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# Gender Dimensions to the Incidence of Tariff Liberalization

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**Abstract**

This paper evaluates a topic in the globalization and poverty debate that is often difficult to measure, namely the transmission of price changes associated with tariff liberalization to households. Furthermore, it raises the question of whether there are discernible differences between male- and female-headed households that affect this consumption-trade link. It is a partial analysis as a consequence, but one that demonstrates the importance of such a focus for continued research and policy development surrounding the impacts of globalization. Specifically, the paper evaluates how tariff changes impacted male- and female-headed households in South Africa over the discrete periods 1995, 2000, and 2004. The analysis of consumption trends by sex of household head shows statistically significant differences which confirm that resources are managed differently between the sexes, and these are transmitted through to the …/

Keywords: trade, poverty, gender, South Africa

JEL classification: F14, J16

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tariff incidence analysis. On the whole, it was found that: (1) male-headed households almost always bear a greater share of the tariff incidence compared to female-headed; (2) both male- and female-headed households – across all expenditure quantiles other than the most wealthy – bear a greater share of the tariff burden compared to their share of total expenditure; and (3) changes to the incidence over 1995, 2000, and 2004 between the sexes mimicked the trends for the population as a whole, but showed crucial differences at the bottom end of the expenditure distribution. This suggests that the sex of the household head matters, and must be considered in addition to other household identifying factors (e.g. socio-economic status) when evaluating the impacts of tariff liberalization.

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## 1 Introduction

Trade policy represents one of the instruments that define and contextualize the amorphous concept of globalization. Its impact upon firms and households is a recurrent theme in the debate surrounding the impacts of globalization (Nissanke and Thorbecke, 2007). In this paper, an examination of the link between tariff liberalization and its impact on households is conducted, focussing on the price transmission mechanism and therefore on the consumption side of the process. Although it is a partial analysis of this link, the work is related to a larger body of recent research that sought to measure the general equilibrium impacts of changes in trade policy on the South African economy (see Edwards and Stern, 2007).

Bardhan (2007) notes that when the poor are consumers, several factors determine whether or not they gain or lose from openness, including (a) if they are net purchasers of tradeable goods, and (b) if the pass-through of tariff reductions to prices is not prevented. This paper focuses on these issues and the broader consumption trade linkage, but goes one step further: it attempts to identify whether the gainers and losers are disproportionately correlated with the sex of the household head. A growing body of literature confirms that resources in the hands of women are more likely to be channelled towards household expenditures that promote the welfare and well-being of other family members (Buvinic and Gupta, 1997; Thomas, 1990, 1997; Hoddinott and Haddad, 1995; Hoddinott et al., 1997). As a result of gender differences in the use and disposition of household income, it is likely that the incidence of tariffs upon households headed by men and women differ.

Trade liberalization in South Africa has progressed steadily since the early 1990s, and the country has fully complied with requirements of the World Trade Organization (WTO) as far as both tariffication and reducing tariff levels are concerned. The impact of trade liberalization – a hotly debated subject in the South African literature (see Holden, 1992; Bell, 1997; Fedderke and Vase, 2001) – can be considered to be ambiguous, where important distinctions lie in the causality attributable to trade liberalization as opposed to technological change (Bhorat and Hodge, 1999; Edwards, 2002). Analyzing the impacts has also been complicated by the phenomenon of jobless growth that has defined the South African economy since 1994.

However, this paper is not concerned with factor incomes that are related to the production side of the globalization–trade–poverty relationship. For an example of recent work in this area also focussed on the differential impacts on men and women, see Thurlow (2006). Instead, the consumption side of this relationship is of interest. In order to evaluate this linkage, the incidence of tariffs is calculated for households in the South African economy, but by sex of household head. The primary analytical objective is therefore to calculate how much of a given household's expenditure on commodities is due to tariffs, to incorporate this into a benefit incidence analysis framework, and then to evaluate how this differs across the income distribution and between the sexes.

In order to evaluate the scale of the expected price effects, it is important to identify the goods consumed by the poor and the extent to which the poor would benefit from or are vulnerable to changes in border prices arising from tariff revision. Consumption patterns differ significantly across household income categories, with poor households spending relatively more of their income on tradable goods as opposed to services. In this paper, data from the Income and Expenditure Survey (Statistics South Africa, 2000) is used to

profile consumption patterns across various households, which is then incorporated into the analysis of changes to the tariff regime in 1995, 2000, and 2004. Sex of the household head is defined directly from the Income and Expenditure Survey (IES), which asks the respondent who the head of the household is. This implies that the distinction between a *de jure* or *de facto* household head may in fact be a subjective one relative to the respondent, which is an important limitation with respect to the social construct of gender.

The methodological approach taken in this paper is similar in principle to a standard benefit incidence analysis (BIA), as discussed by Demery (2000), Bourguignon, Pereira da Silva, and Stern (2002), and Nicita, Olarreaga, and Soloaga (2003). Typically, these studies evaluate the impact on the distribution of living standards and poverty of some policy intervention (e.g. raising education expenditure or taxation levels). The innovation in this paper, initially proposed by Daniels and Edwards (2007), is to treat regime changes in tariff levels analogously to such interventions. An innovative method, taken from statistical control theory, is then introduced to compare the effects of the changes in tariff incidence on the expenditure distribution.

Given this context, it is useful to review the primary hypotheses concerning the impact of a reduction in tariffs on household expenditure, irrespective of whether they are headed by men or women. This helps reinforce theoretical priors and augments the empirical context that will assist us in drawing valid conclusions from the analysis as far as gender is concerned. Two primary hypotheses may be stated concerning the impact of tariff liberalization on prices and their transmission to households:

> All households benefit from a reduction in tariffs in the form of reduced prices;
>
> Poorer households benefit disproportionately to wealthier households.

The motivation for the first hypothesis is that a reduction in tariffs necessarily implies cheaper imported goods when this reduction is passed on to the consumer. We therefore make the additional (restricting) assumption that tariff reductions transmit perfectly to retail prices via (benevolent) retail corporations. The second assumption stems from the welfare implications of Engel's law, which states that the poor spend a greater share of their income on tradable commodities (particularly food). Wealthier households are therefore more likely to consume a larger proportion of non-tradable goods and services, thereby reducing their exposure to tariff changes. In order to identify the precise implications of the gender analysis, it is thus important to separate out the above components of the analysis.

## 2 Methodology

This section is comprised of four parts: an explanation of the method used to calculate tariffs; an explanation of how tariff lines were mapped onto expenditure items; an explanation of the BIA framework; and an explanation of how it is possible to compare the impact of tariff changes on the expenditure distribution.

### 2.1 Tariff levels

Data on regional trade flows were obtained at the HS8-digit level from Customs and Excise, and then aggregated to approximately ninety-six commodities using Supply and

Use (SU) tables.[1] This gave a fairly detailed breakdown of average commodity tariffs. For example, food is disaggregated into eleven categories: meat, fish, fruit, oils, dairy, grain, animal feeds, bakeries, sugar, confectionary, and other food. Clothing and textiles were disaggregated into textiles, textile articles, carpets, other textiles, knitting mills, wearing apparel, leather, handbags, and footwear (see Appendix 1 for a complete list of all ninety-six SU commodity codes). Tariff data are provided for the years 1995, 2000, and 2004.

### 2.2 Matching commodity tariffs and expenditures

In order to calculate the incidence of tariffs across the expenditure distribution, it is necessary to match the same commodities for which there is tariff data to expenditure data. The Income and Expenditure Survey (Stats SA, 2000) is used for this purpose.

The explicit code for aggregating IES commodities to SU commodity groups is described in detail in PROVIDE (2005). In practice, the various disaggregated expenditure items contained in the public use version of the IES are simply added together to form new commodity groups that conform to the SU definition, rather than to the commodity groups defined by Statistics South Africa. This results in the identical number of commodity groups (ninety-six) as contained in the SU data (see Appendix 1).

### 2.3 The benefit incidence analysis framework

Given that we now have matching tariff and expenditure codes, it is possible to proceed to the specifics of the BIA framework. Before doing so, however, it is useful to separate out the components of retail prices due to tariffs. In this paper, we calculate household expenditures on commodities in the following way:

$$E_i^d \equiv p^d q_i = p^w q_i + p^t q_i \qquad (1)$$

where $E_i^d$ is domestic household expenditure on commodity *i*, $p^d q_i$ is the domestic price ($p^d$) per quantity unit ($q$) of commodity *i*, which equals the world (or border) price per unit ($p^w q_i$), plus a domestic tariff per unit ($p^t q_i$). Therefore, expenditure on commodity *i* equals the world price for that commodity inflated by a domestic tariff. It is not necessary in this instance to identify the vectors of quantities and prices because we continue the analysis based on budget shares rather than prices, consequently invoking Cobb-Douglas utility assumptions.

Since tariff data are expressed as a percentage of the total price, we manipulate equation (1) to calculate $p^w$ before $p^t$ can be quantified in local currency (Rands). World prices are calculated as:

$$p^w q_i = p^d q_i \Big/ (1 + t_i) \qquad (2)$$

[1] For an explanation of the SU framework within the context of national accounting conventions, see South African Reserve Bank (1999: 12) and Stats SA (2003).

