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# "Implications of the Goods and Services Tax for Families in Canada"

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Abstract

On January 1, 1991 the Goods and Service Tax (GST) was introduced in Canada replacing the Manufacturers Sales Tax (MST) that had been in existence for about 70 years. The GST package included increases in sales tax credits which, the Finance Minister claimed, were designed to ensure that no family with an income of less than $30,000 per year would be worse off under the GST regime than they were with the MST.

Almost a decade has past since the introduction of the GST. We are now in a position to evaluate the impact of the GST on Canadian families. Of particular interest is whether or not the Finance Minister's guarantee holds. Have families at the bottom end of the income distribution, more specifically families with children, been disadvantaged by the GST.

This study uses the Quadratic Almost Ideal Demand System (QUAIDS) (Banks, Blundell and Lewbel, 1997) and a series of Canadian family expenditure surveys (Famex) to investigate the impact of the GST on households, particularly those with children, in Canada. We calculate the change in welfare attributable to the introduction of the GST by estimating the expenditure change necessary to maintain pre-GST indirect utility. We compare the change in expenditure required to the change in transfers received to indicate whether households are better or worse off after the introduction of the "GST package." The analysis is preformed on households with and without children.

We find that, although low-income single parent families fare well under the new tax regime, the majority of households including those with children are worse off. More specifically, of the households with incomes below $30,000 57%, 64% of the households with children, were worse after the introduction of the GST.

Introduction

Child well-being has been high on the policy agenda for more a decade; in 1989 an all-party motion of parliament called for the elimination of child poverty in Canada by the year 2000. And indeed, the decade since has seen a number of changes to changes to policies that affect families with children. In 1990 parental benefits were added to unemployment insurance (UI) benefits, the child tax benefit and the earned income supplement (EIS)[1] were introduced in 1993, 1997 saw taxation changes on child support payments (the recipient no longer pays tax on support and the payer no longer receives a deduction for support), and the EIS was increased. The National Child Benefit was established in 1998, increased in 1999 and again in 2000. (Kamerman and Khan, 1997; Stoick and Jenson, 1999).

However, available data suggest that the goal of improving the well being of less fortunate children has remained elusive (Phipps, 1999; Myles and Picot, 2000, Crossley and Curtis(2000)). Phipps (1999) reports that poverty intensity among children aged 0 to 18 was actually higher in 1996 than in 1989; children from 0 to 6 were worse off than they had been in 1976. The failure to meet this national priority poses something of a puzzle, particularly in light of the success of other targeted anti poverty agenda, such as the reduction in poverty achieved among the senior population.

Several potential explanations for the persistence of child poverty have been explored by Crossley and Curtis (2000). Poverty measurement, demographic shifts and policy design are addressed. Regardless of the measurement used, gross income, net income or expenditures, there

[1]Some documentation refers to the Earned Income Supplement (EIS) as the Working Income Supplement (WIS). For continuity we will always refer to it as the Earned Income Supplement (EIS)

is no evidence of a reduction in child poverty and socioeconomic shifts do not seem to explain the lack of progress in the battle against child poverty over the last decade. This leads the authors to conclude that more analysis of policy changes occurring since the declaration of the war on child poverty, 1989, is necessary. It is possible that improvements in child benefits, mentioned previously have been offset by simultaneous policy development in other areas. Certainly, the changes to heath and social transfers, leading to provincial cuts in health care and social assistance payments are likely to have had negative consequences for child welfare. Changes in the eligibility requirements (hours worked) for Employment Insurance may also have had an impact on child well-being. As well, tax policy changes over the past decade may be contributing to the lack of progress in the fight against child poverty. For example, the move from the Manufacturers' Sales Tax (MST) to the Goods and Services Tax (GST) in 1991 may have had adverse affects on some individuals and their children. The policy altered the prices of a wide range of goods and services and thus, affected most, if not all, individuals.

The majority of the analyses of the impact of the GST presented to date has used aggregate or micro-simulation data and has presented contradictory conclusions. No definitive evidence has been put forth as to whether individuals were better or worse off as a result of the GST or whether the tax was regressive or progressive. The purpose of this paper is to examine the changes in household welfare as a result of the complex reorganization of both prices and incomes[2] which accompanied the replacement of the MST with the GST.

