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Accounting for Trends in Charitable Tax Deductions: Framework and Application to the District of Columbia

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Abstract

Charitable tax deductions are one of the largest tax expenditures at the state and federal levels, and they are also crucial for the sustainability of the charitable nonprofit sector. Understanding some of the factors that drive changes in charitable tax deductions over time is needed to inform policy. This paper uses a simple multiplicative decomposition to analyze trends in charitable tax deductions with an application to data from the District of Columbia over the period 2001-2011, thus including the recent recession. The decomposition shows how changes in the District's population, the share of the population that files tax returns, the share of filers that claim the deduction, the average adjusted gross income of filers, and the average deduction claimed by claimants all contributed to the overall changes in the level of the deductions. The decomposition is applied for the District's population as a whole as well as by income group.

Keywords: Itemized tax deductions, charitable giving, District of Columbia.

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1. Introduction

Itemized deductions, including the charitable tax deduction, represent significant tax expenditures[2] at federal level. A third of US taxpayers itemize deductions in their tax returns, and the cost for fiscal year 2014 of the charitable deduction was estimated at $43.6 million by the Joint Committee on Taxation (2013). While this is smaller than the cost of the mortgage interest deduction ($71.1 billion) and the local and state tax deduction ($51.8 billion), it is a substantial expenditure and it is larger than the cost of the real estate taxes deduction ($28.6 million).

The charitable tax deduction was enacted in 1917, only four years after the income tax, but it has been the subject in recent years of a debate as to whether it makes sense, and whether reforms are in order at a time of large budget deficits. There is a common perception that lower income households give more as a percentage of their income to charity (whether they itemize such giving in tax returns or not), but this perception has been challenged on the grounds that part of the research considered only those who gave to charity, as opposed to the whole population (Schervish et al., 2002). What is clear however is that the benefits of the tax deduction itself tend to accrue to comparatively wealthier households. The regressive character of the deduction stems not only from the ability of wealthier households to give more in absolute terms, but also from the progressivity of marginal income tax rates and the fact that lower and middle income tax payers may be better off opting for the standard deduction if their charitable and other deductions (such as the mortgage interest deduction) are not large enough. Furthermore, some have argued that the deduction essentially provides subsidies to charities favored by the wealthy (Reich, 2005; Fleisher, 2008), so that in the extreme the deduction might subsidize the private tastes of the elite instead of serving core social purposes for those in need.

Another critique is that the deduction may not be efficient in generating substantially higher levels of charitable giving, in part because the elasticity of charitable deductions to the marginal tax rate may not be high even if it increases with higher levels of giving (on such estimates, see Barrett et al., 1997; Auten et al., 2002; Fack and Landais, 2010; Bakija and Heim, 2011; Tiehen, 2001; Bönke et al., 2013). As noted by Andreoni (2008), a unitary elasticity would lead private donations to match foregone tax revenues. But it could be that the elasticity is lower (Gravelle and Sherlock, 2009). On the other hand, even if the elasticity of deductions to marginal tax rates is lower than expected, the ability of nonprofits to sustain their charitable work would be curtailed without the deduction (Feldstein, 1975; List, 2011), even if not all nonprofits would be affected similarly (Brooks, 2007; Hossain and Lamb, 2012; Yetman and Yetman, 2013). In the current context of high deficits, the charitable deduction has been a target of reform proposals (e.g., Domenici and Rivlin, 2010; see also Colinvaux et al., 2012), with various attempts at assessing the likely costs and benefits for various parties of these proposals (e.g., Cordes, 2011).

While much of the research on the charitable tax deduction focuses on the federal level, the deduction also matters to states and local authorities. In the District of Columbia, among the category of tax expenditures related to federal conformity provisions, the cost of the charitable deduction was $54.5 million in 2012 (Juffras, 2013). This is again about only two thirds of the cost of the mortgage deduction ($87.0 million), but still very large. And as observed at the federal level, there has been a substantial increase in deductions in the District in recent years.

[2] The concept of tax expenditure was coined in 1967 by Stanley Surrey and later defined more precisely by the Congressional Budget Act of 1974 as follows: "Revenue losses attributable to provisions of the … tax laws which allow a special exclusion, exemption, or deduction from gross income or which provide a special credit, a preferential rate of tax, or a deferral of tax liability" (quote reproduced from Juffras, 2013).