We now have data for both domestic and world prices, allowing us to rearrange equation (1) and solve for the amount that households spend on tariffs ($p^t q_i$). Note that by corollary implication, $\Sigma_i\ p^t q$ equals total expenditure on tariffs at the national level.

One of the implications of the above is that it assumes that all commodities households' purchase include a tariff in the final retail price. In other words, it assumes perfect pass-through of foreign to domestic prices. This constitutes an important assumption in this analysis.

Now let us consider the incidence of tariffs. The total incidence of tariffs on a particular household depends on two factors: the share of expenditure on tariffs by that household, and the level of tariffs across those commodities at the national level. To show this result formally, we have the aggregated household tariff incidence defined as:

$$X_j \equiv \sum_{i=1}^{96} E_{ij} \frac{T_i}{E_i} \equiv \sum_{i=1}^{96} \frac{E_{ij}}{E_i} T_i \tag{3}$$

Here, $X_j$ is an estimate of total tariff revenue borne by all households; $E_{ij}$ represents the expenditure on commodity $i$ of household $j$, and $E_i$ the total expenditure on commodity $i$ across all households. $T_i$ is tariff revenue for commodity $i$, and ($i$=1,…,96) denotes the full range of SU commodities.

The incidence of the total tariff ($T$) accruing to each household is then given by:

$$x_j \equiv \sum_{i=1}^{96} \frac{E_{ij}}{E_i} \left( \frac{T_i}{T} \right) \equiv \sum_{i=1}^{96} e_{ij} t_i \tag{4}$$

From this, it follows that the incidence is determined by two factors: the share of expenditure by the household and group (male- or female-headed households) in total spending ($e_{ik}$), and the share of tariff revenue for each commodity and group in total tariff revenue ($t_i$). The $e$'s reflect household spending decisions while the $t$'s reflect tariff costs borne by households as a result of government's trade policy and tariff regime. Statistically, it is then possible to conduct between-group comparisons by evaluating linear combinations of the differences in coefficients for male- and female-headed households.

### 2.4 Comparing distributions

Note that while the calculation of the incidence is possible given the above method, comparisons of whether the change in tariff regime (between 1995, 2000, and 2004) was biased in favour or against the poor are not possible using that framework. In order to do this, a method is adapted from statistical control theory called the cumulative sum. A variation of this method is known and used in time series econometrics, but the adaptation discussed below and in Daniels and Edwards (2006) is the author's first known application to a comparative static outcome. The innovation in this paper is to apply the analysis to the sex of household head, a simple task possible given the implicitly decomposable incidence equations presented above.

We are interested in the impact of different tariff regimes on $x_j$. The first step in adapting this method is thus to create two such differences: 1995–2000 and 2000–2004. For each of these differences, it is then possible to identify who gained or lost by

evaluating the direction of change in $x_j$, where this direction is indicated by a binary variable. Let this variable be characterized as:

$$\Delta x_j = \begin{cases} 1, \text{ if } x_j^{1995} - x_j^{2000} > 0 \\ 0, \text{ if } x_j^{1995} - x_j^{2000} < 0 \end{cases} \quad (5)$$

The equation demonstrates that if the difference between the value of $x_j$ between 1995 and 2000 and, analogously, 2000 and 2004, is positive – implying that the value of $x_j$ is lower in 2000 compared to 1995 – then the household's tariff incidence has reduced ($\equiv \Delta x_j = 1$). Alternatively, if the difference between the value of $x_j$ between 1995 and 2000 is negative, then the household bears a larger share of the tariff incidence ($\equiv \Delta x_j = 0$).

Graphically, it is then possible to display the binary $\Delta x_j$ across the continuous expenditure distribution ordered from lowest to highest. We do this by evaluating the cumulative sum of the proportion of ones in the sample (a constant number) minus $\Delta x_j$, such that:

$$c_n = \sum_{m=1}^{n} \left[ \left( \sum_{1}^{J} \Delta x_j / J \right) - \Delta x_m \right] \text{ where } 1 \leq n \leq J, \quad (6)$$

This constant is then compared against household expenditure, where all households are placed in ascending order ($E_{m+1} \geq E_m$).[2] We have used the $m$ subscript to identify that $\Delta x_j$ and $E_j$ are ordered such that $E_{m+1} \geq E_m$. What we are able to tell from undertaking this analysis is:

> Whether there is a negative or a positive relationship between $\Delta x_j$ and the ordered expenditure distribution. In other words, we are able to identify whether poor households gained (lost) relative to wealthier households?
>
> The type and form, if any, of the relationship between $\Delta x_j$ and expenditure. Plausible relationships include monotonic, sinusoidal or no systematic relationship.

## 3 Results

This section presents the results of the analysis, commencing with an overview of consumption patterns over the expenditure distribution. Thereafter we evaluate tariffs directly, and these sections can be broadly separated into sections that deal with absolute changes in the tariff regime on households, and relative changes in the tariff regime on households (i.e. changes in the incidence). Comparisons are made for three discrete distributions: 1995, 2000, and 2004.

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2 Note $c_J = 0$

### 3.1 Consumption patterns

In this section the profile of consumption patterns is investigated. It commences with an overview of consumption trends over the entire South African population, before separating out the gender dimensions of these trends. All data are taken from the Income and Expenditure Survey (2000).

The consumption schedules are split into major categories of expenditure, broadly separated into tradable goods (that incur tariffs) and non-tradable goods and services (that incur no tariffs). Alcohol and tobacco are isolated from the food and beverages data in order to examine whether there are significant differences in spending on these items within the expenditure distribution and between male- or female-headed households. Housing as defined does not include expenditure on bond[3] and related costs associated with owning a house; it only includes rental costs as this is what conventions in the SU codes require. Housing (not owned) is defined as the sum of all expenditure on (1) rent paid; (2) rent for a garage or extra service room if paid separately to (1); (3) levy for sectional title or share-holding schemes; (4) boarding; and (5) payment for the right to access land (e.g. tribal land or land for informal settlements). Expenditure on housing for those who own a house is included in the household services line item, mandated by the SU accounting conventions. Expenditure on tradable vehicle parts are included as a separate line item, while private and public transport costs are included in the household services aggregation as they incur no tariffs.

Figure 1 shows quite clearly that poorer deciles spend the majority of their income on tradable goods, while wealthier deciles spend proportionately more on non-tradable household services. Of tradable goods, most expenditure is directed to the purchase of food. As far as alcohol and tobacco are concerned, at the national level there is very little to distinguish between the various expenditure categories.

However, the above results change somewhat when separating the consumption trends by sex of household head. In Table 1, only the differences between the two household heads are displayed (for the actual results per decile and gender, see Appendix 2). The differences below are calculated as the estimate for male-headed households minus the estimate for female-headed households. A negative figure implies that male-headed households spend less on a particular group of products, while a positive figure implies that male-headed households spend more than females.

3 A housing ‘bond’ in South African in financial terms is equivalent to a ‘mortgage’ internationally.

Figure 1: Mean consumption schedules by decile of expenditure distribution: 2000

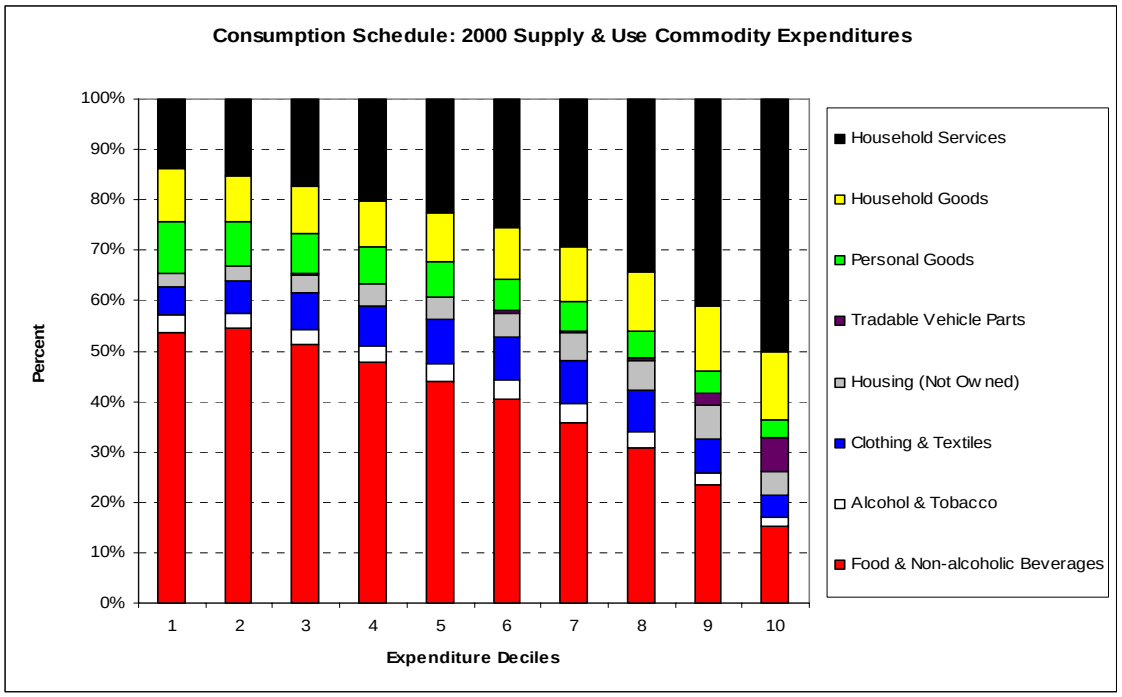



Table 1: Differences in mean per cent consumption expenditure by decile and gender of household head

