Conspicuous Spending and the Income Distribution of Social Groups

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Abstract

Using South African household expenditure data, we analyze how the spending of a household on visible goods, such as jewellery and clothes, depends on the distribution of income within its social group. We find that this spending is positively correlated with the share of peers who possess a similar income level to the household, what we dub the 'local income share'. Moreover, we find that the spending of a household on visible goods is positively correlated with the average income of peers that are poorer than this household. We interpret this as evidence for cascade effects through which income changes among the poorest in the social group can trigger adjustments in the visible spending patterns of the wealthy. In line with previous research (Charles et al., 2009), we also find that visible spending of a household is negatively correlated with the average income of its reference group. We present a simple model of status competition based on Hopkins and Kornienko (2004) that synthesizes these effects and can account for our results.

Keywords: Conspicuous consumption, Status, Income distribution, Cascade effects

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1 Introduction

As people become more affluent, they tend to spend more on visible goods, such as clothing, jewellery and automobiles (Charles et al., 2009; Heffetz, 2011; Grier et al., 2015). A question of perennial interest is to what extent this behavior is driven by individual preferences alone or is fostered by intensifying status competition among increasingly affluent households (Frank, 1985; Becker, Murphy and Wening, 2005; Arrow and Dasgupta, 2009; Frijters and Leigh, 2008). While many studies have analyzed the relationship between visible spending and household income, only a few have examined how the affluence of social groups may also foster greater visible spending by households. A notable finding here is that, for a given level of (permanent) income, the visible spending of a household is negatively correlated with the mean income of its social group (Charles et al., 2009; Kaus, 2013). This finding suggests that belonging to a wealthier social group can be a substitute for visible spending as households in wealthy groups tend to spend relatively less on visible goods.

If a social group's mean income level influences household spending on visible goods, this begs the question of whether higher moments of the group's income distribution may also influence household spending on visible goods. This question has so far only been addressed using traditional index measures like the Gini coefficient or the coefficient of variation to account for the level of inequality (Charles et al., 2009; Brown et al., 2011). These studies have found that the income distribution has a relatively small effect on visible spending. Other studies have started to shed light on important issues such as the extent to which different goods and services are visible to peers (Solnick and Hemenway, 2005), how the visibility of goods affects income elasticities (Heffetz, 2011; Roth, 2014), how geographical proximity plays a role in visible spending (Grinblatt et al., 2008) and how household spending on visible goods is affected by business cycles (Kamakura and Du, 2012).

We argue that there are important theoretical reasons for why the impact of the income distribution of social groups on visible spending cannot be fully captured using index measures, such as the Gini coefficient, that map the whole income distribution into a single index number. Rather, it is vital to employ 'local', income level dependent measures like the density of the income distribution around individual households. The fundamental reason for why the incomes of others matter for visible spending is that households may wish to signal their private wealth to others. Many argued that households care about their perceived relative position or rank in their reference group (Hopkins and Kornienko, 2004; Frank, 1985; Bilancini and Boncinelli, 2008, 2012). Studies of subjective well-being show that individuals tend to gain psychological satisfaction from being better off than others and feel uneasy when they see others doing better(Clark et al., 2008). The incentive to spend more on visible goods thus depends on the payoff the household stands to gain in terms of a rise in its social standing, i.e. on the increase in its perceived relative rank within the social group. As this gain is larger if there are relatively more peer households with similar income and spending levels that can be overtaken, the visible spending of a household should positively depend on the fraction of peers who possess a similar income level. Imagine a race where prizes in the form of social status are allocated to the competitors according to their relative finishing positions. When the better competitors are much better (i.e. richer) and the worse ones are much worse (i.e. poorer), there is no incentive for a competitor to race fast (i.e. to spend a lot on visible goods) as she is unlikely to overtake better competitors or to be overtaken by worse competitors. However, when there exist many competitors with similar abilities, a competitor has a greater incentive to race faster as this could potentially lead to a larger increase in her finishing position. As a consequence of this mechanism, discussed in Frank (1985); Robson (1992); Hopkins and Kornienko (2009), we conjecture that the level of visible spending of a household should positively depend on the fraction of peers who possess a similar income level. As a change in the level of income inequality has heterogeneous effects on this fraction of peers across different income levels, it is not possible to account for this mechanism by using global measures of income inequality, such as the Gini coefficient.

We therefore devise a new micro-orientated empirical approach to shed more light on the relationship between household visible spending and the distribution of social group income. We define 'local income share' as the share of social group peers that possess the same level of income (within a range of +/- 2.5 per cent) to a given household. We then proceed to explore how this share influences household spending on visible goods. Our results show that this local income share has a positive and significant effect on conspicuous consumption and performs much better than the Gini coefficient (Brown et al., 2011). This indicates that the mechanism identified above might be an important driver of conspicuous spending.[1] In our analysis, we assume that the relevant reference groups are given by the peers of the same ethnicity (Black, Coloured, or White) living in the same province in the same year. This approach is consistent with previous studies (Charles et al., 2009; Kaus, 2013), as well as empirical evidence suggesting that in South Africa ethnic group affiliation plays an important role in society, influencing attitudes towards marriage partners (Kenyon, 2015), subjective well-being (von Fintel, 2015) and trust (Posel and Hinks, 2013). The results are also robust when we instead assume that the relevant reference groups are defined at a more disaggregated district level.

We further introduce a rank-based model of status competition in order to analyze in more detail how the distribution of social group income affects visible spending. Here we use a simplified version of the model of Hopkins and Kornienko (2004) which allows for closed-form solutions. We show that an increase in the local income share tends to increase status spending in this setting. Furthermore, the model predicts that the status spending of a household positively depends on the average income of the households that are poorer than a given household. In other words, there are 'cascade effects' in the sense that changes in the incomes of low income households trigger richer households within the group to adjust their spending on visible goods. In particular, an increase in the average income of poorer households increases their spending on status goods, pushing richer households to also spend more on these goods in order to keep their perceived rank in the income distribution. Our extended empirical analysis supports this prediction. It shows that the visible spending of a household is positively correlated with the average

[1] There may, however, be alternative, non-signalling reasons explaining why visible spending increases in the local income share, such as consumption externalities and network effects (Katz and Shapiro, 1985).

income of households poorer than this household. In a final step, we modify the model to express household visible spending as a function of both local income share and the average income of the poorer households outside the bandwidth used to derive the local income share. Consistent with the model predictions, we find that both the local share variable and the average income variable (capturing the cascade effect) positively affect visible spending in our data.

Consistent with previous studies (Charles et al., 2009; Kaus, 2013), we also find that the average income of a social group has a negative effect on visible spending, even if we control for the new local income distribution measures. We explain how this effect can be accounted for within our model setup if we assume that households not only care about their perceived relative standing within their group, but also about the perceptions of outsiders who only observe their group affiliation. These results ultimately suggest that visible spending is not only influenced by the household's relative position within its social group, but also by the social group's relative position within broader society.

This paper is structured as follows. Section 2 discusses our contribution with respect to the recent literature. Section 3 discusses the data and the new empirical approach. Section 4 reports the results on how the local income share is correlated with visible spending. Section 5 presents the model of conspicuous behavior that is subsequently tested in Section 6. Section 7 provides a discussion of the results and concludes.