This paper was written from the point of view of a local revenue authority – namely the Office of Revenue Analysis of the District of Columbia. The objective of the paper is limited, but still important: it is to help give local policy makers a sense of recent changes in the level of the deductions over time, and what some of the factors that have led to these changes are. Achieving such a basic understanding of changes in the levels of the deductions is not only a requirement for tax and revenue projections, but also a first step before thinking about policy options. To that end, the paper relies on a simple multiplicative decomposition to assess key factors that have led to changes over time in charitable tax deductions for the district as a whole and by income group.

The case of the District of Columbia is interesting for this analysis because three different periods can be outlined over the last decade with very different outcomes for the level of charitable deductions. In the first few years of the millennium, the District was still in a difficult situation with a declining population and a weak financial position. During that period, charitable deductions stagnated. Next, the District benefited from a substantial turnaround, not only in terms of average incomes but also in terms of rapid population growth. This turnaround in the District together with external events (including Hurricane Katrina) led to a dramatic increase in charitable deductions in just one year, after which deductions the level of the deductions remained high but flat for two years (on modeling charitable donations after natural disasters, see Brown yet al., 2012). The next phase corresponded to the great recession. Even though the District was somewhat spared from the worst effects of the downturn thanks to its federal workforce and the impact of the stimulus, charitable deduction declined sharply as of 2009. Clearly, a lot happened in the decade, and the decomposition proposed in the paper helps to show how various phases affected the levels of deductions overall and by income group.

The structure of the paper is as follows. Section 2 provides the decomposition of the levels of and changes over time in deductions into a number of factors contributing to those levels and changes – namely a jurisdiction's population, the share of the population filing tax returns, the share of filers who claim the charitable deduction, the average income of filers, and the average charitable deduction among claimants as a share of the average income of filers. Section 3 provides the results of the decomposition for the District. A brief conclusion follows.

2. Methodology

In order to analyze trends in charitable tax deductions in the District of Columbia, we use a simple multiplicative decomposition initially proposed by Wodon (2013) for the analysis of mortgage deductions. Define the total amount of charitable deductions by *TD*, which stands for total deductions. If *P* is the population of the District, *F* is the number of income tax filers, *D* is the number of filers who claim a charitable deduction, *AY* is the average federal gross adjusted income of filers, and $AD|D$ is the average charitable deduction claimed among filers who claim a charitable deduction, the following accounting identity holds:

$$TD = \left(P \times \frac{F}{P} \times \frac{D}{F} \right) \times \left(AY \times \frac{AD \mid D}{AY} \right) \tag{1}$$

In equations (1) the use of the conditional symbol "|" indicates that for the last term in the decomposition, the average charitable deduction is estimated among filers with a charitable deduction and not among all filers. Since the decomposition is multiplicative, for small enough

changes the proportional change over time in total deductions between an initial period *s* and a final period *t* can be approximated in additive terms, as follows:

$$\Delta TD / TD_s = (TD_t - TD_s)/TD_s \approx (\ln P_t - \ln P_s) + (\ln \frac{F_t}{P_t} - \ln \frac{F_s}{P_s})$$
$$+ (\ln \frac{D_t}{F_t} - \ln \frac{D_s}{F_s}) + (\ln AY_t - \ln AY_s) + (\ln \frac{AD \mid D_t}{AY_t} - \ln \frac{AD \mid D_s}{AY_s}) \quad (2)$$

The potential usefulness of the decomposition is that it highlights five different factors that may affect deductions: change in the population of the District, change in the share of the population that files, changes in the share of filers claiming a charitable tax deduction, change in the average income of filers, and change in the average deduction of filers among those who deduct. Note that the approximation in (2) is valid only for small enough changes. If changes are substantial, one way to get the decomposition to work is to look at changes from one year to the next. Alternatively, when looking at changes over longer period of changes, average annual rates of changes can be used. As will be shown in section 3, this works very well for the District.