This study assesses the affect of the GST by utilizing the Quadratic Almost Ideal Demand

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[2]Grady (1990) claims that increases in sales tax credits changes the distribution of transfer payments and should not be evaluated when discussing tax incidence.

System (QUAIDS) (Banks et al., 1997) to calculate changes in expenditure levels necessary to maintain welfare levels in Canadian households, particularly those with children, after the the imposition of the GST. Data from Statistics Canada's Family Expenditure Survey for the years before the implementation of the GST, 1982, 1984, 1986 and 1990, are used to estimate the QUAIDS system. Indirect utilities are then calculated using the estimates from the system. Compensating variations, $c(p^0, z, u^0)-c(p^1, z, u^0)$, are computed for each household in the data. Finally, to incorporate the changes in the sales tax credits and surtaxes that accompanied the GST, the compensating variation is compared to the increase (credits) or decrease (surtax), the change in transfer income, available for consumption. Households that receive sales tax credits that more than offset the change in expenditure necessary to maintain pre-GST levels of welfare are considered better off. Those that do not receive additional transfers that cover the needed change are worse off.

We find that all households, except one, have negative compensating variations indicating that they are worse off with the sales tax change (prior to adjustment for credits or surtaxes). Households with the lowest incomes need the smallest increase in expenditure to maintain their pre-GST welfare levels, the necessary change in expenditure increases, at a decreasing rate, with net income. Post tax credits/surtaxes 83% of the households, 89% with children, are worse off after the move from the MST to the GST. We find that households with higher levels of total expenditure have bigger absolute losses. As well the GST appears to be progressive for households with net incomes of less than $30,000 but approaches neutrality for households with net incomes over $30,000. Finally, 57% of all households, 64% with children, whose incomes were less than $30,000 were made worse off by the imposition of the GST, after accounting for

improvements in the sales tax credits.

The outline of the paper is as follows. In the next section a background discussion of the implementation of the GST and the literature on the effects of the GST on Canadians is reviewed. In Section 3 we briefly review the theory and estimation of QUAIDS. Section 4 describes the data . Section 5 contains our empirical results and in the final section we present our discussion and conclusions.

## II. Background

On January 1st, 1991 the goods and services tax (GST) replaced the manufacturers' sales tax[3] (MST). Typically the MST was imposed on the manufacturer's selling price (in some cases the wholesaler's price) of goods produced in Canada and the duty price of imported goods. The tax rate ranged from a low of 9 percent on construction materials to 19 percent on tobacco and alcohol. The MST was criticized on several points. Greenbaum (1991) reports problems with the MST as described in the 1967 Report on the Royal Commission on Taxation; the tax favoured imports over domestic goods, distorted allocation of resources and consumer choices, suffered from a narrow tax base and was excessively complex. However, the revenues from the tax were approximately $19 billion per annum had to be replaced if the MST was eliminated. The government chose to replace the MST with a flat rate, broadly based goods and service tax.

In the 1989 federal budget the Finance Minister announced the intended introduction of the GST on January 1, 1991. Originally the rate for the broad-based tax was set at 9%. An

[3]For excellent reviews of the MST see Boadway and Kitchen (1999), Whalley and Fretz (1990) and Greenbaum (1991) and of the GST see Sapona (1990), Murray (1990), Whalley and Fretz (1990), Greenbaum (1991) and Boadway and Kitchen (1999).

increase to refundable sales tax credits for low and modest income families, a reduction of the middle-income tax rate, a housing rebate, a system of rebates for municipalities, universities, hospitals and assistance to small businesses were all included in the plan (Wilson, 1989). Substantial debate ensued over the tax rate and base between introduction of the Bill and its passing. The rate was eventually lowered and the tax base was narrowed somewhat. Bill C-62 "The Goods and Services Tax Act" was signed into law on December 17, 1990[4].

Grady (1990) summarizes the new tax package as the GST imposed at a rate of 7% and a wide tax base excluding basic groceries, health and medical care, education, day care, legal aid services, residential rents, financial services, municipal services and passenger ferries[5]. The sales tax credit was increased from $140 to $190 per adult and from $70 to $100 per dependent child. The credit was still reduced by 5% of family net income in excess of the base amount of $24,800 (increased from $18,000). Single parents were eligible to claim the adult credit for one dependent child and single payers, including single parents, were entitled to a higher credit of $190 plus 2% of net income in excess of the basic personal amount (approximately $6,256[6] in 1991). To offset the reductions in revenues the surtax on high-income earners was increased by 2 percentage points and the high income surtax became applicable at $12,500 rather than $15,000.