2 Background

In this section, we explain in more detail how our results relate to the existing literature. In terms of measuring income inequality, previous studies of conspicuous behavior have used a range of index measures to capture the changes in the distribution of income, including: the Gini coefficient, the coefficient of variation, the skewness, and the kurtosis (Charles et al., 2009; Brown et al., 2011; Jin et al., 2011). In particular, Brown et al. (2011) have found some evidence for a positive correlation between the dispersion of income and conspicuous spending in rural Chinese villages. Among the poorest 25 per cent of households, they find that spending on visible goods (in their case funeral and wedding expenses) is positively correlated with the kurtosis of the (per capita) income distribution. The authors conclude that the rank-based model of status consumption is only useful for describing the poorest segment of society, while the behavior of richer income groups may be guided by other motives (Brown et al., 2011, p. 146).[2]

There are potential drawbacks to using index measures to examine how changes in the income distribution affect visible spending. When employing different index measures, it should be noted that skewness and kurtosis as analyzed in (Brown et al., 2011) do not precisely capture the same effect as the second order moment. Both skewness and kurtosis are non-dimensional in nature in that their values purely describe the shape of the distribution (Press et al., 1992). As a result, the standard deviation of these estimates tend to be quite large. Therefore, an accurate measure of skewness and kurtosis requires a large sample size, which is usually not available in studies of visible spending.[3]

The most important drawback to using index measures is, however, that they do not directly address the main conjecture (described above) that household spending on visible goods is a positive function of the share of peers with a similar income level. Although this local income share variable is related to the income distribution of the group, it is not exactly the same thing. To illustrate, consider a mean-preserving redistribution of income that increases the dispersion of income, as illustrated in Figure 1 by a change from Y to Y'. This income redistribution leads to a reduction in the density of households in dense regions (from A to B, e.g., close to the mean), but to an increase in the density of households in regions close to the tails of the distribution (e.g., from C to D). If visible spending increases with a rise in the share of peers who possess a similar income level, such an increase in inequality would therefore increase visible spending among households in tail regions, but reduce it for households with incomes close to the mean. Such nuances cannot be captured by regressing index measures of income inequality on visible spending. As there are many different possible redistributions through which overall income inequality can increase, there is no *a priori* reason to assume that all of

[2]An interaction term combining the effects of kurtosis and skewness was also found to have a significantly positive effect on conspicuous spending among the bottom 25 per cent, as well as the top 25 per cent of households.

[3]the sample size in Brown et al. (2011) ranges from 129 to 346.

these redistributions would affect the number of peers within a particular region in the same way.

FIGURE 1 ABOUT HERE

In terms of how the income distribution tends to change in the process of economic growth, it has been observed that when poor economies start to develop, a small segment of individuals usually become (very) wealthy, while the income of the others initially remains relatively stable (Chotikapanich et al., 2012). This implies that the skewness of the distribution increases. Such a pattern can also be observed in the US data studied by Charles et al. (2009, see Figure 2, p. 444), and in most (but not all) of the social group income distributions featured in the South African data (see Table 1). According to the main conjecture, such an increase in both total income and income inequality would reduce status competition and visible spending among the poor households, and increase it at higher income levels at which the local income share rises (note that such a rise might only occur at very large income levels, but not at intermediate ones). Moreover, as the rich get richer, they might also simply increase their status spending independently of signalling considerations since Charles et al. (2009); Heffetz (2011) find that visible goods are luxury goods. Whether or not total status spending across household increases or decreases as income inequality grows is therefore unclear. In this regard, our study seeks to develop a better understanding of the manner in which household spending on visible goods evolve across the income distribution as income inequality grows. Such an understanding is important as conspicuous consumption is thought to inhibit the accumulation of household savings among low income households in developing economies (Moav and Neeman, 2012). It can also help inform the ongoing debate about proposals to tax conspicuous spending (Frank, 1985; Robson, 1992; Hopkins and Kornienko, 2009).

3 Data and Empirical Approach

The data is sourced 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. 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). Because of that, the 1995 and 2000 income and expenditure items were recategorized according to 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 be corrected for the values of imputed rent to ensure that we 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 is some doubt about whether the IES sample of 2000 is representative of the South African 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 the corresponding population shares reported in the 2001 census, as suggested by Özler (2007).

For the purpose of this study, the social group is defined by social affiliation at the provincial level. This method follows previous studies which have also defined social groups by region and social affiliation (Charles et al., 2009; Kaus, 2013). This approach is also justified in the South African case as much evidence suggests that social affiliation is an important factor in a range of social interactions, such as the labour market, the education system and the housing market (Moodley and Adam, 2000). Descriptive statistics about the social group incomes derived with this method can be found in Table 3. Black households have an average income that is around half of the population's average income, while the average income of Coloured households roughly corresponds to the average national income. On the other hand, White households have an average household income that is three times higher than the national average. Summary statistics also show large differences in education levels. While most of the Black and Coloured household heads did not finish secondary school, this is not the case for White households. The average household size of White households is also slightly smaller (three members) than that of Black and Coloured households (four members).

Figure 2 and Table 1 provide a snapshot of how the income distribution varies across both social groups as well as three selected provinces (there are 9 provinces in total). Table 2 reports on visible spending patterns across social groups. Consistent with other studies, our data reveal a high degree of income inequality across groups (van der Berg et al., 2008). Moreover, it appears that this income inequality across social groups grew during the observed time period. For example, while Blacks in the Western Cape (Province 1) appeared to suffer marginal reductions in average income between 1995 and 2005, Whites appeared to experience a 30 per cent increase in average household income. This pattern is generally consistent with the observation that income inequality tends to grow via a small group segment of individuals becoming rich, while the income of others remains relatively stable (Chotikapanich et al., 2012). There is also considerable variation in the regional dimension. For example, the average income of households in the Free state (Province 4) are consistently lower than those of households in the Western Cape (Province 1), irrespective of social group affiliation. The average provincial population size is about 5.7 million, with the smallest population being 1.1 million (Northern Cape) and the largest population being 12.2 million (Gauteng). The population density within these provinces ranges from 675 persons per square kilometre (Gauteng) to 3.1 per square kilometre (Northern Cape) (StatsSA, 2009).

Consistent with previous studies, visible spending is defined as the sum of all household expenditures on personal care, clothing and footwear, jewellery, and cars (Charles et al., 2009; Kaus, 2013). Recent studies by Heffetz (2011) and Roth (2014) confirmed that these goods are considered to be highly visible among US and Indonesian households.[4] As can be seen in Table 2, average visible spending for each social group appears to reflect its income level. As a share of total expenditure, it is interesting to note that visible spending among Coloureds (on average 11.9 per cent of total expenditure) is lower

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

than that of both Blacks (12.9 per cent) and Whites (12.1 per cent). While differences in average visible spending across these social groups are statistically significant, Kaus (2013) shows that the dummies for social group affiliation become statistically insignificant once the average income of social groups is taken into account. We seek to extend this model in the following section by considering the influence of local income share on visible spending.

* FIGURE 2, TABLE 1 AND TABLE 2 ABOUT HERE*

3.1 Local income share

We derive our measure of local income share in the following way: we count the number of households within a bandwidth b of income that belong to the same reference group k, province and time period (e.g. Black population in Western Cape province surveyed in 1995, see Table 1). We then define the local income share as this number divided by the total number of sample households in k and denote it by $LS_{i,k,t}$. This variable reports what percentage of the social group is located within b.[5]

In terms of k, it is worth noting that there are 9 provinces in South Africa with population size ranging from 1,145,861 people (Northern Cape) to 12,272,263 people (Guateng). As it is not clear whether the relevant reference groups of households are indeed as large as these provinces, we also dissaggregate the data to the district level and explore whether our results also hold on the district level. There are 52 districts in South Africa with population sizes ranging from 74,247 people (Central Karoo District Municipality in the Western Cape) to 12,272,263 (Guateng in Johannesburg). This creates a total of 468 'regions' (52 Districts x 3 social groups x 3 years). In addition, we also use a second approach that splits the data into rural or urban groups within each province.[6] This creates 162 regions (9 provinces x 2 urban vs rural locations x 3 social groups x 3 years =162). In both cases, regions with less than 50 observations are excluded.

[5]The total number of sample households here refers to the sample of households observed in the IES, not the actual population.

[6]Note that for this second approach, we are essentially assuming that rural/urban household within the province belong to the same social group.

In terms of selecting an appropriate b, we choose to count all households that are within a 5 per cent income range of the household (i.e. +/-2.5 per cent). The choice of b is illustrated in Figure 3, which depicts the number of peers within the 5 per cent bandwidth for each particular income level. The left hand side figure depicts the kernel density distribution of household income of the Black population in 1995 within the Western Cape province. The right hand side figure displays a scatter plot of the corresponding local income share variable. Comparing the two shows that the choice of a 5 per cent range for b generates a $LS_{i,k,t}$ variable that accurately reflects the social group income distribution depicted on the left hand side. Both the kernel density and the local density variable have a similar shape in that they possess right skewed distributions and approximately the same mean. Larger values of b yield a less accurate reflection of the actual income distribution. Consequently, we judge the 5 per cent value to be a satisfactory value for b.