In addition to estimating the decomposition for the population as a whole, it is interesting to implement it by income group or, alternatively, by types of filers, comparing for example those married filing jointly with those married filing separately. In this paper, the focus is on income groups. Denoting different tax filers groups by *i=1, …n*, the decomposition is:

$$TD_t = \sum_{i=1}^{n} TD_{it} = \sum_{i=1}^{n} \left(P_t \times \frac{F_t}{P_t} \right) \left(\frac{F_{it}}{F_t} \times \frac{D_{it}}{F_{it}} \right) \left(AY_{it} \times \frac{AD \mid D_{it}}{AY_{it}} \right) \quad (3)$$

Note that in (3) there is an additional term in the decomposition which corresponds to the share of filers in different groups (F_i/F). Proportional changes over time from a baseline can be estimated for each group as done in (2). Five income groups will be distinguished in this paper: according to the following income thresholds: $50,000 or less, $50,000 to $75,000, $75,000 to $100,000, $100,000 to $200,000, $200,000 to $500,000, and above $500,000. For ease of interpretation, the income groups are defined using the same threshold over time in nominal terms. However, average income and average tax deductions are estimated in real terms, in constant US$ of 2011. The deflator used is the consumer price index for the Baltimore-Washingt0n DC metropolitan area. Conducting the analysis in real terms as opposed to nominal terms matters since the cumulative rate of inflation in the decade is at close 30 percent.

3. Results

Table 1 presents key results for the decade as a whole using a tax return database from the DC Office of Revenue Analysis. Detailed results by year are available in an appendix table and will be discussed later. Between 2002 and 2011, total charitable deductions in the District of Columbia increased by about half in real terms from $569.7 million to $834.9 million in real terms. This represents an annual growth rate of 4.31 percent per year. The decomposition of the growth rate in logarithmic terms generates an estimate of the annual growth rate of 4.25 percent

per year, which is very close to the actual value. The growth rate of 4.25 percent per year is itself the sum of the overall population growth rate over the decade (0.83 per year), the increase in the number of filers as a share of the population (1.93 percent per year), the increase of the share of filers who itemized their charitable donation (1.09 percent per year), the decrease in the average gross income of filers due in large part to the recent recession (-1.70 percent per year), and the increase in the share of the average deduction among claimants as a share of the average income of all filers (2.08 percent per year). Thus, with the exception of the reduction in gross average incomes over the decade as a whole, all other factors in the decomposition contributed to the growth in charitable deductions between 2002 and 2011.

The story on a year to year basis is however more complex. The detailed data available in appendix suggest four very different phases during the decade. The first phase runs from 2002 to 2005. In that period the level of charitable deductions did not increase much – there was an increase in 2003 and 2004, but a decrease in 2005 to virtually the same level as that observed in 2002. This was a period during which the District of Columbia was still in a difficult financial situation, or only emerging slowly from that situation, and during which population and incomes declined. The number of filers as a share of the total population increased only slightly during those years, while the share of those itemizing charitable deductions and the average deduction by claimants as a share of the filers' adjusted gross income remained essentially flat.

Next, in just one year charitable deductions almost doubled from their low of $560.8 million in 2005 to their peak of $1,058.7 million in 2006 (in US$ 2011 value). This is an astounding increase which is likely to have been caused by a remarkable combination of factors. First, the data shows that this year marked the rebound of the city at least in terms of the growth in the adjusted gross income of filers (the growth in the population started the following year). The average adjusted gross income increased from $77,287 (in US$ 2011 value) to $93,489. Some of this may have been related to improving job opportunities in the District, but some may also have been related to a booming stock market and the realization of capital gains. In addition, dramatic events that occurred in 2005, including Hurricane Katrina, generated an outpouring of generosity not only in 2005 but also in 2006. Charitable deductions were further encouraged through tax incentive measures adopted under the Katrina Emergency Tax Relief Act of 2005 (KETRA) and the Gulf Opportunity Zone Act of 2005 which extended these provisions to areas affected by Hurricanes Rita and Wilma. The detailed decomposition results in the appendix table show that while the share of filers in the population increased between 2005 and 2006, the largest proportional increases were in terms of the share of filers who itemized, their adjusted gross income, and the average value of the deductions among claimants as a share of the average adjusted gross income of filers.