| Decile | Food and bevs | Alcohol and tob. | Cloth and textile | Accom-modation | Traded vehicle parts | Personal goods | HH goods | HH service |
|---|---|---|---|---|---|---|---|---|
| 1 | -2.62* | 4.79* | -1.31* | -0.32 | 0.01 | -0.91* | 0.21 | 0.15 |
| 2 | -2.69* | 4.22* | -0.49 | 0.70 | 0.03 | -0.98* | -0.08 | -0.70 |
| 3 | -3.54* | 3.21* | -0.49 | 1.41 | 0.05* | -0.91* | 0.36 | -0.09 |
| 4 | -4.79* | 3.65* | 0.22 | 2.07* | 0.08* | -0.99* | -0.37 | 0.13 |
| 5 | -4.29* | 2.74* | 0.98* | 1.18* | 0.08* | -1.14* | 0.30 | 0.16 |
| 6 | -4.52* | 3.34* | 0.88* | 0.77* | 0.43* | -0.93* | 0.94* | -0.92 |
| 7 | -3.24* | 3.05* | 0.25 | 0.00 | 0.18 | -0.69* | 1.23* | -0.79 |
| 8 | -1.25 | 1.61* | -0.69 | 0.06 | 0.52* | -0.50* | 1.71* | -1.45 |
| 9 | 0.32 | 1.00* | -0.74* | -1.85* | 0.76 | -0.63* | 1.95* | -0.82 |
| 10 | -0.97 | 0.08 | -0.46 | -2.31* | 0.99 | -0.25 | 0.14 | 2.79* |

Note: * Indicates a statistically significant difference (at the 95 per cent level or above), between the distributions of mean consumption estimates per decile for men compared to women (where the null is that the linear combination of the difference equals zero).

Immediately evident from Table 1 is the greater level of expenditure on alcohol and tobacco by male-headed households, and these differences are statistically significant across the expenditure distribution for all deciles except the wealthiest. Results also suggest that the figures generally (though not monotonically) decrease as we move up the expenditure distribution, implying that poorer households have the greatest discrepancy.

If we read across the rows of Table 1, it seems that the greater expenditure on alcohol and tobacco among male-headed households leads to negative substitution effects for food and beverage commodities particularly, possibly also in clothing and textiles, and personal goods.

For household services on the other hand, there are rarely statistically significant differences between male- and female-headed households, except among the wealthiest.

The importance of the above will become fairly fundamental to our understanding of tariff incidence, since it is the relative proportions of commodity expenditures and their associated tariffs that will eventually find their way through to the incidence analysis. In light of these differences, we can evaluate the percentage of total expenditure devoted to tariff taxes. This precedes the tariff incidence analysis, and helps establish the general household context.

### 3.2 Tariffs and expenditures: 1995, 2000, and 2004

This section evaluates the percentage of total expenditure devoted to tariffs. We commence by evaluating the direction of change in tariffs between 1995, 2000, and 2004, then proceed to estimate total tariff revenue in each of the three years, before proceeding to summarize the proportion of spending devoted to tariffs. At this stage, we are not interested in the tariff incidence yet; that is explored in 4.3 and 4.4.

Since the early 1990s, South Africa liberalized its trade policy in line with WTO recommendations, in some cases faster than was required. In this section we summarize only those goods that saw an increase in tariffs over the time period. These goods represent a small subset of the total of commodities that experienced a decline in tariffs (see Appendix 1 for the full range of SU commodity tariffs in 1995, 2000, and 2004).

Table 2 shows only those commodities that experienced a tariff increase in either 1995–2000 or 2000–2004. Of the ninety-six total commodity codes, only four increased between 1995 and 2000, compared to ten between 2000 and 2004. Between 1995 and 2000, important food groups' grain and sugar saw tariff increases, whereas only oils and animal feeds in the food group category saw increased tariffs between 2000 and 2004. However, the size of the tariff increases in percentage terms were generally smaller in 2000–2004 compared to 1995–2000.

Table 2: Tariffs that increased between 1995, 2000, and 2004

| Increase 1995–2000 | Per cent change | Increase 2000–2004 (a) | Per cent change | Increase 2000–2004 (b) | Per cent change |
|---|---|---|---|---|---|
| Grain | 29.9 | Oils | 12.9 | Other non-metallic | 6.0 |
| Sugar | 22.7 | Animal feeds | 0.5 | Machine-tools | 1.9 |
| Tyres | 14.5 | Paper | 4.2 | Mining machinery | 5.1 |
| Motor vehicle parts | 21.8 | Basic chemicals | 1.2 | Optical instruments | 0.4 |
| | | Pharmaceuticals | 18.3 | Other transport | 5.1 |

As can be expected, the impact of this change in tariff regime on total tariff revenue was not uniform. Table 3 presents estimates of total tariff revenue, calculated as the sum of total household expenditure attributable to tariffs.

First thing to note in Table 3 is that standard errors and confidence intervals are presented for the estimates of the total. This is mandated by the fact that we use household survey data drawn from a random (probability-based) stratified, two-stage design with sampling weights. Consequently, the estimate of the weighted total is a random variable, and estimates based on this data must account for potential error introduced by the survey design.

To a large extent, the results in Table 3 are expected owing to the reduction in tariffs over the time period. 1995 had the highest revenue at approximately R35 billion, reducing by a rather substantial amount (approximately 31 per cent) to R24.2 billion in 2000, before decreasing by approximately 18 per cent to R20 billion in 2004.

The implications of these tariff declines for all households irrespective of gender of household head are displayed in Figure 2, where results are differentiated by expenditure decile.

Table 3: Total tariff revenue: 1995, 2000, and 2004

| Year | Estimate (Billions) | Std Err. | 95% Confident interval | | Population Size (households)* |
|---|---|---|---|---|---|
| | | | Lower limit | Upper limit | |
| 1995 | 34.78 | 0.66 | 33.50 | 36.10 | 11,041,055 |
| 2000 | 24.15 | 0.44 | 23.30 | 25.00 | 11,041,055 |
| 2004 | 19.97 | 0.37 | 19.20 | 20.70 | 11,041,055 |

Note: * The population size is constant because we are using the 2000 expenditure survey sample for all three comparisons (hence we are isolating the impact of the tariff change).

Figure 2: Per cent of tariff expenditure to total expenditure

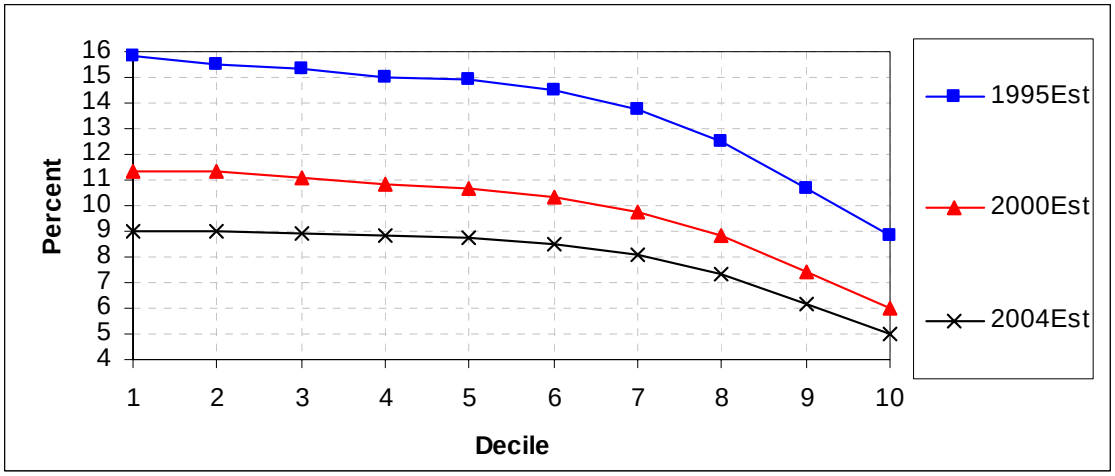


Figure 2 shows that all households have witnessed absolute welfare gains (i.e. Pareto enhancing) between 1995, 2000, and 2004, as measured by the percentage of total expenditure spent on tariffs. In other words, all households are paying less for tradable goods. In addition, poorer expenditure groups have experienced the greatest welfare gains over this period, measured by the size of the reductions in total spending on tariffs.

Disaggregating these trends further, it is possible to evaluate the magnitude of tariff expenditure declines for each decile of the expenditure distribution differentiated by sex of household head (for the actual mean estimates per gender and expenditure decile, consult Appendix 3).