FIGURE 3 ABOUT HERE

We begin by introducing $LS_{i,k,t}$ into a basic model of social group visible spending featured in Charles et al. (2009); Kaus (2013). This regresses the log of the visible spending of household i, Vis_i, on social group dummies which indicate whether a household is 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. The demographic indicators include a set of dummies for education, the first is for whether the head of the household has more than ten years education and the second is for whether this includes a university degree. Dem_i includes area type, age, age squared, and family size.

$$ln(Vis_i) = \beta_0 + \beta_1 Bl_i + \beta_2 Col_i + \beta_3 ln(pInc_i) + \beta_4 \mathbf{Dem_i} + \beta_5 \mathbf{Yr_i} + \varepsilon_\mathbf{i}. \quad (1)$$

Permanent income is usually measured by total household expenditure. However, as pointed out by Charles et al. (2009) there exists a well-known endogeneity issue here as total expenditure is related to the sub-components of household expenditure, including visible spending[7] Measurement errors in these components may, moreover, translate into

[7] An additional endogeneity problem might arise due to the following channel: when status competition not only increases visible spending, but also motivates households to work harder and to enjoy less leisure

measurement errors in the composite. Hence, the log of total expenditure needs to be instrumented. In our study, we consider two approaches. In the first approach we used a vector of variables including a dummy for positive current income, log of current income, the level of current income, a cubic in the level of current income, as well as dummies for three different levels of education in order to instrument for the log of total expenditure. A potential criticism of this selection is that education may also directly influence the dependent variable (visible spending) as education could be considered a substitute for visible spending. For this reason we omitted the education variable from the vector of instruments. Using the critical values found in Sock and Yogo (2009) as a guide, the tests of the statistical validity of different sets of instruments showed that a specification with the log of current income is best suited as a single instrument for permanent income.

4 Results: local income share

Table 4 reports these results. Note that the log-log formulation of the regression equation allows us to interpret the coefficient γ as the (permanent) income elasticity of visible consumption expenditure. Along with permanent income and demographic variables, the baseline specification A features the Gini coefficient, $Gini_{k,t}$. It is negatively and significantly correlated with log visible spending at the $\alpha = 1\%$ level of significance. The negative and significant finding for $Gini_{k,t}$ is consistent with Charles et al. (2009) findings for White Americans and the findings of Brown et al. (2011) for the poorest 25 per cent in rural China.[8] Concerning the demographic control variables (results in the appendix), our results show that family size is positively correlated to visible spending. Education and age (of household head) were found to have a negative and significant correlation with visible spending. The negative relationship between visible spending and age is consistent with other studies that have found that visible spending tends to be higher among younger unmarried consumers in China who are seeking marriage partners (Grier et al., 2015).

time Arrow and Dasgupta (2009), household income might depend on consumption preferences. As we lack data on the number of hours that households work, we cannot directly address this issue. See also Manski (1993) for a further discussion of Endogenous Social effects.

[8]See also Jin et al. (2011) and Roychowdhury (2016).

We now introduce the local share measure to examine whether this variable better captures the relationship between visible spending and the income distribution of social groups. Specification B introduces the local income share ($LS_{i,k,t}$) and the average social group income ($Inc^{\mu}_{k,t}$). The negative and significant result for the latter is consistent with Charles et al. (2009) and (Kaus, 2013). $LS_{i,k,t}$ is positively correlated with log visible spending, which is significant at the $\alpha = 0.1\%$ level. This provides direct evidence for the notion that household visible spending tends to grow as the share of peers with a similar income level to a given household increases. It is worth noting here that there is a low correlation between $LS_{i,k,t}$ and $Inc^{\mu}_{k,t}$ (-0.0506).[9] These results suggest that $LS_{i,k,t}$ has an effect on log visible spending that is not captured by $Inc^{\mu}_{k,t}$.[10]

Specification C proceeds to verify how the exclusion of $Inc^{\mu}_{k,t}$ influences the significance of local density. It shows that Bl_i and Col_i are now significant, suggesting that there are major differences in visible spending levels across social groups if $Inc^{\mu}_{k,t}$ is ignored. Compared to C, the results in B highlight how the inclusion of $Inc^{\mu}_{k,t}$ can account for these observed differences across social income groups. These results are consistent with results found in Charles et al. (2009); Kaus (2013).

Specifications D and E examine to what extent the marginal effect of $LS_{i,k,t}$ on log visible spending depends on the levels of $LS_{i,k,t}$. To check this, Specifications D and E indicate that the effect of $LS_{i,k,t}$ on log visible spending is nonlinear and concave. The negative and significant parameter estimate for $LS^2_{i,k,t}$ suggests that while the effect of $LS_{i,k,t}$ is positive, the magnitude of this effect diminishes as $LS_{i,k,t}$ increases. [11]

Specifications F and G then introduce the Gini coefficient alongside $LS_{i,k,t}$. In the case of F, the Gini is still marginally significant if the impact of $LS_{i,k,t}$ on log visible spending is assumed to be linear. However, the Gini becomes insignificant if the nonlinear impact of $LS_{i,k,t}$ of visible spending is specified (see results in G). The fact that the Gini

[9] This low correlation is chiefly because $LS_{i,k,t}$ is defined at a household level, while $Inc^{\mu}_{k,t}$ is defined at the k group level.

[10] The results for local income share have recently been verified in another study of conspicuous spending in rural India by Roychowdhury (2016).

[11] In particular, using results from D, the derivative of visible spending with respect to $LS_{i,k,t}$ is given by $d(vis_i)/d(LS_{k,t}) = (-117.8 * LS_{k,t} + 8.233)e^{LS_{k,t}*(8.233-58.94*LS_{k,t})}$. At the maximum value of $LS_{k,t} = 0.035$, this marginal effect is positive.

coefficient is insignificant in G suggests that the combined effect of $LS_{i,k,t}$ and $LS^2_{i,k,t}$ better captures how changes in the income distribution impact visible spending than this coefficient. This is evidence that, relative to index measures, the local income share approach provides a better way of empirically studying the manner in which the social group income distribution influences household visible spending.

TABLE 4 ABOUT HERE

Next we examine whether the relationship between $LS_{i,k,t}$ and visible spending holds at a more disaggregated level of analysis. In order to ensure these results are robust we use two different aggregation levels. First, Table 5 present the district level results. Specifically, rather than using provinces to define $LS_{i,k,t}$, we switch to using districts. The correlation coefficient between the value of $LS_{i,k,t}$ defined on the province and district level is 0.5638. For $LS^2_{i,k,t}$, the same correlation coefficient is 0.3738. These values suggest there is sufficient variation between the district level and the province level to proceed with the robustness test. Note that the number of observations declines from 72,136 to 48,040 as districts with less than 50 observations were dropped from the sample. Specification H introduces the district level $LS_{i,k,t}$ which is found to have a positive and significant impact on visible spending. I introduces average group income which has a negative and significant impact.[12] This is consistent with previous results reported in B on the provincial level. J introduces $LS^2_{i,k,t}$ that was also found to be negative and significant, which is also consistent with provincial level results (see E in Table 4). One difference between the province and district level results is evident in I where the Gini coefficient coefficient remains negative and significant, even when controlling for both $LS_{i,k,t}$ and $LS^2_{i,k,t}$. A second approach uses information on whether the households are located in rural or urban areas to disaggregate the data. Table 6 reports the results. In terms of our main results, these show that $LS_{i,k,t}$ is consistently found to be positive and significantly correlated with household visible spending across urban subgroups and rural subgroups within the provinces.

[12] Note that $Inc^{\mu}_{k,t}$ was kept at the provincial level in order to make the parameter estimates comparable between specification H in Table 5 and B in Table 4. Similar results were found when $Inc^{\mu}_{k,t}$ was defined at the district level.