Table 1: Summary Results for the Period as a Whole, 2002-2011 (%)

	All	<50k	50k-75k	75k-100k	100k-200k	200k-500k	>500k
Charitable deductions							
Initial value, 2002 ($ millions, in US$ 2011)	569.7	130.0	83.7	72.1	85.6	69.3	128.9
Final values, 2011 ($ millions)	834.9	90.4	85.1	70.1	142.1	109.0	338.3
Annual growth rate (*) (%)	4.31	-3.71	0.58	-0.07	5.99	5.52	11.10
Decomposition initial values, 2002							
Population (thousands)	574.5	-	-	-	-	-	-
Filers (thousands)	245.8	-	-	-	-	-	-
Filers by income group (thousands)	-	169.5	31.9	15.8	19.7	6.8	2.0
Filers itemizing deductions (thousands)	86.6	35.0	18.4	11.0	15.2	5.5	1.6
Average income ($ thousands, real 2011) (**)	76,312	27,580	79,204	111,599	176,304	375,344	1,854,430
Average deduction if >0 ($ thousands, real 2011)	6.6	3.7	4.6	6.6	5.6	12.6	82.9
Decomposition final values, 2011							
Population (thousands)	619.0	-	-	-	-	-	-
Filers (thousands)	315.4	-	-	-	-	-	-
Filers by income group (thousands)	-	176.7	48.1	27.9	41.4	17.0	4.3
Filers itemizing deductions (thousands)	122.6	28.7	19.9	18.6	34.1	16.5	4.7
Average income ($ thousands, real 2011)	84,986	21,260	61,179	86,412	137,773	287,923	1,656,000
Average deduction if >0 ($ thousands, real 2011)	6.8	3.1	4.3	3.8	4.2	6.6	72.3
Decomposition of growth rate							
Population (%)	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Filers/population (%)	1.94	1.94	1.94	1.94	1.94	1.94	1.94
Filers group share (%)	-	-2.31	1.80	3.51	5.49	7.41	5.54
Itemizing deductions/filers (%)	1.09	-2.66	-3.68	-0.38	0.74	2.02	3.92
Average income (%)	-1.70	-5.79	-5.76	-5.74	-5.63	-5.84	-4.15
Average deduction/income (%)	2.08	3.94	5.06	-0.47	2.26	-1.33	2.65
Sum of annual growth rates (*)(%)	4.25	-4.04	0.18	0.31	5.63	5.02	10.72

Source: Authors' computations.

Note: (*) the annual rate of change is the compounded year-on-year change estimated through a power function; it is not the cumulative change between the initial and final years divided by the number of years between the two dates. (**) In the base year 2002, the average incomes by group may be higher than the upper bound because the average incomes are adjusted for inflation to reflect US$ 2011 values, while the interval bounds for the groups are not adjusted.

For the next two years, the level of the deductions remained fairly flat. Adjusted gross incomes fell in 2008 as the recession and stock market downturn hit, but deductions were sustained thanks to population growth, steady shares of filers in the population and itemizers among filers, and higher average deductions among claimants as a share of the adjusted gross income of filers. Deductions then dropped in 2009, as incomes fell further due to the recession, and the share of itemizers as well as the average value of the charitable deduction as a share of adjusted gross income also fell. Since 2009, the level of deductions has remained relatively flat, with a further decrease in 2010, but a corresponding rebound in 2011 despite the weak economy.

Beyond looking at trends for the district as a whole, it is also useful to look at trends by income group. This can be done for the overall decade in table 1, or by year in the appendix table. Considering first the trend for the decade as a whole, it is striking that deductions have become much more concentrated among top income brackets. The level of the deductions in the bottom three income brackets actually fell between 2002 and 2011, while in the top bracket consisting of filers with over $500,000 in annual adjusted gross income, the annual rate of growth in the deductions was in the double digits at 11.10 percent. Part of those shifts is mechanical and due to the fact that the income brackets have been kept constant in nominal terms for the analysis, as is often done. Just with inflation and without income growth in real terms, this means that some filers will move from lower to upper brackets, so that at least for the bottom income group, the share of individuals in that lower bracket will decrease.

But the shifts are much more fundamental than what could be explained by inflation alone. The district has been attracting in recent year a more wealthy population, and the share of those in the higher income brackets has increased. In addition, in those groups, the share of those who itemize has also increased rapidly, and their average deduction as a share of the average income in the group also has increased. This more than compensates for the decrease in the average income of the higher income groups over the decade. As a result, while the top income group of those with income levels above $500,000 accounted for 22.6 percent of total deduction in 2002 (a proportion similar to that of the bottom income group that year), its share of total deductions increased to 40.5 percent in 2011 (while the share of the deductions accounted for by those in the bottom income group was reduced to 10.8 percent). Again, shifts in the population share of the various groups did play a role in this change. But other factors were at work, including apparently an inability of lower income groups to contribute and deduct as much as they used, which was probably due to the larger impact of the recession on those groups.