Table 4 shows that there are relatively small differences between the amounts that male- and female-headed households spend on tariffs, which are rarely greater than half a per cent over all three periods. Despite this, there are clearly some important and significant differences in the distributions, which are worth noting. The first point is that where a difference exists it is almost always positive, indicating that male-headed households have greater exposure to tariffs. This may simply be due to their greater expenditure on alcohol and tobacco, which are commodities with generally high associated tariffs over all three periods (see Appendix 1).

For 1995 tariff data, statistically significant differences exist in the bottom three deciles and also in deciles five through seven. The change in tariff regime generally reduces this difference, a function largely resulting from the 'shift of the curve' between the periods and displayed in Figure 2. It also reduces the number of deciles that produce statistically significant differences (from six to two).

Table 4: Differences in mean estimates per decile and gender of household head of expenditure on tariffs as a per cent of total expenditure

| Decile | 1995 Tariffs: Difference between male- and female-headed HH | 2000 Tariffs: Difference between male- and female-headed HH | 2004 Tariffs: Difference between male- and female-headed HH |
|---|---|---|---|
| 1 | 0.4831* | 0.1521 | 0.2843* |
| 2 | 0.6414* | 0.2284* | 0.3622* |
| 3 | 0.3455* | -0.0004 | 0.1423 |
| 4 | 0.1997 | 0.0485 | 0.1321 |
| 5 | 0.4049* | 0.2122 | 0.2404 |
| 6 | 0.6993* | 0.3728* | 0.4075* |
| 7 | 0.5211* | 0.2607 | 0.2882* |
| 8 | 0.2607 | 0.1035 | 0.1028 |
| 9 | 0.3431 | 0.1820 | 0.1547 |
| 10 | -0.2278 | -0.1582 | -0.1507 |

Note: * Indicates a statistically significant difference (at the 95 per cent level or above), between the distributions of mean tariff share estimates per decile for men compared to women (where the null is that the linear combination of the difference equals zero).

However, for 2004 tariff data the differences between male- and female-headed households increase once more, for all but the highest two deciles. This suggests that this change in tariff regime may have had differential impacts – both in terms of sex of head of household and class.

Reading across the rows of Table 4, it is evident that the differences between households headed by men and women in 1995 were always larger than the differences in 2000, whereas the differences between 2000 and 2004 were smaller for deciles one through seven, and larger for deciles eight through ten. Therefore, while the change in tariff regime between 1995 and 2000 generally saw not only lower expenditure on tariffs but also smaller differences between male- and female-headed households, the change in tariff regime between 2000 and 2004, while also reducing the absolute levels of expenditure on tariffs, actually served to increase the disparity between male- and female-headed households.

Note that these are very tentative findings, and should be treated as such at this stage of the analysis. Below we proceed to evaluate the incidence of tariffs, which will provide the analytical foundations from which more authoritative conclusions may be drawn in this regard.

### 3.3 Benefit incidence analysis

This section presents results for estimates of the incidence of tariffs. As noted in the methodology, comparisons are made over the period 1995, 2000, and 2004.

From Table 5 we see a monotonic relationship between the incidence and expenditure deciles, suggesting that the wealthier the household (proxied by total expenditure), the greater the share of tariffs borne by the group. This is entirely expected and is formulaically driven (to see this, consult equation (4)).

Between 1995 and 2000 the estimate of the mean tariff incidence shows an increase for all eight of the bottom deciles. This suggests that poorer households witnessed an increase in the tariff burden during this time. Wealthier households, namely those in deciles nine to ten, saw a reduction in their overall tariff burden. Between 2000 and 2004, mean estimates for deciles one to six decreased, while deciles seven to ten saw an increase in the tariff burden.

It is also possible to disaggregate the above results such that we separate out the comparison of within-gender differences over time (1995, 2000, 2004) from between-gender differences in a single period, e.g. 1995. Within-gender differences are presented in Table 6.

Table 5: Mean incidence of tariffs per for all households: 1995, 2000, and 2004

| Decile | 1995* | 2000* | 2004* | Observations | Population size |
|---|---|---|---|---|---|
| 1 | 0.0056 | 0.0057 | 0.0055 | 2,891 | 1,103,610 |
| 2 | 0.0104 | 0.0109 | 0.0105 | 2,900 | 1,104,301 |
| 3 | 0.0140 | 0.0145 | 0.0141 | 2,842 | 1,104,290 |
| 4 | 0.0182 | 0.0188 | 0.0185 | 2,795 | 1,104,003 |
| 5 | 0.0235 | 0.0240 | 0.0238 | 2,707 | 1,104,094 |
| 6 | 0.0298 | 0.0305 | 0.0304 | 2,678 | 1,104,745 |
| 7 | 0.0386 | 0.0392 | 0.0393 | 2,610 | 1,103,543 |
| 8 | 0.0518 | 0.0522 | 0.0526 | 2,567 | 1,104,569 |
| 9 | 0.0740 | 0.0737 | 0.0741 | 2,297 | 1,103,901 |
| 10 | 0.1598 | 0.1537 | 0.1549 | 1,976 | 1,103,999 |

Note: * Estimates multiplied by 1000 for presentation purposes (therefore sum of incidence=1000). The 'Observations' column denotes the actual number of households in each decile, which, when weighted results in the 'Population size' column.

Table 6: Within gender differences in mean tariff incidence over time

| Decile | Male | | Female | |
|---|---|---|---|---|
| | 1995–2000 | 2000–2004 | 1995–2000 | 2000–2004 |
| 1 | -8.66E-08* | 1.51E-07* | -1.92E-07* | 2.57E-07* |
| 2 | -3.43E-07* | 2.90E-07* | -5.52E-07* | 4.92E-07* |
| 3 | -3.55E-07* | 2.98E-07* | -6.64E-07* | 5.20E-07* |
| 4 | -5.49E-07* | 2.56E-07* | -7.03E-07* | 4.49E-07* |
| 5 | -5.14E-07* | 1.67E-07* | -6.74E-07* | 3.45E-07* |
| 6 | -4.82E-07* | -4.40E-08 | -8.22E-07* | 3.09E-07* |
| 7 | -4.70E-07* | -2.35E-07* | -8.86E-07* | 1.25E-07 |
| 8 | -3.23E-07* | -3.87E-07* | -7.63E-07* | -2.64E-07* |
| 9 | 5.27E-07* | -4.60E-07* | -6.82E-08 | -4.16E-07* |
| 10 | 6.34E-06* | -1.20E-06* | 4.64E-06* | -1.63E-06* |

Note: * Indicates a statistically significant difference (at the 95 per cent level or above), between the distributions of mean incidence estimates per decile for men in 1995 or 2000 compared to men in 2000 or 2004.

Table 6 shows very small differences in the estimates, largely a result of the fact that the values of the incidence are themselves very small with approximately seven decimal places. Unlike Table 5, the estimates in Table 6 have not been multiplied by 1000, but instead utilized in original form (therefore they sum to one). In Table 6 the difference is calculated for male-headed households in 1995 minus male households in 2000, and likewise for 2004. A positive sign indicates that the value in 1995 exceeded the value in 2000, and vice versa for negative signs.

From Table 6 it is evident that the incidence increased across eight of the expenditure deciles for male-headed households between 1995 and 2000, suggesting that these households were made *worse off* by the change in tariff regime. This is similarly so for

1995–2000 for female-headed households, though here even the ninth decile was made worse off. Importantly, all of these findings are statistically significant, with the exception of the ninth decile for women.

Between 2000 and 2004, however, we see that the bottom five deciles for male-headed households had positive signs, suggesting that the tariff incidence was higher in 2000 compared to 2004. This is similarly so for female-headed households up until the seventh decile. In these comparisons, all findings are statistically significant for all deciles, suggesting far-reaching tariff reform and changes to the incidence across households. Importantly, the results also suggest class-specific differences, which are discussed later.

The results may also be analysed invariant to time. Here we separate out the differences within a given year and compare between the sexes.

In Table 7, as has been consistently applied throughout, the difference is calculated for male minus female estimates (see Appendix 4 for mean estimates by gender and expenditure decile). A positive sign indicates that the value for male households is greater than that for female; statistical significance indicates that confidence may be placed in the findings that these differences are in fact meaningful.

We can see from Table 7 that there are important differences between the estimates based on the sex of the household head. In 1995, male incidence estimates were always larger than female; in fact, the only time that female incidence was ever larger than the male was in 2000 in the first expenditure decile. This suggests that male-headed households generally have a more unequal distribution of the tariff incidence compared to women. In addition, it should be noted that seven of the estimates in 1995 are statistically significant, compared to three in 2000 and six in 2004. This suggests that the impact of the change in tariff regime had no consistent relationship across 1995, 2000, and 2004.