TABLE 5 AND 6 ABOUT HERE

5 A simple model of status consumption

We now present a model in order to analyze the role of the income distribution on visible spending in more detail. The model allows us to analyze whether visible spending of a household not only depends on the local income share, but also on incomes of households with very different income levels (beyond b). This is a theoretical possibility since income bands among households within a social group are overlapping, so that changes in the income and visible spending of a household located outside of a considered income bandwidth might nevertheless trigger cascade effects that cause households within the bandwidth to adjust their visible spending levels. Contrary to the previous literature, which focused on the analysis of status races within given reference groups Hopkins and Kornienko (2004), we furthermore discuss the possibility that group affiliation can serve as an additional source of status. We argue that in such a case, the status race in one reference group can be affected by the relative wealth of this group in comparison to other groups. We furthermore argue that accounting for such interactions can explain the empirical findings of (Charles et al., 2009; Kaus, 2013).

In the following, the model setup is introduced:

The income z of households belonging to a reference group k is distributed with cumulative density $G_k(z)$ in the interval $[\underline{z}_k, \bar{z}_k]$ with $\underline{z}_k \geq 0$. $G_k(z)$ is assumed to be twice continuously differentiable and to have positive density $g_k(z)$ within the considered interval. Households allocate their incomes between a visible positional (status) good x and a non-positional good y. It is assumed that neither income nor the consumption of the non-positional good can be directly observed by other households, but that each household can observe which other households belong to the same reference group. Moreover, it is assumed that each household knows the shape of the income distribution $G_k(z)$. The exact position of another household within this distribution can, therefore, only be indirectly inferred from its level of status consumption. Households simultaneously choose their levels of status consumption and are assumed to care about their perceived rank in the income distribution of the reference group. There is consequently a game of incomplete information in which households strategically choose their status consumption, taking into account how it affects their perceived position in the income distribution of their reference group. A household's status S is assumed to be determined as follows:

$$S = \gamma F_k(x) + (1-\gamma) F_k^-(x) + \alpha_k \tag{2}$$

$F_k(x)$ is the probability mass (or cumulative density) of households with status consumption less than or equal to x within reference group k and $F_k^-(x)$ is the probability mass of households with status consumption strictly less than x in this group. Households therefore care about their rank in the distribution of status consumption withing the group. The more they spend on the visible goods relative to their peers, the more status they obtain. A lower value of the parameter $\gamma \in [0, 1)$ indicates that the status loss associated with having equal instead of strictly more status consumption than others is larger.[13] The parameter $\alpha_k > 0$ indicates a minimal status level that can differ across reference groups.

A household's utility is given by

$$U(x, y, S(x, F_k(\cdot))) = yS = y\left(\gamma F_k(x) + (1-\gamma) F_k^-(x) + \alpha_k\right) \tag{3}$$

Note that, unlike in the more general model of Hopkins and Kornienko (2004), we assume that households do not intrinsically value the consumption of visible goods and only value it as a signalling device that allows them to obtain status. Consequently, we only consider a special case of Hopkins and Kornienko (2004). This, however, has the advantage that it allows for closed form solutions for equilibrium behavior.[14] Denoting the price of the status good by p and normalizing the price of the non-positional good to one, the budget constraint of a household is given by $z = px + y$.

In equilibrium, all households adopt the same strategy $x(z)$ that reflects a strictly

[13] (Frank, 1985) only considers the case in which $\gamma = 1$ holds. In this case, the status associated with being on top of the status consumption distribution is equal to that associated with having the same status consumption as everyone else, which does not seem very plausible.

[14] Hopkins and Kornienko (2004) assume utility to be given by $U(x, y, S(x, F_k(\cdot))) = V(x, y)S$. We thank them for introducing the simplified version of the model to us.

positive relation between income z and status consumption x. Taking the equilibrium behavior of others as given, the status of a household with income z_i and the level of status consumption x_i in reference group k is then given by $G_k(x^{-1}(x_i)) + \alpha_k$. Taking the budget constraint into account, the utility of the household is consequently given by

$$U_i = (z_i - px_i) \left(G_k(x^{-1}(x_i)) + \alpha_k\right)$$

Differentiating with respect to x_i gives the first order condition

$$(z_i - px_i) \frac{g_k\left(x^{-1}\left(x_i\right)\right)}{x'\left(x^{-1}\left(x_i\right)\right)} - p\left(G_k\left(x^{-1}\left(x_i\right)\right) + \alpha_k\right) = 0$$

Taking into account that $x_i = x(z_i)$ holds in a symmetric equilibrium (i.e. that all household adopt the same strategy $x(z)$, implying that $F(z) = G(z)$ holds), the first order condition can be rewritten as the following differential equation

$$x'(z) = \frac{g_k(z)}{(G_k(z) + \alpha_k)} \left(\frac{z}{p} - x\right)$$

When $\alpha_k > 0$ holds, the household with the lowest income $\underline{z}_k$ does not benefit from status consumption (as it will get the lowest status α_k anyway), so that $x(\underline{z}_k) = 0$ holds. The solution to the differential equation above is then given by[15]

$$x(z)p = \frac{\int_{\underline{z}_k}^{z} t g_k(t)dt}{G_k(z) + \alpha_k} \tag{4}$$

This equation gives the equilibrium expenditures on the status good, $x(z)p$, as a function of the income z of a household in reference group k. Visible spending therefore positively depends on the term $\frac{\int_{\underline{z}_k}^{z} t g_k(t)dt}{G_k(z)}$, which represents the average income of households that are poorer than the household with income z (and is equal to it when $\alpha_k = 0$ holds). The intuition behind this effect is the following: as status S and the consumption y of the non-positional good are assumed to be complementary to each other (as they determine utility in a multiplicative way), households are willing to spend more on status signalling when their incomes increase. An increase in the incomes of households poorer than z

[15] When $\alpha_k = 0$ holds, the poorest household instead spends all income on the status good (see Hopkins and Kornienko (2004), Proposition 1). In this case, the solution to the differential equation is given by $x(z)p = \frac{\int_{\underline{z}_k}^{z} t g_k(t)dt}{G_k(z)+\alpha} + \underline{z}_k$. All our qualitative results stay the same in this case.

therefore increases their status spending. This in turn increases the status competition for the household with income z and forces it to also spend more on the status good in order to keep its perceived rank in the social group. Here, the racing analogy might again be instructive: a competitor has to run faster in order to keep its relative position if the weaker competitors get stronger. However, if the better competitors get even stronger, this has no effect on the relative ranks of the weaker competitors. In other words, if the incomes of poorer households increase, richer households must spend more on visible goods in order to maintain their perceived rank in the income distribution of their reference group. As noted by Hopkins and Kornienko (2004), these type of red queen dynamics might to some extent account for the Easterlin paradox that income growth is not necessarily accompanied with higher levels of life satisfaction among households (Clark et al., 2008). In the empirical analysis, we denote the average income of households belonging to a group k in year t that are poorer than a certain household i by $\gamma_{i,k,t}$.

Furthermore, note here that status expenditures at each income level z fall in the minimal status level α_k. The reason for this is simply that a higher minimal status level granted to each household independently of its level of status consumption softens status competition by reducing the marginal utility derived from additional status, and thereby reduces spending on status goods. In light of the work by Charles et al. (2009), who show that the visible spending of a household with a certain income level falls if the average income of its reference group increases, it seems plausible that this minimal status level of each household belonging to a reference group is positively related to the average income of this group. A reason for this might be the following: suppose that households not only derive status from their perceived rank within their reference group, but also from the (rough) perception that outsiders have about their economic standing relative to that of households in other groups. It is likely that outsiders lack information about the income distribution or visible spending distribution within the social group it does not belong to. However, they might still observe to which reference group the household belongs and might (roughly) know what the average income of this group is. In this case, the group status derived from the perception of outsiders is independent from the individual household's actions and therefore does not affect the optimal household behavior. Therefore, it can simply be accounted for in the model by assuming a positive relation between the (exogenous) parameter α_k and the average income of group k. In other words, the higher is the average income of the social group, the higher is the minimum amount of status that each member of the group receives α_k. In the empirical analysis, we therefore try to control for α_k by controlling for the log of the average group income, i.e. for $Inc^{\mu}_{k,t}$.