4. Conclusion

The purpose of this paper was to provide an account of changes in the levels of charitable tax deduction in the District of Columbia using a simple multiplicative decomposition highlighting some of the key factors that led to such changes. Between 2002 and 2011, charitable deductions increased by about half in real terms, with population growth, an increase in the share of the population filing tax returns, an increase in the share of filers claiming the deduction, and an increase in the average deduction among claimants as a share of the average adjusted gross income of filers all played a role in this increase. By contrast, there a decrease in the average income of filers over the same period that offset some of the effects of the other variables. The estimation of the decomposition by year revealed some of the complex circumstances that led to

these changes, and the estimation of the decomposition by income group suggested a dramatic increase in the role of top income earners in the overall charitable deduction in the District.

The decomposition is on purpose a very simple and purely descriptive tool that is not meant to imply causality and that does not replace more sophisticated analytical work to inform policy. But hopefully this type of simple decomposition can be instrumental in promoting a better understanding of the dynamics of charitable deductions, which could be useful especially for local authorities that may not have the means to undertake more advanced work.

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Appendix Table: Detailed Results by Year and for the Decade as a Whole

	P	F/P (%)	F_i/F (%)	D_i/Fi (%)	Y_i ($)	$AD\|D_i/Y_i$ (%)	G_i ($M)		P	F/P (%)	F_i/F (%)	D_i/Fi (%)	Y_i ($)	$AD\|D_i/Y_i$ (%)	G_i ($M)
	All – Levels								**All - Growth rates (%)**						
2002	574,504	42.8%	-	35.2%	76,312	6.6%	569.7	2002-03	-0.23	-0.23	-	-5.24	0.21	17.91	12.41
2003	573,158	42.7%	-	33.4%	76,474	7.9%	627.4	2003-04	-0.82	0.83	-	11.76	9.61	-4.66	16.72
2004	568,502	43.0%	-	37.6%	84,185	7.6%	721.4	2004-05	-0.13	4.58	-	-2.83	-8.55	-14.34	-21.26
2005	567,754	45.1%	-	36.6%	77,287	6.6%	560.8	2005-06	-0.11	6.99	-	21.53	19.03	19.64	67.08
2006	567,136	48.3%	-	45.3%	93,489	8.0%	1,058.7	2006-07	0.62	4.42	-	-4.13	0.90	0.06	1.87
2007	570,681	50.5%	-	43.5%	94,333	8.0%	1,041.2	2007-08	0.65	0.31	-	-2.66	-13.02	19.51	4.79
2008	574,404	50.7%	-	42.4%	82,817	9.7%	1,045.3	2008-09	1.01	-0.26	-	-2.67	-4.85	-17.43	-24.21