Table 7: Between gender differences in mean tariff incidence by decile

| Decile | 1995 | 2000 | 2004 |
|---|---|---|---|
| 1 | 9.35E-08 | -1.22E-08 | 9.33E-08 |
| 2 | 3.83E-07* | 1.73E-07 | 3.75E-07* |
| 3 | 4.44E-07* | 1.35E-07 | 3.57E-07* |
| 4 | 3.46E-07 | 1.92E-07 | 3.85E-07 |
| 5 | 7.49E-07* | 5.89E-07 | 7.67E-07* |
| 6 | 1.40E-06* | 1.06E-06* | 1.41E-06* |
| 7 | 1.25E-06 | 8.37E-07 | 1.20E-06 |
| 8 | 2.06E-06* | 1.62E-06 | 1.74E-06 |
| 9 | 5.34E-06* | 4.75E-06* | 4.79E-06* |
| 10 | 3.07E-05* | 2.90E-05* | 2.86E-05* |

Note: * Indicates a statistically significant difference (at the 95 per cent level or above), between the distributions of mean incidence estimates per decile for men compared to women.

Further insight into these trends can be gleaned from analysing the changes in incidence, which we now turn to.

### 3.4 Change in incidence: 1995–2000 and 2000–2004

In this section we analyse the change in incidence for households between 1995, 2000, and 2004 by focussing only on the direction of change (see section 2.4).

Table 8 shows the proportion of households observing unfavourable or favourable changes to their tariff incidence between 1995–2000 or 2000–2004. The number of observations for each decile is displayed directly beneath the proportion. Favourable changes imply that the tariff incidence decreased; unfavourable changes imply that they increased.

Table 8: Change in incidence: 1995–2000 and 2000–2004

| Decile | Male HH in 1995–2000 | | Female HH in 1995–2000 | | Male HH in 2000–2004 | | Female HH in 2000–2004 | |
|---|---|---|---|---|---|---|---|---|
| | Unfavour-able | Favour-able | Unfavour-able | Favour-able | Unfavour-able | Favour-able | Unfavour-able | Favour-able |
| 1 | 0.54 | 0.46 | 0.61 | 0.39 | 0.33 | 0.67 | 0.25 | 0.75 |
| | 802 | 694 | 839 | 555 | 494 | 1002 | 363 | 1031 |
| 2 | 0.65 | 0.35 | 0.75 | 0.25 | 0.33 | 0.67 | 0.22 | 0.78 |
| | 906 | 473 | 1114 | 407 | 449 | 930 | 331 | 1190 |
| 3 | 0.64 | 0.36 | 0.77 | 0.23 | 0.36 | 0.64 | 0.24 | 0.76 |
| | 940 | 470 | 1078 | 352 | 487 | 923 | 336 | 1094 |
| 4 | 0.70 | 0.30 | 0.73 | 0.27 | 0.41 | 0.59 | 0.29 | 0.71 |
| | 1035 | 429 | 981 | 349 | 581 | 883 | 394 | 936 |
| 5 | 0.67 | 0.33 | 0.71 | 0.29 | 0.45 | 0.55 | 0.35 | 0.65 |
| | 1132 | 494 | 775 | 306 | 713 | 913 | 371 | 710 |
| 6 | 0.65 | 0.35 | 0.74 | 0.26 | 0.51 | 0.49 | 0.37 | 0.63 |
| | 1128 | 556 | 741 | 253 | 845 | 839 | 372 | 622 |
| 7 | 0.65 | 0.35 | 0.71 | 0.29 | 0.57 | 0.43 | 0.48 | 0.52 |
| | 1152 | 577 | 625 | 254 | 949 | 780 | 426 | 453 |
| 8 | 0.60 | 0.40 | 0.65 | 0.35 | 0.60 | 0.40 | 0.57 | 0.43 |
| | 1078 | 680 | 526 | 283 | 1011 | 747 | 462 | 347 |
| 9 | 0.48 | 0.52 | 0.58 | 0.42 | 0.54 | 0.46 | 0.52 | 0.48 |
| | 795 | 857 | 387 | 258 | 934 | 718 | 340 | 305 |
| 10 | 0.25 | 0.75 | 0.24 | 0.76 | 0.59 | 0.41 | 0.67 | 0.33 |
| | 487 | 1209 | 89 | 187 | 958 | 738 | 172 | 104 |
| Total | 0.56 | 0.44 | 0.69 | 0.31 | 0.49 | 0.51 | 0.35 | 0.65 |
| | 9455 | 6439 | 7155 | 3204 | 7421 | 8473 | 3567 | 6792 |

Regarding the change in incidence between 1995 and 2000 first, it is evident from the table that there are differences between male and female-headed households as we move up the expenditure distribution. Male households experience predominantly favourable shifts from the eighth decile upwards, while female households experience predominantly favourable shifts only from the ninth decile. Otherwise, within decile changes for men compared to women are generally very similar in direction (rather than magnitude, which we are not interested in here, but graph below to help isolate this component of the relationship).

Between 2000 and 2004 on the other hand, both male- and female-headed households experience identical trends in the change in incidence as we move up the expenditure distribution. All deciles witness favourable changes in their tariff incidence up until the tenth decile, which experiences predominantly unfavourable changes.

Generally, we can see from the table that the change in tariff incidence is predominantly unfavourable between 1995 and 2000, with the change in tariff regime benefiting the very wealthy. However, between 2000 and 2004, the change in tariff regime was generally pro-poor, *irrespective of the gender of the household head*. We can see these trends fairly clearly by plotting the binary indicator of un/favourable change against the continuous expenditure distribution.

In Figures 3 and 4, a U-shaped or inverted U-shaped cumulative sum curve indicates, respectively, a negative or a positive trend between those households that experienced favourable shifts in their tariff incidence. Note that all cumulative sum graphs presented

Figure 3: Cumulative sum of differenced distribution on ordered expenditure, 1995–2000

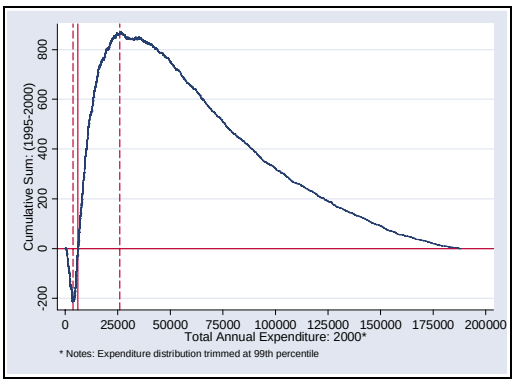
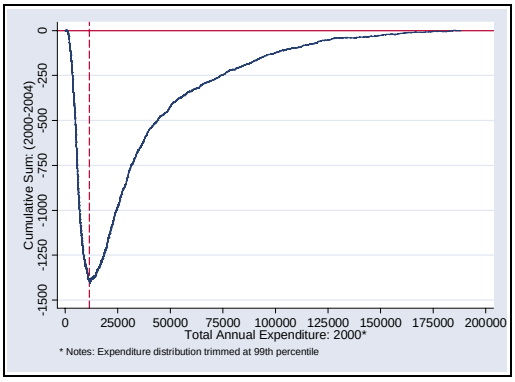



Figure 4: Cumulative sum of differenced distribution on ordered expenditure, 2000–2004



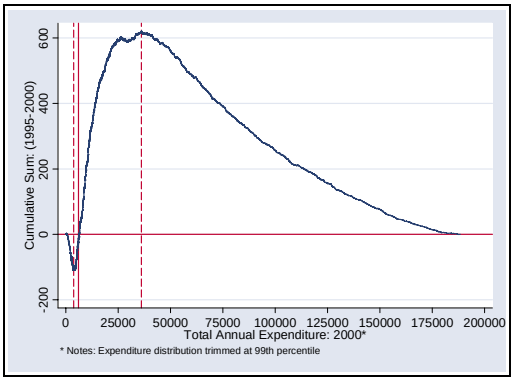
trim the expenditure distribution at the ninety-ninth percentile for presentation purposes.[4] The dashed vertical lines in the Figures approximate turning points in the distribution: in Figure 3, the first dashed vertical line is at R3,700 total household expenditure per annum, while the second dashed vertical line is at R26,000 per annum. The solid vertical line is at R6,000, which separates the cumulative sum curve from below-zero to above-zero. In Figure 4, the dashed vertical line (approximate turning point) is at R11,500 per annum.

The Figures show quite clearly that the change in tariff regime between 1995–2000 was very different to 2000–2004. They confirm that the former change was biased against the poor, while the latter in favour of the poor. Below we separate the trends by gender.

Figures 5 and 6 display the results for 1995–2000 only. The general direction of the curve for both male- and female-headed households is identical, though the turning points differ. For male-headed households, the dashed vertical lines (which approximate turning points) are placed at R3,700 and R36,000 per annum. For female-headed households, the lines are R3,700 and R25,000 respectively. The solid vertical line is approximated at R6,000 for male-headed households compared to R7,000 for female-headed households.