We now analyze the role that the local income share plays in this model. This is done by splitting households in the reference group k into those with incomes falling into the interval $[\underline{z}_k; \gamma z]$ and those with incomes falling into the interval $[\gamma z; z]$, where $0 < \gamma < 1$ holds. Let us for simplicity assume that the density within the interval $[\gamma z; z]$ is constant and given by $\tilde{g}_k$ and refer to it as the local density of the household with income z. In our empirical analysis we proxy this local density by our local share variable $LS_{i,k,t}$[16]. Taking into account that the relative rank $G_k(z)$ of the household with income z in the income distribution is given by $G_k(z) = \int_{\underline{z}_k}^{\gamma z} g_k(t)dt + \int_{\gamma z}^{z} \tilde{g}_k dt$, equation 4 can then be written as follows:

$$x(z)p = \frac{\int_{\underline{z}_k}^{\gamma z} t g_k(t)dt + \int_{\gamma z}^{z} t\tilde{g}_k dt}{\int_{\underline{z}_k}^{\gamma z} g_k(t)dt + \int_{\gamma z}^{z} \tilde{g}_k dt + \alpha_k} = \frac{\int_{\underline{z}_k}^{\gamma z} t g_k(t)dt + \frac{1}{2}\tilde{g}_k \left(1-\gamma^2\right) z^2}{\int_{\underline{z}_k}^{\gamma z} g_k(t)dt + \tilde{g}_k \left(1-\gamma\right) z + \alpha_k} \tag{5}$$

Local density $\tilde{g}_k$ can only increase if the density (i.e. number) of households with incomes outside of the interval $[\gamma z; z]$ is reduced. Suppose that $\tilde{g}_k$ increases because the incomes of some households rise in such a way that they move from the interval $[\underline{z}_k; \gamma z]$ to the interval $[\gamma z; z]$. Then, the denominator of the above equation stays constant as the rank $G_k(z)$ and therefore the number of households with incomes below z does not change. At the same time, the numerator increases, implying that visible spending increases. This is because an increase in $\tilde{g}_k$ increases the average income of households poorer than z and thereby increases status competition for the households with income z.

In an alternative scenario, the income densities in the interval $[\underline{z}_k; \gamma z]$ remain un-

[16]It should be noted that these two variables are not completely identical as our empirical local share is estimated for an interval of incomes of +/-2.5 per cent of z, while the local share used in the model here is only the one relevant for incomes between γz and z. We, however, think that the resulting measurement error is small.

changed and an increase in local density $\tilde{g}_k$ is made possible by a reduction in the number of households that are richer than z. This implies the average income of households poorer then z again increases (as there are now more of those households with incomes close to z) and status consumption again increases[17]. In both cases, the model therefore predicts that an increase in local density increases visible spending, which is in line with our empirical findings (in which we denote local density $\tilde{g}_k$ by $LS_{i,k,t}$)[18].

Equation 5 can also be written as follows:

$$x(z)p = \frac{\int_{\underline{z}_k}^{\gamma z} t g_k(t)dt}{G_k(z) + \alpha_k} + \frac{\frac{1}{2}\tilde{g}_k \left(1-\gamma^2\right) z^2}{\int_{\underline{z}_k}^{\gamma z} g_k(t)dt + \tilde{g}_k \left(1-\gamma\right) z + \alpha_k} \tag{6}$$

The first term on the right-hand side depends positively on the term $\frac{\int_{\underline{z}_k}^{\gamma z} t g_k(t)dt}{G_k(z)}$ that is equal to the total income of households in the reference group k that are poorer than the household with income γz, divided by the total number of households with income lower than z in the group.In our empirical analysis, we set $\gamma = 0.975$ (due to the 2.5 per cent one-sided bandwidth used for measuring local density) and derive this term for all households i (with incomes $z(i) = z$) and label it $\psi_{i,k,t}$. It should be noted that $\psi_{i,k,t}$ is approximately equal to the average income of households poorer than γz when γ is close to one (as in our case).

Given that an increase in $\tilde{g}_k$ does not go along with an even larger increase in $\int_{\underline{z}_k}^{\gamma z} g_k(t)dt$ and therefore in the rank $G_k(z)$, the second term on the right hand side depends positively on local density $\tilde{g}_k$. Visible spending by a household with income z then positvely depends on both local density $\tilde{g}_k$, as well as $\psi_{i,k,t}$. This is because the average income of households poorer than z which determines the visible spending levels of the household with income z increases in both the average income of households

[17] It is simple to show this formally: when $\int_{\underline{z}_k}^{\gamma z} t g_k(t)dt$ is held constant, equation 5 implies that visible spending rises in local density $\tilde{g}_k$, but at a decreasing rate. The marginal effect of local density therefore becomes weaker the larger local density is. This seems to be in line with our empirical findings of a non-linear effect of local density on visible spending. It should, however, be noted that we regress the log of visible spending and not its absolute value on the absolute value of local density, so that we do not directly test for the nonlinearity predicted here.

[18] It should, however, be noted that the model also allows for negative correlations between local density and visible spending. This is because it is possible to implement income transfers that at the same time increase the average income of households poorer than z (which drives visible spending of z), but reduce the local density at z. In particular, a combination of transfers from households richer than z and from z to households poorer then z would lead to this outcome)

poorer than γz and in the local density $\tilde{g}_k$. When an increase in $\tilde{g}_k$ does not go along with an even larger increase in the rank $G_k(z)$, the model therefore predicts that visible spending of a household with income z is a positive function of both the local density $LS_{i,k,t}$ for income z and of the variable $\psi_{i,k,t}$ (measuring the total income of households in the reference group k that are poorer than the household with income γz, divided by the total number of households with income lower than z in the group).

5.1 Testing of model predictions

In the following section we confront the further predictions of the model presented in the previous section with the data. In reality and in contrast to the model, It is likely that households not only purchase visible goods for signalling purposes, but also because they have some intrinsic value. Therefore, household income should have a direct positive effect on visible spending. We control for this effect by including log household income in all regressions (as in the previous analysis).

Table 7 presents provincial level results, while Table 8 reports district level results. Specification K in Table 7 begins with a direct test of equation 4 which predicts that status consumption of household i positively depends on $\gamma_{i,k,t}$, the average income of households poorer than i. As our dependent variable is logged, we also control for the log of $\gamma_{i,k,t}$. The results in K show that the parameter estimate is positive and significant at the $\alpha = 0.1\%$ level. This suggests that a rise in the average income of households poorer than a given household is indeed associated with a rise in visible spending. A similar result is found on the district level, as can be seen in specification O in Table 8. Taken together, these results ultimately suggest that households engage in visible spending in order to distinguish themselves from poorer peers within in their social group.

TABLE 7 AND 8 ABOUT HERE

Specification L in Table 7 then introduces the log of mean social group income, $Inc^{\mu}_{k,t}$, alongside the log of $\gamma_{i,k,t}$ in order to control for the parameter α_k in equation 4. Note that there is a very low correlation between these variables, as $Inc^{\mu}_{k,t}$ varies only by k and t, while $\gamma_{i,k,t}$ is a local variable that also depends on household income. The results show that while the log of $\gamma_{i,k,t}$ is positively and significantly correlated with income, the log of average group income is negatively and significantly correlated with visible spending. This is in line with our reasoning that the minimal status level α_k of households belonging to group k should increase in the average income $Inc^{\mu}_{k,t}$ of this group. As argued above, visibly belonging to a richer group is likely to give households status which is independent of their level of visible spending and should reduce their desire to obtain additional status through visible spending. A similar result is found at the district level, as can be seen in column P in Table 8.