2009	580,236	50.5%	-	41.2%	78,892	8.2%	818.9	2009-10	2.05	2.15	-	-2.61	4.77	-9.16	-2.82
2010	592,228	51.6%	-	40.2%	82,745	7.5%	782.8	2010-11	4.42	-1.31	-	-3.32	2.67	7.23	9.69
2011	619,020	50.9%	-	38.9%	84,986	8.0%	834.9	Average	0.83	1.94	-	1.09	1.20	2.08	7.14
								Cumulative	0.83	1.96	-	1.10	1.20	2.11	7.20
	Below 50k - Levels								**Below 50k - Growth rates (%)**						
2002	574,504	42.8%	68.98%	20.65%	27,580	10.4%	130.0	2002-03	-0.23	-0.23	-1.38	-13.28	-0.75	5.08	-10.81
2003	573,158	42.7%	68.03%	18.08%	27,373	10.9%	113.5	2003-04	-0.82	0.83	-3.56	8.00	-1.43	4.03	7.06
2004	568,502	43.0%	65.65%	19.59%	26,985	11.4%	118.5	2004-05	-0.13	4.58	-1.90	-8.69	0.90	0.23	-5.02
2005	567,754	45.1%	64.41%	17.96%	27,228	11.4%	108.4	2005-06	-0.11	6.99	-4.55	23.84	-6.29	19.98	39.85
2006	567,136	48.3%	61.54%	22.79%	25,569	13.9%	155.8	2006-07	0.62	4.42	-2.80	-8.97	-2.38	-8.97	-18.08
2007	570,681	50.5%	59.84%	20.84%	24,966	12.7%	125.5	2007-08	0.65	0.31	-1.39	-11.20	-8.31	17.10	-2.84
2008	574,404	50.7%	59.01%	18.63%	22,976	15.1%	116.7	2008-09	1.01	-0.26	-1.68	-5.66	-2.86	-2.76	-12.21
2009	580,236	50.5%	58.03%	17.61%	22,328	14.7%	103.1	2009-10	2.05	2.15	-2.00	-2.31	-0.67	13.50	12.72
2010	592,228	51.6%	56.88%	17.20%	22,179	16.8%	115.2	2010-11	4.42	-1.31	-1.50	-5.66	-4.23	-12.71	-20.99
2011	619,020	50.9%	56.03%	16.26%	21,260	14.8%	90.4	Average	0.83	1.94	-2.31	-2.66	-2.89	3.94	-1.15
								Cumulative	0.83	1.96	-2.28	-2.62	-2.85	4.02	-0.94
	50k to 75k – Levels								**50k to 75k - Growth rates (%)**						
2002	574,504	42.8%	12.98%	57.57%	79,204	4.4%	83.7	2002-03	-0.23	-0.23	1.80	-5.42	-2.76	48.06	41.21
2003	573,158	42.7%	13.22%	54.53%	77,051	7.2%	122.9	2003-04	-0.82	0.83	1.49	8.42	-2.75	-41.38	-34.21
2004	568,502	43.0%	13.42%	59.31%	74,961	4.7%	84.9	2004-05	-0.13	4.58	3.24	-5.56	-3.81	2.79	1.11
2005	567,754	45.1%	13.86%	56.11%	72,162	4.9%	82.6	2005-06	-0.11	6.99	2.95	13.49	-3.49	11.29	31.12
2006	567,136	48.3%	14.27%	64.21%	69,688	5.5%	108.8	2006-07	0.62	4.42	1.66	-9.94	-3.56	2.25	-4.55
2007	570,681	50.5%	14.51%	58.13%	67,254	5.6%	100.4	2007-08	0.65	0.31	1.95	-7.81	-4.43	5.72	-3.62
2008	574,404	50.7%	14.80%	53.77%	64,337	5.9%	92.6	2008-09	1.01	-0.26	2.59	-5.78	-0.24	4.59	1.91
2009	580,236	50.5%	15.19%	50.75%	64,181	6.2%	94.2	2009-10	2.05	2.15	-0.20	-7.42	-1.55	2.96	-2.01
2010	592,228	51.6%	15.16%	47.12%	63,195	6.4%	90.8	2010-11	4.42	-1.31	0.72	-13.14	-3.24	9.30	-3.25
2011	619,020	50.9%	15.27%	41.32%	61,179	7.0%	85.1	Average	0.83	1.94	1.80	-3.68	-2.87	5.06	3.08
								Cumulative	0.83	1.96	1.81	-3.62	-2.83	5.19	3.36