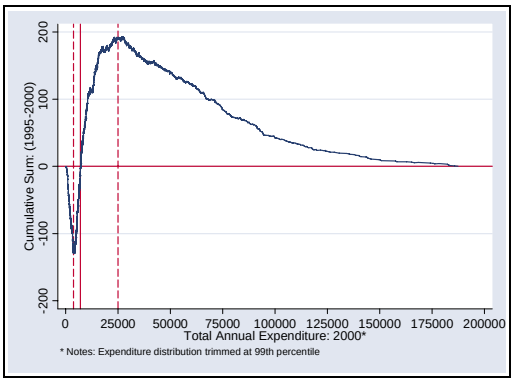
Therefore, while the general direction is similar to the overall population, the turning points are different between the sexes, with male-headed households experiencing predominantly negative changes for a greater range of the expenditure distribution: R3,700–R36,000 for men compared to R3,700–R25,000 for women. Consequently, it may be stated that male-headed households experienced unfavourable changes for a greater range of the expenditure distribution, which implies that even if they earned

Figure 5: Cumulative sum, 1995–2000: male headed households




4 This is simply a matter of convenience. South Africa has one of the highest inequality levels in the world, which in this context means that the x-axis on the graphs extend way beyond R200,000 total expenditure per annum maximum. Furthermore, it is possible to see that there are negligible changes to the incidence above this level because the curve approaches zero, demonstrating that the wealthier the household, the less significant changes to the tariff regime are to that household.

Figure 6: Cumulative sum, 1995–2000: female headed households




more than female-headed households (up to R37,000), their profile of consumption spending was sufficiently different to predispose them to negative impacts more than female-headed households. By corollary implication, female-headed households starting experiencing predominantly favourable changes to their tariff incident sooner than male-headed (>R25,000 compared to >R36,000).

Between 2000 and 2004, these curves change direction, mimicking the trends for the total population in Figure 4.

We can see that the curves are similar in direction and shape for both male and female headed households. In both Figure 7 and 8, the turning points (dashed vertical lines) are at R12,000 per annum, suggesting that most households that spend that level or less per month experienced positive changes to their tariff incidence. Therefore, both male- and-female-headed households experienced changes to their tariff incidence in an identical manner between 2000 and 2004.

By way of summary then, it may be stated that the change in tariff incidence between 1995–2000 and 2000–2004 was very different, and the cumulative sum curves confirmed the fact that the former period promoted change in favour of the wealthy, with the exception of the very poor spending less than R3,700 per annum. The change between 2000–2004 was completely the opposite, favouring the lower parts of the expenditure distribution. However, returning to the question of the below R3,700 per annum finding for 1995–2000, further analysis (not presented here) suggests that this is largely attributable to the population group of the household head, where only African households experience this below-R6,000 benefit; nowhere else. Further work should explore this dimension of the incidence in more detail.

As far as gender is concerned, it should be noted that the shape of the curves for male-headed and female-headed households followed exactly the same direction as the national trends in both comparisons. However, the range of the households that gained and lost between 1995–2000 differed, with clear ‘advantages’ associated with living in a female-headed household. This was not evident between 2000–2004, however, indicating that the change in tariff regime does not necessarily affect all households – even those earning similar incomes – equally.

Figure 7: Cumulative sum, 2000–2004: male headed households

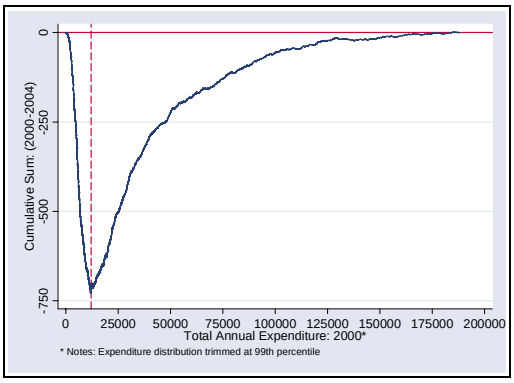
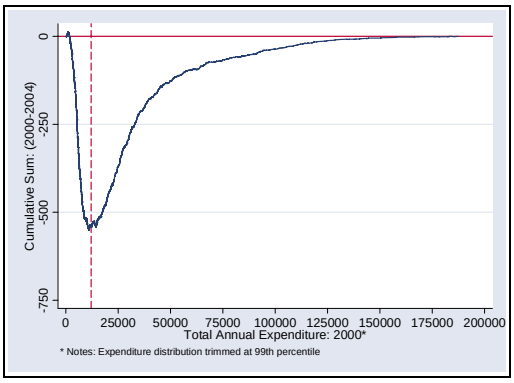



Figure 8: Cumulative sum, 2000–2004: female headed households




## 4 Conclusion

This paper has investigated the incidence of tariff liberalization and its differential effect on male- and female-headed households. It is a *ceteris paribus* study in the sense that the sole use of 2000 expenditure data is equivalent to holding all household characteristics constant. In many ways, this is the paper's greatest strength, for it is then possible to isolate the impact of the change in tariff regime on households. However it also constitutes a weakness to the extent that within-household preferences change over time.

For South Africa, tariff revenue between 1995 and 2000 decreased by 31 per cent compared to 18 per cent between 2000 and 2004. There were two implications of this reduction in tariffs: first, everybody benefited in the form of lower levels of expenditure on tariffs, constituting Pareto enhancing welfare effects given the perfect pass-through assumption. Second, the differences between households headed by men and women in 1995 were always larger than the differences in 2000, whereas the differences between 2000 and 2004 were smaller for deciles one through seven, and larger for deciles eight through ten. Therefore, the change in tariff regime between 1995 and 2000 led to smaller differences between male- and female-headed households, whereas the change between 2000 and 2004 actually served to increase the disparity for the majority of deciles in the expenditure distribution. These changes were not attributable to increases in tariff duties on alcohol and tobacco, which suggests a more complex dynamic at the household consumption level.

Results for the tariff incidence were separated into within-sex differences over time and between-sex differences in a single time period. Over time, there were almost always statistically significant changes to the incidence, suggesting that the change in tariff regime not only affected the absolute expenditures on tariffs (as discussed in the previous paragraph), but also the relative distribution of the incidence of those tariffs. This is an incredibly important finding, for it suggests that while there were welfare improvements attributable to lower spending on tariffs, there were *not* similar improvements to the incidence. In fact, between 1995 and 2000, all but the wealthiest two, (one in the case of women, deciles witnessed an increase in their tariff burden. Between 2000 and 2004, this result changed and showed pro-poor improvements to the incidence. Between-sex differences revealed that male-headed households always have a higher incidence estimate compared to female-headed, suggesting a more unequal distribution in the tariff incidence.

The change in tariff incidence between 1995–2000 and 2000–2004 relative to the continuous expenditure distribution was very different for the population as a whole, and the cumulative sum curves confirmed the fact that the former period promoted change in favour of the very poor, spending less than R3,700 per annum, and lower-middle to upper classes (>R26,000). Between 2000 and 2004, the cumulative sum curves demonstrated that the change in tariff regime promoted favourable change for those earning less than approximately R11,500 with all others above this level of expenditure experiencing predominantly unfavourable changes.

However, when these trends were separated by sex of household head, only the result for 2000–2004 remained completely valid. While the general direction of the curve between 1995–2000 was similar at the national level and between the sexes, the turning points were very different. Here, male-headed households experienced predominantly negative changes for a greater range of the expenditure distribution (R3,700–R36,000) compared to women (R3,700–R25,000). Consequently, it may be concluded that male-headed households experienced unfavourable changes for a greater range of the expenditure distribution, which implies that even if they earned more than female-headed households (up to R37,000), their profile of consumption spending was sufficiently different to predispose them to negative impacts more than female-headed households. Consequently, female-headed households started experiencing predominantly favourable changes to their tariff incidence sooner – relative to expenditure – compared to males between 1995 and 2000 (>R25,000 for women compared to >R36,000 for men). This suggests that the sex of the household head *matters*, and must be considered independently from anything else when considering the full scope of tariff liberalization.

An important feature of this analysis has been the methodological innovation introduced. Using an incidence analysis framework in this manner has the ability to inform governmental trade departments negotiating at the WTO or even within bilateral and plurilateral contexts. In other words, it can be used as a simulation exercise on proposed changes to tariffs associated with new, existing or modified agreements between a given country and its trading partners. Here, the incidence methodology allows fairly precise calculations to be made across the income distribution, and in so doing it provides an additional analytical basis to make decisions about trade policy. In such an exercise, cognisance must be taken of the proportion of total government

revenue attributable to tariffs and the potential loss of revenue associated with tariff reductions.

Changes to the tariff incidence by sex of household head must be situated theoretically at least within the debate on intra-household resource allocation. It is here that there is a priori reason to suspect differences between male- or female-headed households. To the extent that material differences exist in consumption patterns, these are then transmitted through to the tariff incidence. In the discourse on globalization and poverty, this dimension of the transmission mechanism if often tougher to deal with analytically because of the numerous steps required to draw logical and consistent inferences. This paper has targeted one such dimension by analysing tariffs, and it was found that there is prima facie evidence to suggest that female-headed households do indeed allocate resources in a manner that better promotes the well-being of other family members when compared to male-headed households.

Policy recommendations flowing from the analysis in this paper clearly point to the risks associated with imposing additional costs on consumption goods that constitute a large fraction of poorer households' expenditures. Since tariffs act as a regressive tax, they must be treated as such. Consequently, tariffs on food goods must be carefully considered in conjunction with the additional indirect costs on those goods that may be imposed by, for example, indirect taxes (e.g. value-added tax). The regressivity of tariffs is clearly also entirely dependent on the share of the given line item in poor peoples' budgets. Consequently, all food groups and goods should not be treated equally when conducting trade negotiations, and governments should weigh staple foods much more highly than other foods.