In specifications M and N of Table 7, we proceed to test equation 6. As before, we use the log of average group income $Inc^{\mu}_{k,t}$ in order to control for α_k. In order to control for the first term in equation 6, we control for the log of $\psi_{i,k,t}$. Note that $\psi_{i,k,t}$ is approximately equal to the average income of households in the reference group with incomes lower than 97.5 per cent of the income of household i, that means to the average income of the poorer households outside of the interval used for measuring local density. Unlike the variable $\gamma_{i,k,t}$, $\psi_{i,k,t}$ therefore does not depend on local density. In order to control for the second term of equation 6 we simply control for local density $LS_{i,k,t}$. Consistent with previous results and the model predictions, $LS_{i,k,t}$ is positively and significantly correlated with visible spending. Compared to the results in Table 5 (see E) the magnitude of the parameter estimate has declined in the presence of $\psi_{i,k,t}$. This suggests that some of significance of $LS_{i,k,t}$ in B could be due to the omission of $\psi_{i,k,t}$. The log of this new variable is, in line with the model prediction, positively and significantly correlated with visible spending. While the log of $\psi_{i,k,t}$ is significant, we note that the R^2 for L (0.4945) is relatively low compared to B (0.4989). This suggests that although it provides a more comprehensive and theoretically coherent model of visible spending, the specification featured in M could be over-fitting the data. Nevertheless, these results, taken together, provide empirical support for the idea that visible spending is not only driven by the local density $LS_{i,k,t}$, but also by the average income of poorer households within the social reference group. These results are therefore consistent with the rank-based model of visible spending presented in the previous section. Similar results are also found on the district level, as shown in specifications P and Q in Table 8.

6 Discussion and Conclusions

Taken together, these results provide a rich set of insights about how the income distribution of social groups influences conspicuous behavior. An important contribution of our study is to show that local measures of the income distribution like the local income share or the average income of households poorer than a certain household can better explain the visible spending behavior of households than traditionally used index measures of the income distribution. A key finding is that, irrespective of their income level, households tend to respond to a change in local income share in the same way: increases in the local income share are associated with increases in spending on visible goods. This casts doubt on the idea that rank-based models of status consumption are only useful for describing the "poorest segment" of society (Brown et al., 2011, p. 146). Rather, it suggests that such models are highly relevant for understanding the consumption patterns of all households, regardless of whether they are rich or poor.

Our results also provide evidence of cascade effects as we find that a household's spending on visible goods is positively correlated with the average income of poorer peer households within the social group. In other words, we find evidence that visible spending levels among the richest in the social group are positively correlated with the income levels of the poorest. Our results are in line with the predictions of a model in which households care about their perceived relative income position within their social group. The results are also broadly consistent with what Leibenstein (1950) dubbed the snob effect. According to it, people have a desire to distinguish themselves from the 'common herd' (poorer households). Alternative models in which households are argued to imitate the consumption behavior of richer (rather than poorer) households (Frank et al., 2014) seem less appropriate to explain our findings. The same holds true for contributions which argue that households care about absolute rather than relative income differences. This case is analyzed by Bilancini and Boncinelli (2012). Focusing on the case of two income groups, they show that a decrease in income inequality can then reduce status competition and conspicuous spending of both rich and poor households as it reduces the difference in the status payoff of being perceived rich rather than poor. In this case, poor households reduce their spending on visible goods and this in turn reduces the pressure on rich households to spend more on visible goods in order to distinguish themselves from the poor. In such a context, an increase in the average income of poorer households (or an increase in local income density) should therefore reduce rather than increase household spending on visible goods. We find that the opposite is the case. Therefore, these findings suggest that households might indeed care more about their perceived relative position in the social income distribution, rather than their absolute position.

When it comes to signalling status, an important question is what the relevant reference groups of households are. In the context of post-apartheid South Africa, our respective assumptions seem to be broadly consistent with empirical evidence suggesting that ethnic group affiliation plays an important role in society, influencing attitudes towards marriage partners (Kenyon, 2015), subjective well-being (von Fintel, 2015) and trust (Posel and Hinks, 2013). We note that a limitation of our study and a topic for future research is to consider how social groups may be formed in other social dimensions beyond race, such as age or gender. Furthermore, we did not consider how changes in the income distribution of other social groups to which households do *not* belong affect visible spending. Nevertheless, our results suggest that although there has been a decline in geographical segregation between social groups (Christopher, 2001), households still seem to care about their perceived rank within their traditional reference groups, as evidenced by the significant impact that the local income shares within these groups have on visible spending. Another question for future research is whether this situation will change as segregation between groups continues to decline, and how this would influence visible expenditure by low income households across social groups.

This paper also highlighted how visible spending of a household seems to depend on both the average income of its reference group and on the average income of poorer households within its social group. The first effect was discovered by (Charles et al., 2009) and implies that a household belonging to a poor social group tends to spend more on visible goods than a household with the same income belonging to a richer group. As pointed out by Moav and Neeman (2012), this effect could lead to persistent poverty among poorer social groups due to lower investment in health and education. However, if visible spending is also a positive function of the average income of households poorer than the household in consideration, the picture is less clear as this average income might be lower in poorer income groups. Our result therefore indicate that it is important to take both effects into consideration.

In conclusion, let us discuss the implications of our findings for visible spending patterns in the context of the following example: as economies develop, their income inequality typically grows via a small segment of individuals becoming (very) wealthy, while the income of others initially remains relatively stable (Chotikapanich et al., 2012). Our results suggest that such a rise in income inequality in combination with a rise in total income would have four distinct effect on visible spending. First, as visible goods are luxury goods, visible spending would increase among the small segment of new wealthy households. Second, in dense income neighbourhoods, this would lead to a small decline in visible spending among the households whose income has remained stable, since the share of peers in the group who possess similar income declines. Third, wealthy households in the right hand tail of the income distribution may experience relatively large increases in their visible spending if the local income share in these regions increases due to new wealthy individuals moving into their income interval. Fourth, for households that were even wealthier than the newly rich segment, visible spending would also rise as the average income of poorer households rises for this group. Such a change in incomes would therefore affect visible spending of different households in a different way.

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7 Figures and Tables

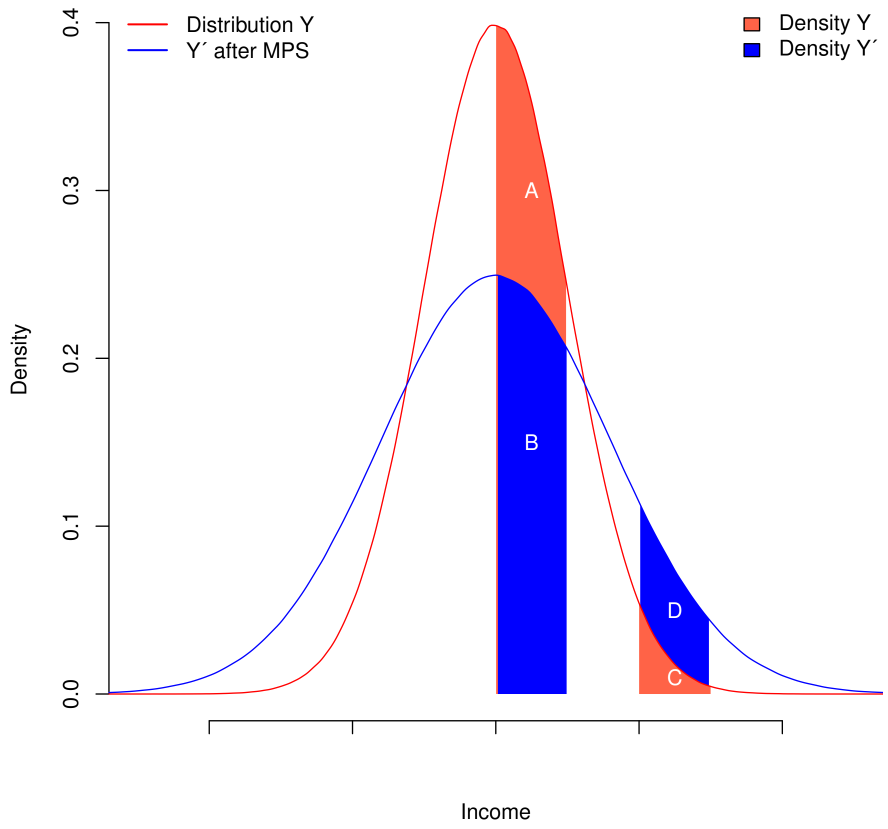

Figure 1: Local density and the income distribution

Notes: The figure illustrates how a mean preserving spread in the overall distribution of income from Y to Y' has non-homogeneous effects on local income share since local income share falls close to the mean from A to B and rises at the tails of the distribution from C to D.