Source: Authors' estimation. Note: G_i expressed in $ million; all dollar value in real terms for 2011.

Notes: The annual rate of change is the compounded year-on-year change estimated through a power function; it is not the cumulative change between the initial and final years divided by the number of years between the two dates. In the base year 2002, the average incomes by group may be higher than the upper bound because the average incomes are adjusted for inflation to reflect US$ 2011 values, while the interval bounds for the groups are not adjusted.

Appendix Table (Continued): Detailed Results by Year and for the Decade as a Whole

	P	F/P (%)	F_i/F (%)	D_i/Fi (%)	Y_i ($)	$AD\|D_i/Y_i$ (%)	G_i ($M)		P	F/P (%)	F_i/F (%)	D_i/Fi (%)	Y_i ($)	$AD\|D_i/Y_i$ (%)	G_i ($M)
	75k to 100k – Levels								**75k to 100k - Growth rates (%)**						
2002	574,504	42.8%	6.44%	69.29%	111,599	4.5%	72.1	2002-03	-0.23	-0.23	3.39	-4.64	-2.61	-26.75	-31.08
2003	573,158	42.7%	6.66%	66.15%	108,722	3.5%	51.4	2003-04	-0.82	0.83	5.60	9.58	-2.64	2.31	14.87
2004	568,502	43.0%	7.05%	72.79%	105,894	3.6%	58.0	2004-05	-0.13	4.58	5.77	-2.14	-3.88	2.69	6.88
2005	567,754	45.1%	7.47%	71.25%	101,862	3.7%	59.8	2005-06	-0.11	6.99	3.84	13.04	-3.51	4.69	24.93
2006	567,136	48.3%	7.76%	81.17%	98,344	3.8%	74.0	2006-07	0.62	4.42	3.43	-5.83	-3.49	0.41	-0.43
2007	570,681	50.5%	8.03%	76.58%	94,969	3.8%	71.1	2007-08	0.65	0.31	2.48	-2.68	-4.39	3.61	-0.01
2008	574,404	50.7%	8.23%	74.55%	90,895	4.0%	68.1	2008-09	1.01	-0.26	3.82	-4.12	-0.05	0.85	1.24
2009	580,236	50.5%	8.55%	71.54%	90,847	4.0%	68.8	2009-10	2.05	2.15	2.00	-3.66	-1.67	2.98	3.84
2010	592,228	51.6%	8.73%	68.97%	89,342	4.1%	70.3	2010-11	4.42	-1.31	1.23	-3.00	-3.34	4.97	2.98
2011	619,020	50.9%	8.83%	66.93%	86,412	4.3%	70.1	Average	0.83	1.94	3.51	-0.38	-2.84	-0.47	2.58
								Cumulative	0.83	1.96	3.57	-0.38	-2.80	-0.47	2.71
	100k to 200k – Levels								**100k to 200k - Growth rates (%)**						
2002	574,504	42.8%	8.01%	77.07%	176,304	2.5%	85.6	2002-03	-0.23	-0.23	4.74	-1.05	-2.73	-16.26	-15.76
2003	573,158	42.7%	8.39%	76.26%	171,561	2.1%	71.2	2003-04	-0.82	0.83	9.73	6.56	-2.52	25.54	39.33
2004	568,502	43.0%	9.25%	81.43%	167,284	2.7%	102.6	2004-05	-0.13	4.58	5.44	-0.52	-3.88	0.14	5.62
2005	567,754	45.1%	9.77%	81.01%	160,922	2.7%	104.3	2005-06	-0.11	6.99	8.40	13.27	-2.81	3.84	29.57
2006	567,136	48.3%	10.63%	92.50%	156,458	2.8%	135.4	2006-07	0.62	4.42	5.11	-4.25	-3.46	-1.89	0.55
2007	570,681	50.5%	11.18%	88.66%	151,136	2.8%	131.4	2007-08	0.65	0.31	5.36	-0.64	-4.31	4.91	6.27
2008	574,404	50.7%	11.80%	88.09%	144,763	2.9%	133.9	2008-09	1.01	-0.26	4.78	-2.60	-0.41	-0.74	1.78
2009	580,236	50.5%	12.38%	85.83%	144,169	2.9%	136.0	2009-10	2.05	2.15	3.82	-3.36	-1.55	2.14	5.24
2010	592,228	51.6%	12.86%	82.99%	141,945	2.9%	140.9	2010-11	4.42	-1.31	2.01	-0.75	-2.98	2.69	4.09
2011	619,020	50.9%	13.12%	82.38%	137,773	3.0%	142.1	Average	0.83	1.94	5.49	0.74	-2.74	2.26	8.52
								Cumulative	0.83	1.96	5.64	0.74	-2.70	2.29	8.76
	200k to 500k – Levels								**200k to 500k - Growth rates (%)**						
2002	574,504	42.8%	2.77%	81.22%	375,344	2.6%	69.3	2002-03	-0.23	-0.23	3.38	3.64	-3.77	-1.13	1.65
2003	573,158	42.7%	2.86%	84.23%	361,456	2.5%	68.6	2003-04	-0.82	0.83	18.24	4.43	-1.45	8.11	29.33
2004	568,502	43.0%	3.43%	88.04%	356,235	2.8%	89.4	2004-05	-0.13	4.58	2.46	0.45	-4.65	-12.64	-9.93
2005	567,754	45.1%	3.52%	88.44%	340,065	2.4%	77.9	2005-06	-0.11	6.99	20.26	14.52	-3.01	1.81	40.45
2006	567,136	48.3%	4.31%	102.25%	329,971	2.5%	112.6	2006-07	0.62	4.42	11.90	-2.50	-3.36	-7.21	3.87
2007	570,681	50.5%	4.85%	99.73%	319,060	2.3%	113.0	2007-08	0.65	0.31	-0.56	6.95	-5.24	-1.70	0.41
2008	574,404	50.7%	4.83%	106.91%	302,779	2.3%	108.6	2008-09	1.01	-0.26	-2.45	-0.15	-0.84	1.66	-1.03
2009	580,236	50.5%	4.71%	106.75%	300,235	2.3%	107.3	2009-10	2.05	2.15	7.27	-6.15	-1.35	-0.73	3.24
2010	592,228	51.6%	5.07%	100.38%	296,223	2.3%	109.0	2010-11	4.42	-1.31	6.18	-3.03	-2.84	-0.18	3.24
2011	619,020	50.9%	5.39%	97.38%	287,923	2.3%	109.0	Average	0.83	1.94	7.41	2.02	-2.95	-1.33	7.92
								Cumulative	0.83	1.96	7.69	2.04	-2.90	-1.33	8.29