Having noted the partial nature of benefit incidence analyses, the gender dimension of the incidence points to the fact that the targeting mechanism in any grant-based programme to mitigate the negative effects of globalization (e.g. job losses) must be very carefully designed. Targeting households as opposed to specific individuals within them raises efficacy problems and potential resource allocation problems. However, the information requirements for this are large, possibly increasing administration costs and reducing the efficacy of the effort. It is important to state that one of the limitations of this analysis is that it has focussed on an implicit *de jure* definition of the household head. This is known to be a highly imperfect measurement, and further research on within-household resource allocation should be explored in connection with headship status to determine the extent of measurement error in this regard.

Finally, it should be noted that the results in this study are sensitive to the perfect pass-through assumption. This effectively assumes that market structures are conducive to transmitting the change in tariffs to final retail prices. For poor nations, this may not always be the case, and in these circumstances, competition policy in the retail industry must be considered *in addition to* trade policy. Collusion and oligopoly structures can work to actively undermine the hard work of trade departments.

## Appendix

Appendix 1: Supply and use (SU) table average tariffs (including duties) per commodity group: 1995, 2000, and 2004

| SU Code | Description | 1995 | 2000 | 2004 | SU Code | Description | 1995 | 2000 | 2004 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Agriculture | 8.18 | 5.74 | 3.28 | 49 | Iron and steel | 7.44 | 4.33 | 3.89 |
| 2 | Coal | 0.00 | 0.00 | 0.00 | 50 | Non-ferrous metals | 7.20 | 2.43 | 1.98 |
| 3 | Gold | 8.00 | 0.00 | 0.00 | 51 | Structural metal | 10.54 | 4.17 | 4.04 |
| 4 | Other mining | 2.24 | 0.97 | 0.90 | 52 | Treated metal products | 0.00 | 0.00 | 0.00 |
| 5 | Meat | 25.26 | 17.67 | 15.45 | 53 | General hardware | 14.31 | 10.46 | 10.24 |
| 6 | Fish | 18.25 | 11.55 | 4.53 | 54 | Fabricated metal | 15.04 | 7.05 | 6.80 |
| 7 | Fruit | 20.06 | 16.65 | 15.01 | 55 | Engines | 6.86 | 3.75 | 2.13 |
| 8 | Oils | 13.03 | 6.48 | 7.44 | 56 | Pumps | 8.99 | 5.40 | 4.89 |
| 9 | Dairy | 32.78 | 31.97 | 18.95 | 57 | Gears | 7.62 | 6.33 | 5.96 |
| 10 | Grain mills | 6.28 | 8.96 | 6.46 | 58 | Lifting equipment | 9.29 | 3.73 | 3.09 |
| 11 | Animal feeds | 5.65 | 4.00 | 4.02 | 59 | General machinery | 6.59 | 3.22 | 2.94 |
| 12 | Bakeries | 43.34 | 23.75 | 20.45 | 60 | Agricultural machinery | 5.25 | 2.12 | 2.03 |
| 13 | Sugar | 25.96 | 33.60 | 13.32 | 61 | Machine-tools | 3.27 | 1.59 | 1.62 |
| 14 | Confectionery | 29.15 | 15.25 | 14.82 | 62 | Mining machinery | 5.31 | 0.69 | 0.72 |
| 15 | Other food | 14.21 | 12.70 | 12.08 | 63 | Food machinery | 3.12 | 0.00 | 0.00 |
| 16 | Bev. and tob. | 39.53 | 23.87 | 20.97 | 64 | Special machinery | 6.75 | 3.26 | 2.40 |
| 17 | Textiles | 40.64 | 27.78 | 15.77 | 65 | Household appliances | 24.35 | 13.25 | 12.53 |
| 18 | Textile articles | 40.55 | 29.29 | 24.17 | 66 | Office machinery | 0.00 | 0.00 | 0.00 |
| 19 | Carpets | 38.49 | 30.00 | 25.49 | 67 | Electric motors | 14.10 | 7.75 | 7.30 |
| 20 | Other textiles | 18.50 | 15.44 | 12.98 | 68 | Electricity apparatus | 12.32 | 7.92 | 7.11 |
| 21 | Knitting mills | 51.40 | 31.46 | 19.75 | 69 | Wire and cable | 14.30 | 13.50 | 12.78 |
| 22 | Wearing apparel | 77.01 | 52.94 | 34.66 | 70 | Accumulators | 19.51 | 7.90 | 7.37 |
| 23 | Leather | 8.25 | 4.35 | 4.02 | 71 | Lighting equipment | 24.79 | 11.12 | 10.70 |
| 24 | Handbags | 38.25 | 25.00 | 24.73 | 72 | Electrical equipment | 8.00 | 2.78 | 2.73 |
| 25 | Footwear | 37.74 | 22.96 | 22.40 | 73 | Radio and television | 17.19 | 3.16 | 2.73 |
| 26 | Wood | 13.68 | 8.93 | 8.67 | 74 | Optical instruments | 8.13 | 0.33 | 0.33 |
| 27 | Paper | 7.06 | 5.38 | 5.62 | 75 | Motor vehicles | 31.59 | 19.25 | 15.31 |
| 28 | Paper containers | 15.86 | 10.57 | 8.72 | 76 | Motor vehicle parts | 12.05 | 15.41 | 13.97 |
| 29 | Other paper | 12.79 | 8.93 | 8.53 | 77 | Other transport | 8.04 | 0.80 | 0.85 |
| 30 | Publishing | 10.69 | 6.21 | 6.09 | 78 | Furniture | 28.97 | 17.60 | 17.37 |
| 31 | Recorded media | 15.03 | 0.91 | 0.45 | 79 | Jewellery | 23.93 | 8.33 | 7.73 |
| 32 | Petroleum | 12.91 | 4.56 | 3.37 | 80 | Other manufacturing | 20.96 | 6.56 | 5.81 |
| 33 | Basic chemicals | 7.28 | 1.37 | 1.39 | 81 | Electricity | 0.00 | 0.00 | 0.00 |
| 34 | Fertilizers | 0.35 | 0.00 | 0.00 | 82 | Water | 0.00 | 0.00 | 0.00 |
| 35 | Primary plastics | 6.31 | 4.62 | 4.26 | 83 | Buildings | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 36 | Pesticides | 9.20 | 6.67 | 6.66 | 84 | Other constructions | 0.00 | 0.00 | 0.00 |
| 37 | Paints | 14.79 | 4.09 | 4.09 | 85 | Trade services | 0.00 | 0.00 | 0.00 |
| 38 | Pharmaceuticals | 6.14 | 0.84 | 1.03 | 86 | Accommodation | 0.00 | 0.00 | 0.00 |
| 39 | Soap | 39.55 | 16.11 | 15.21 | 87 | Transport services | 0.00 | 0.00 | 0.00 |
| 40 | Other chemicals | 9.18 | 3.84 | 3.48 | 88 | Communications | 0.00 | 0.00 | 0.00 |
| 41 | Tyres | 15.53 | 18.17 | 12.51 | 89 | FSIM | 0.00 | 0.00 | 0.00 |
| 42 | Other rubber | 15.19 | 10.00 | 9.54 | 90 | Insurance services | 0.00 | 0.00 | 0.00 |
| 43 | Plastic | 16.44 | 10.11 | 9.65 | 91 | Real estate services | 0.00 | 0.00 | 0.00 |
| 44 | Glass | 14.09 | 7.56 | 7.31 | 92 | Other business services | 0.00 | 0.00 | 0.00 |
| 45 | Non-structural ceramics | 23.36 | 11.33 | 11.33 | 93 | Government services | 0.00 | 0.00 | 0.00 |
| 46 | Structural ceramics | 9.53 | 4.44 | 4.44 | 94 | Health and social work | 0.00 | 0.00 | 0.00 |
| 47 | Cement | 0.73 | 0.00 | 0.00 | 95 | Other services/activities | 0.00 | 0.00 | 0.00 |
| 48 | Other non-metallic | 9.07 | 5.07 | 5.40 | 96 | Household domestic services | 0.00 | 0.00 | 0.00 |