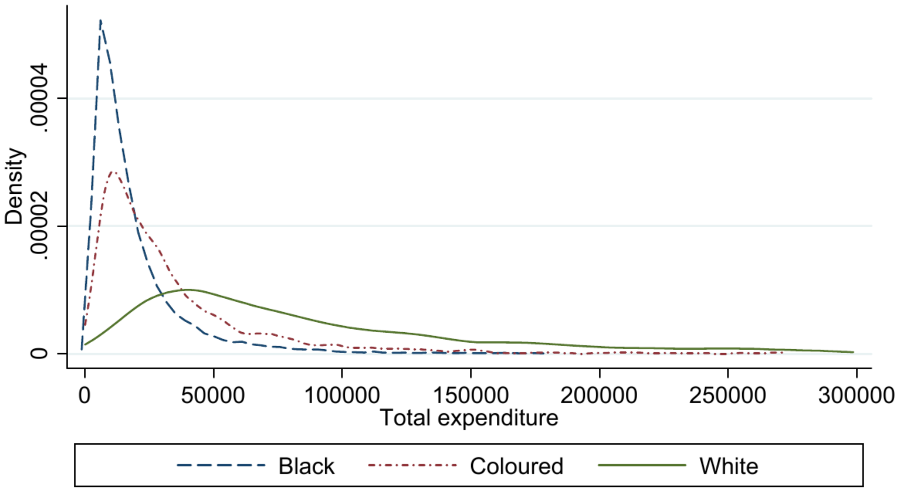

Figure 2: Income distribution across social groups
Notes: A kernel density of annual total expenditure across social groups. Total expenditure is reported in 2005 South African Rand. The average exchange rate in 2005 was 6.36 South African Rand per U.S. Dollar. (IMF, 2011).

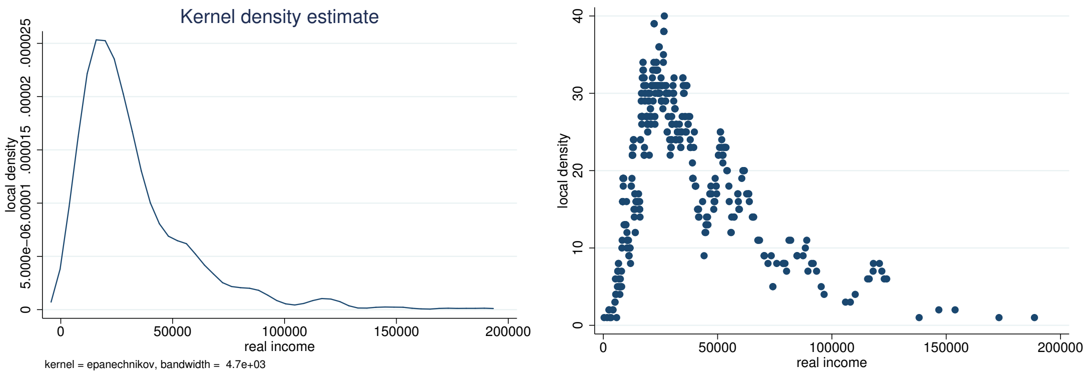

Figure 3: Local income share and the income distribution
Notes: Kernel distribution of household income among the Black population in Western Cape province in 1995 (left hand side) and the number of peer found within a five per cent bandwidth for each household. All amounts are given in 2005 South African Rand.

Table 1: Income distribution for selected provinces.

	Black			Coloured			White		
	1995	2000	2005	1995	2000	2005	1995	2000	2005
Province 1 - Western Cape									
Mean	32,729	26,349	30,400	49,805	47,918	51,395	147,165	146,419	192,179
Standard Deviation	26,441	24,088	22,871	43,178	47,026	51,855	136,600	138,250	21,2239
Minimum	353.20	0	0	3,602.65	0	0	7,629.14	0	1,399.73
Maximum	188,609	203,520	141,735	270,198	276,480	303,883	1,058,525	729,600	1,913,720
Median	24,849	19,507	24,807	36,026	31,642	33,107	113,642	107,238	129,118
Observations	525	575	484	1,578	1,473	1,357	1,017	393	505
Province 4 - Free State									
Mean	21,451	20,553	29,893	23,399	36,653	48,926	106,351	134,024	160,872
Standard Deviation	23,331	23,218	35,377	22,025	52,606	59,511	86,831	157,271	158,188
Minimum	0	0	0	3,108	3,840	786	2,525	0	7,214
Maximum	153,641	177,037	209,435	121,854	267,882	265,617	535,099	1,275,520	849,357
Median	12,857	12,791	16,967	16,742	16,589	20,060	84,768	93,440	119,645
Observation	2,267	1,989	1,428	198	39	95	589	199	189
Province 7 - Gauteng									
Mean	54,926	32,686	44,299	86,689	60,281	145,346	177,866	162,569	230,073
Standard Deviation	50,223	33,420	49,538	64,666	64,356	160,736	143,335	145,843	226,921
Minimum	2,296	0	0	4,662	0	3,216	3,758	0	334
Maximum	307,285	230,400	306,666	328,300	360,832	588,497	974,834	988,160	1,452,604
Median	38,135	23,040	27,366	72,376	39,014	77,601	146,449	122,880	162,930
Observations	1,686	3,141	1,935	250	143	48	1,052	481	402

Notes: Values are reported in 2005 South African Rand.

Table 2: Visible Spending.

Variable	Black	Coloured	White	All
Mean Visible Spending	3,571	5,503	18,414	5,676
Standard Deviation	9,239	14,059	41,913	18253
Minimum	0	0	0	0
Maximum	398,607	304,171	641,768	641,768
Share of total expenditure	0.129	0.119	0.121	0.127
Subcategories as a share of total expenditure				
Personal Care	0.039	0.036	0.029	0.038
Apparel (incl. footwear)	0.082	0.068	0.038	0.075
Jewelry	0.002	0.002	0.002	0.002
Cars	0.006	0.013	0.052	0.013

Notes: Values reported in 2005 South African Rand. Average total expenditure for social groups is reported in Table 3.

Table 3: Summary statistics.

Variable	Black	Coloured	White	All
Education less than 12 years	0.86	0.86	0.31	0.79
Completed High School	0.13	0.13	0.54	0.18
Mean Total Expenditure	23,928	35,881	111,009	36,358
Mean Total Income	28,573	46,108	155,655	46,724
Standard Deviation	33,007	49,047	154,673	76,579
Minimum	0	0	0	0
Maximum	363,463	588,497	2,609,913	2,609,913
Mean Social Income	28,632	46,064	155,321	46,721
Standard Deviation	8,000	13,869	27,390	43,539
Minimum	19,077	11,469	107,699	11,469
Maximum	55,612	145,346	230,068	230,068
Mean Local share $LS_{i,k,t}$	0.035	0.032	0.032	0.034
Standard Deviation	0.023	0.018	0.018	0.023
Minimum	0	0	0	0
Maximum	0.14	0.33	0.11	0.67
Age	47.5	46.9	49.2	47.6
Household size	4.3	4.3	2.8	4.1
Observations	54,159	8,902	9,075	72,136

Notes: The sample is restricted to the 99th percentile of total expenditure distribution of each subgroup within each year. Two per cent of the sample are omitted due to missing values in the education variable. 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. Source: South African Income and Expenditure Survey.

Table 4: Local income share and visible spending: province level.