Source: Authors' estimation. Note: G_i expressed in $ million; all dollar value in real terms for 2011.

Notes: The annual rate of change is the compounded year-on-year change estimated through a power function; it is not the cumulative change between the initial and final years divided by the number of years between the two dates. In the base year 2002, the average incomes by group may be higher than the upper bound because the average incomes are adjusted for inflation to reflect US$ 2011 values, while the interval bounds for the groups are not adjusted.

Appendix Table (Continued): Detailed Results by Year and for the Decade as a Whole

	P	*F/P* (%)	*F/F* (%)	*D/Fi* (%)	Y_i ($)	$AD\|D/Y_i$ (%)	G_i ($M)		*P*	*F/P* (%)	*F/F* (%)	*D/Fi* (%)	Y_i ($)	$AD\|D/Y_i$ (%)	G_i ($M)
	Above 500k – Levels								**Above 500k - Growth rates (%)**						
2002	574,504	42.8%	0.83%	76.65%	1,854,430	3.4%	128.9	2002-03	-0.23	-0.23	0.62	9.81	1.70	34.93	46.59
2003	573,158	42.7%	0.83%	84.55%	1,886,196	4.9%	199.9	2003-04	-0.82	0.83	36.67	7.91	-6.31	-6.20	32.09
2004	568,502	43.0%	1.20%	91.51%	1,770,852	4.6%	268.0	2004-05	-0.13	4.58	-20.74	-3.00	-17.75	-33.01	-70.05
2005	567,754	45.1%	0.97%	88.81%	1,482,823	3.3%	127.9	2005-06	-0.11	6.99	42.43	19.78	28.35	36.69	134.13
2006	567,136	48.3%	1.49%	108.23%	1,968,872	4.8%	472.1	2006-07	0.62	4.42	5.83	-0.95	-4.86	4.18	9.25
2007	570,681	50.5%	1.58%	107.21%	1,875,462	5.0%	499.8	2007-08	0.65	0.31	-17.14	18.71	-19.36	26.22	9.39
2008	574,404	50.7%	1.33%	129.27%	1,545,320	6.5%	525.4	2008-09	1.01	-0.26	-15.17	4.85	-7.23	-35.92	-52.73
2009	580,236	50.5%	1.14%	135.69%	1,437,531	4.5%	309.5	2009-10	2.05	2.15	13.88	-18.72	3.22	-19.59	-17.01
2010	592,228	51.6%	1.31%	112.53%	1,484,624	3.7%	256.7	2010-11	4.42	-1.31	3.44	-3.12	10.92	16.49	30.85
2011	619,020	50.9%	1.36%	109.07%	1,656,000	4.4%	338.3	Average	0.83	1.94	5.54	3.92	-1.26	2.65	13.61
								Cumulative	0.83	1.96	5.69	4.00	-1.25	2.68	13.91

Source: Authors' estimation. Note: G_i expressed in $ million; all dollar value in real terms for 2011.

Notes: The annual rate of change is the compounded year-on-year change estimated through a power function; it is not the cumulative change between the initial and final years divided by the number of years between the two dates. In the base year 2002, the average incomes by group may be higher than the upper bound because the average incomes are adjusted for inflation to reflect US$ 2011 values, while the interval bounds for the groups are not adjusted.