Appendix 2: Consumption schedules by decile and sex of household head

| Expen Decile | Sex | Food and bev. | Alcohol and tob. | Cloth and textile | Accom moda-tion | Traded vehicle parts | Personal goods | HH goods | HH service |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Male | 52.3 | 5.9 | 4.9 | 2.5 | 0.0 | 10.0 | 10.5 | 13.9 |
| | Female | 54.9 | 1.2 | 6.2 | 2.8 | 0.0 | 10.9 | 10.3 | 13.8 |
| 2 | Male | 53.0 | 5.2 | 6.1 | 3.5 | 0.0 | 8.1 | 9.0 | 15.0 |
| | Female | 55.7 | 1.0 | 6.6 | 2.8 | 0.0 | 9.0 | 9.1 | 15.7 |
| 3 | Male | 49.4 | 4.6 | 7.1 | 4.4 | 0.1 | 7.6 | 9.5 | 17.4 |
| | Female | 53.0 | 1.4 | 7.6 | 3.0 | 0.0 | 8.5 | 9.1 | 17.5 |
| 4 | Male | 45.5 | 4.9 | 8.0 | 5.4 | 0.1 | 7.0 | 8.8 | 20.3 |
| | Female | 50.3 | 1.2 | 7.8 | 3.3 | 0.0 | 8.0 | 9.2 | 20.1 |
| 5 | Male | 42.3 | 4.6 | 9.2 | 4.9 | 0.1 | 6.5 | 10.0 | 22.5 |
| | Female | 46.6 | 1.8 | 8.2 | 3.7 | 0.0 | 7.6 | 9.7 | 22.3 |
| 6 | Male | 38.7 | 5.1 | 9.0 | 5.0 | 0.5 | 6.0 | 10.5 | 25.3 |
| | Female | 43.2 | 1.7 | 8.2 | 4.2 | 0.0 | 6.9 | 9.5 | 26.2 |
| 7 | Male | 34.7 | 4.7 | 8.8 | 5.4 | 0.3 | 5.6 | 11.3 | 29.2 |
| | Female | 37.9 | 1.7 | 8.6 | 5.4 | 0.1 | 6.3 | 10.0 | 29.9 |
| 8 | Male | 30.5 | 3.8 | 7.8 | 5.9 | 0.9 | 5.0 | 12.3 | 33.8 |
| | Female | 31.7 | 2.1 | 8.5 | 5.9 | 0.3 | 5.6 | 10.6 | 35.3 |
| 9 | Male | 23.6 | 2.6 | 6.5 | 6.3 | 2.6 | 4.2 | 13.5 | 40.8 |
| | Female | 23.3 | 1.6 | 7.2 | 8.1 | 1.8 | 4.8 | 11.5 | 41.6 |
| 10 | Male | 15.1 | 1.9 | 4.2 | 4.4 | 7.0 | 3.4 | 13.6 | 50.4 |
| | Female | 16.1 | 1.8 | 4.6 | 6.7 | 6.0 | 3.7 | 13.5 | 47.6 |

Appendix 3: Mean decile estimates of expenditure on tariffs as a per cent of total expenditure

| Decile | Sex | 1995 | 2000 | 2004 | Observations | Pop. size |
|---|---|---|---|---|---|---|
| 1 | Male | 16.08 | 11.38 | 9.15 | 1,496 | 562,008 |
| | Female | 15.59 | 11.23 | 8.86 | 1,394 | 540,642 |
| 2 | Male | 15.85 | 11.42 | 9.18 | 1,379 | 507,312 |
| | Female | 15.21 | 11.19 | 8.82 | 1,521 | 597,170 |
| 3 | Male | 15.53 | 11.12 | 8.99 | 1,410 | 536,028 |
| | Female | 15.19 | 11.12 | 8.85 | 1,430 | 567,701 |
| 4 | Male | 15.13 | 10.89 | 8.87 | 1,464 | 561,036 |
| | Female | 14.93 | 10.84 | 8.74 | 1,330 | 542,639 |
| 5 | Male | 15.09 | 10.77 | 8.83 | 1,626 | 661,594 |
| | Female | 14.68 | 10.56 | 8.59 | 1,081 | 442,500 |
| 6 | Male | 14.75 | 10.47 | 8.66 | 1,684 | 700,960 |
| | Female | 14.06 | 10.10 | 8.25 | 994 | 403,786 |
| 7 | Male | 13.92 | 9.84 | 8.17 | 1,729 | 740,942 |
| | Female | 13.40 | 9.58 | 7.88 | 879 | 362,048 |
| 8 | Male | 12.60 | 8.85 | 7.37 | 1,758 | 763,326 |
| | Female | 12.34 | 8.75 | 7.26 | 809 | 341,243 |
| 9 | Male | 10.77 | 7.48 | 6.22 | 1,652 | 786,939 |
| | Female | 10.43 | 7.30 | 6.06 | 645 | 316,962 |
| 10 | Male | 8.80 | 5.95 | 4.95 | 1,696 | 951,339 |
| | Female | 9.03 | 6.11 | 5.10 | 276 | 151,549 |

Appendix 4: Mean incidence per decile and sex of household head

| Decile | Sex | 1995 | 2000 | 2004 | Observations | Pop. size |
|---|---|---|---|---|---|---|
| 1 | Male | 0.0056 | 0.0057 | 0.0056 | 1,496 | 562,008 |
| | Female | 0.0055 | 0.0057 | 0.0055 | 1,394 | 540,642 |
| 2 | Male | 0.0106 | 0.0110 | 0.0107 | 1,379 | 507,312 |
| | Female | 0.0102 | 0.0108 | 0.0103 | 1,521 | 597,170 |
| 3 | Male | 0.0142 | 0.0146 | 0.0143 | 1,410 | 536,028 |
| | Female | 0.0138 | 0.0144 | 0.0139 | 1,430 | 567,701 |
| 4 | Male | 0.0184 | 0.0189 | 0.0186 | 1,464 | 561,036 |
| | Female | 0.0180 | 0.0187 | 0.0183 | 1,330 | 542,639 |
| 5 | Male | 0.0238 | 0.0243 | 0.0241 | 1,626 | 661,594 |
| | Female | 0.0230 | 0.0237 | 0.0233 | 1,081 | 442,500 |
| 6 | Male | 0.0304 | 0.0308 | 0.0309 | 1,684 | 700,960 |
| | Female | 0.0290 | 0.0298 | 0.0295 | 994 | 403,786 |
| 7 | Male | 0.0390 | 0.0394 | 0.0397 | 1,729 | 740,942 |
| | Female | 0.0377 | 0.0386 | 0.0385 | 879 | 362,048 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | Male | 0.0524 | 0.0527 | 0.0531 | 1,758 | 763,326 |
| | Female | 0.0503 | 0.0511 | 0.0514 | 809 | 341,243 |
| 9 | Male | 0.0756 | 0.0750 | 0.0755 | 1,652 | 786,939 |
| | Female | 0.0702 | 0.0703 | 0.0707 | 645 | 316,962 |
| 10 | Male | 0.1640 | 0.1576 | 0.1588 | 1,696 | 951,339 |
| | Female | 0.1333 | 0.1287 | 0.1303 | 276 | 151,549 |

Note: * Estimates multiplied by factor 1000

Appendix 5: Cumulative incidence per quantile and sex of household head

| Quan-tile | Total Male | Total Female | 1995 Male | 1995 Female | 2000 Male | 2000 Female | 2004 Male | 2004 Female |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.27 | 0.46 | 0.37 | 0.53 | 0.38 | 0.53 | 0.37 | 0.51 |
| 2 | 0.79 | 1.32 | 1.09 | 1.54 | 1.12 | 1.56 | 1.08 | 1.5 |
| 3 | 1.49 | 2.44 | 2.05 | 2.84 | 2.11 | 2.89 | 2.05 | 2.79 |
| 4 | 2.34 | 3.78 | 3.23 | 4.4 | 3.34 | 4.51 | 3.25 | 4.34 |
| 5 | 3.37 | 5.3 | 4.64 | 6.21 | 4.8 | 6.38 | 4.67 | 6.14 |
| 6 | 4.58 | 6.99 | 6.29 | 8.23 | 6.51 | 8.48 | 6.36 | 8.17 |
| 7 | 6.01 | 8.85 | 8.2 | 10.49 | 8.5 | 10.81 | 8.31 | 10.44 |
| 8 | 7.63 | 10.92 | 10.41 | 13.01 | 10.77 | 13.39 | 10.56 | 12.96 |
| 9 | 9.49 | 13.24 | 12.9 | 15.78 | 13.33 | 16.25 | 13.1 | 15.74 |
| 10 | 11.61 | 15.82 | 15.73 | 18.86 | 16.23 | 19.38 | 15.98 | 18.83 |
| 11 | 14.05 | 18.71 | 18.92 | 22.26 | 19.5 | 22.85 | 19.24 | 22.24 |
| 12 | 16.88 | 21.97 | 22.53 | 26.05 | 23.19 | 26.71 | 22.92 | 26.06 |
| 13 | 20.2 | 25.65 | 26.62 | 30.31 | 27.35 | 31.04 | 27.11 | 30.33 |
| 14 | 24.22 | 29.93 | 31.3 | 35.16 | 32.11 | 35.92 | 31.85 | 35.19 |
| 15 | 29.13 | 34.92 | 36.73 | 40.69 | 37.62 | 41.52 | 37.37 | 40.78 |
| 16 | 35.32 | 40.98 | 43.09 | 47.15 | 44.04 | 48.02 | 43.84 | 47.31 |
| 17 | 43.4 | 48.46 | 50.8 | 54.89 | 51.73 | 55.76 | 51.51 | 55.11 |
| 18 | 54.17 | 58.32 | 60.34 | 64.43 | 61.33 | 65.33 | 61.11 | 64.7 |
| 19 | 69.51 | 71.96 | 73.52 | 77.02 | 74.34 | 77.73 | 74.23 | 77.31 |
| 20 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

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