Variables	Specifications						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Black	0.117	0.115	0.556$^{(***)}$	0.539***	0.0806	0.137	0.0989
	(0.0873)	(0.0882)	(0.0398)	(0.0884)	(0.0870)	(0.0872)	
Coloured	0.0533	0.0586	0.378***	0.365***	0.0334	0.0737	0.0989
	(0.0651)	(0.0656)	(0.0362)	(0.0362)	(0.0657	(0.0649)	(0.0650)
Log Household Income	1.339***	1.333***	1.313***	1.287***	1.304***	1.330***	1.303***
	(0.0219)	(0.0653)	(0.0205)	(0.0204)	(0.0211)	(0.0214)	(0.0212)
$LS_{i,k,t}$		2.644***	2.721***	8.233***	8.747***	2.571***	8.485***
		(0.337)	(0.338)	(0.808)	(0.827)	(0.339)	(0.832)
$LS^2_{i,k,t}$				-58.94***	-65.30***		-63.10***
				(7.290)	(7.449)		(7.437)
Log $Inc^{\mu}_{k,t}$		-0.283***			-0.293***	-0.283***	-0.293***
		(0.0508)			(0.0508)	(0.0508)	(0.0508)
$Gini_{k,t}$	-0.761**					-0.683*	-0.527
	(0.280)					(0.281)	(0.282)
Intercept	-1.646**	-2.263***	-4.430***	-5.284***	-1.993***	-1.905**	-1.726**
	(0.193)	(0.583)	(0.626)	(0.217)	(0.585)	(0.624)	(0.624)
N	72,136	72,136	72,136	72,136	72,136	72,136	72,136
R^2 (centered)	0.4964	0.4971	0.4962	0.4978	0.4989	0.4974	0.4990

Notes: The regression includes household controls reported in Table 9. Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *) Significant at the 0.1% (1%, 5%) level.

Table 5: Local income share and visible spending: district level.

Variables	Specifications		
	H	*I*	*J*
Black	0.450***	-0.0573	-0.00984
	(0.0482)	(0.108)	(0.106)
Coloured	0.378***	-0.150	-0.132
	(0.0362)	(0.0850)	(0.0841)
Log Household Income	0.232***	1.340***	1.317***
	(0.0511)	(0.0240)	(0.0238)
$LS_{i,k,t}$	1.326***	2.644***	3.692***
	(0.297)	(0.337)	(0.525)
$LS^2_{i,k,t}$			-14.67***
			(3.404)
Log $Inc^{\mu}_{k,t}$		-0.313***	-0.291***
		(0.0578)	(0.0566)
$Gini_{k,t}$			-0.842***
			(0.184)
Intercept	-5.302***	-1.740*	-1.463*
	(0.248)	(0.699)	(0.709)
N	48,040	48,040	48,040
R^2 (centered)	0.4848	0.4857	0.4882

Notes: The regression includes the same household controls reported in Table 9. Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *) Significant at the 0.1% (1%, 5%) level.

Table 6: Robustness test for urban and rural populations.

Variables	Specifications		
	All	Urban	Rural
Social group variables			
Black	0.0215	0.126	-0.274
	(0.106)	(0.124)	(0.229)
Coloured	-0.0981	-0.00910	-0.275
	(0.0838)	(0.0962)	(0.199)
Moments of the income distribution			
Log $Inc^{\mu}_{k,t}$	-0.288***	-0.197**	-0.491***
	(0.0568)	(0.0653)	(0.119)
$Gini_{k,t}$	-1.099**	-0.684	-0.977
	(0.344)	(0.418)	(0.549)
$LS_{i,k,t}$	4.115***	5.460***	3.665***
	(0.574)	(1.132)	(0.764)
$LS^2_{i,k,t}$	-14.97***	-26.96**	-12.74***
	(3.304)	(8.958)	3.844
N	48,040	24,983	23,057
R^2 (centered)	0.4880	0.5227	0.3705

Notes: sub-regions with less than 50 observations were excluded from the regression. The regression includes log household income and the same household controls reported in Table 9. Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *) Significant at the 0.1% (1%, 5%) level.

Table 7: Model with cascade effects: province level.

Variables	Specifications			
	K	L	M	N
Black	0.486***	0.0993	0.105	0.0838
	(0.0386)	(0.0883)	(0.0882)	(0.0886)
Coloured	0.320***	0.0396	0.0456	0.0331
	(0.0357)	(0.0655)	(0.0655)	(0.0658)
Log Household Income	1.087***	1.072***	1.056***	1.144***
	(0.0353)	(0.0356)	(0.0426)	(0.0464)
Log $\gamma_{i,k,t}$	0.139***	0.164***		
	(0.0261)	(0.0266)		
Log $\psi_{i,k,t}$			0.168***	0.100**
			(0.0305)	(0.0334)
$LS_{i,k,t}$			0.936*	5.935***
			(0.386)	(1.095)
$LS^2_{i,k,t}$				-46.48***
				(8.859)
Log $Inc^{\mu}_{k,t}$		-0.246***	-0.234***	-0.260***
		(0.0578)	(0.0500)	(0.0508)
Intercept	-4.430***	-1.598**	-1.623**	-1.665**
	(0.193)	(0.588)	(0.591)	(0.590)
N	71,677	71,677	71,664	71,664
R^2 (centered)	0.4941	0.4947	0.4945	0.4965

Notes: The regression includes the same household controls reported in Table 9. Full results are available in the appendix Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *) Significant at the 0.1% (1%, 5%) level.

Table 8: Model with cascade effects: district level.

Variables	Specifications			
	O	*P*	*Q*	*R*
Black	0.354***	-0.0203	-0.0190	-0.0258
	(0.0482)	(0.107)	(0.107)	(0.107)
Coloured	0.171**	-0.113	-0.105	-0.107
	(0.0521)	(0.0847)	(0.0846)	(0.0844)
Log Household Income	0.998***	1.072***	0.964***	1.009***
	(0.0381)	(0.0356)	(0.0443)	(0.0439)
Log $\gamma_{i,k,t}$	0.191***	0.207***		
	(0.0274)	(0.0288)		
Log $\psi_{i,k,t}$			0.215***	0.180***
			(0.0312)	(0.0308)
$LS_{i,k,t}$			0.417	2.200***
			(0.307)	(0.565)
$LS^2_{i,k,t}$				-9.773**
				(3.491)
Log $Inc^{\mu}_{k,t}$		-0.231***	-0.218***	-0.226***
		(0.0559)	(0.0556)	(0.0557)
Intercept	-3.898***	-1.223	-1.188	-1.256
	(0.217)	(0.698) (0.702)	(0.699)	
N	47,307	47,307	47247	47247
R^2 (centered)	0.4784	0.4790	0.4781	0.4801

Notes: The regression includes the same household controls reported in Table 9. Full results are available in the appendix Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *) Significant at the 0.1% (1%, 5%) level.

Table 9: Demographic results (Provincial level).

Variables	Specifications						
	A	*B*	*C*	*D*	*E*	*F*	*G*
Year 1995	-0.214***	-0.200***	-0.221***	-0.217***	-0.195***	-0.218***	-0.207***
	(0.0278)	(0.0253)	(0.0263)	(0.0263)	(0.0253)	(0.0256)	(0.0255)
Year 2000	0.170***	0.174***	0.232***	0.233***	0.173***	0.158***	0.163***
	(0.0210)	(0.0205)	(0.0190)	(0.0190)	(0.0204)	(0.0204)	(0.0203)
Age	-0.0271***	-0.0259***	-0.0262***	-0.0254***	-0.0250***	-0.0249***	-0.0247***
	(0.00238)	(0.00237)	(0.00236)	(0.00235)	(0.00237)	(0.00235)	(0.00235)
Age^2	0.000157***	0.000141***	0.000144***	0.000140***	0.000135***	0.000131***	0.000131***
	(0.0000224)	(0.0000224)	(0.0000223)	(0.0000222)	(0.0000223)	(0.0000222)	(0.0000222)
Family size (various dummies)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
Area type (urban)	0.0170	0.0402*	0.00929	0.0130	0.0454*	0.0771***	0.0672***
	(0.0197)	(0.0198)	(0.0195)	(0.0194)	(0.0198)	(0.0195)	(0.0197)
Education (> 10 years)	-0.0784**	-0.0642*	-0.0584*	-0.0347	0.0189	0.00803	
	(0.0267)	(0.0262)	(0.0260)	(0.0261)	(0.0258)	(0.0258)	
Education (university degree)	-0.0981*	-0.0711	-0.0654	-0.0130	-0.0133	0.0692	0.0550
	(0.0480)	(0.0474)	(0.0471)	(0.0473)	(0.0475)	(0.0473)	(0.0470)

Notes: Robust standard errors, clustered at PSU level, are indicated in parentheses. *** (**, *) Significant at the 0.1% (1%, 5%) level.