.36 South African Rand per U.S. Dollar (IMF, 2011).

Figure 5: Effect of relative local density partitioned by small and large income neighborhoods conditional on the choice of the cut off point




*Notes:* The chart depicts the effect of relative local density partitioned by small and large income neighborhoods as estimated in specification (2) in Tables 5 and 6. The dotted lined depict the 95% confidence interval for small income neighborhoods. The estimate, however, varies with the choice of the cut off point, which vary on the x-axis. Although the magnitude changes, the effects are consistent. While in small groups significant positive effects are observable, relative local density is insignificant in larger neighborhoods. With a very low cut off point, the number of households that have small income neighborhoods is comparatively small. The strong effects are thus due to a minority of observations and furthermore accompanied by a large confidence range. An intermediate cut off point, i.e. 0.02 (as chosen in our regressions), includes a reasonable number of observations (18,683) and shows much tighter confidence bands.