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[4]Liberal Senators invoked various procedural tactics to delay passing of the Bill. Prime Minister Brian Mulroney invoked Section 26 of the Constitution Act, 1867, a provision not previously used, appointed 8 new senators and eliminated the Liberal majority (Greenbaum, 1991)

[5]Many products were also exempt from the MST including food products, books, magazines, health products, heating fuel, clothing, and most machinery and equipment (Ruggeri and Bluck, 1990).

[6] The actual value was $6,169 according to The National Finances (1991) pp.7:6

## II.i Literature Review

Almost a decade has passed since the introduction of the GST package. Several studies analyzing the impact of the GST have been completed. Most of the studies were conducted prior to the introduction of the GST. The studies includes general equilibrium analyses, using aggregate data (Hamilton and Kuo, 1991; Hamilton and Whalley, 1989 and Jones and Whalley, 1988), distributional analyses using micro-simulation data (Grady, 1990, 1991 and Gillespie, 1991), and the incidence of the sales tax using microdata (Ruggeri and Bluck, 1990).

The outcomes of the studies investigating the impact of the GST vary widely. Hamilton and Kuo (1991) find large gains for the Canadian economy while Jones and Whalley (1988) find welfare losses for Canadians. The largest estimated gains are realized by Hamilton and Kuo (1991) who analyze a static general equilibrium model of the Canadian economy composed of 12 regional economies (10 provinces and 2 territories). They utilize data from Statistics Canada's input/output tables to estimate the effects of the tax reform on production in each region and on the aggregate welfare of Canadians. Their model estimates an increase in real output for all regions in Canada. Quebec and Ontario expand the least at 1.0 and 1.1 percent, respectively. BC and the Atlantic increase real output by 1.3 and 1.4 percent and the Prairies by 2.5 percent. They also conclude that welfare will increase by 0.9 percent of GDP (the welfare gain is less than the growth in real output due to payments for capital services from abroad).

Hamilton and Kuo explain that their results are substantially larger than other studies, especially Jones and Whalley (1988) who find an overall welfare decrease with only Ontario seeing an increase in regional income, due to the fact that their study attempts to capture the effects of the reform on the cost capital for Canadian producers and they assume a small open

economy thus there can be no terms-of-trade effects. Hamilton and Whalley's (1989) results , using a similar general equilibrium excluding the effects of lower cost of capital, indicate an improvement in welfare and real output but only about one-third as large as Hamilton and Kuo.

Ruggeri and Van Wart (1992) point out the limitations of computable general equilibrium models that must be calibrated to generate and the initial benchmark equilibrium state of the economy. These models can not incorporate any economic costs imposed by implementation of a policy. The model precludes any interaction between short-term adjustment processes and long-term equilibrium values. Dungan and Wilson (1989) attempt to incorporate the impact of the introduction of the GST into their analysis and indicate an increase in the price level of 2.5 percent by three years after the introduction of the GST and a decrease in real GDP of 0.3 percent in the first four years. They also find that the unemployment rate increases by 0.6 percentage points in the same time period. Ruggeri and Van Wart (1992) point out that early evidence supported Dungan and Wilsons claims. By the end of the first quarter of 1991 Statistics Canada had estimated that the GST was responsible for most of the 1.5 percent increase in the consumer price index (cpi) and the 1.2 percent decline in GDP.

Dungan et al. (1990) estimated the longer term (11 years) macroeconomic effects of a 7% GST. The price level increased by 2.5% by the third year and real output fell by about 0.3% in the first four years. However, in the loner run, by the sixth year after the introduction of the GST, real output is higher by about 0.6%, productivity gains result in lower labour costs and a reduction in the increase in the CPI to 1.25%. Ruggeri and Van Wart (1992) and Spiro (1993) point out that studies should take into account the increase in cross-border shopping and the underground economy as a result of the implementation of the GST when estimating its impact.

A second avenue of investigation presented involves the analysis of individual incomes (changes to the disposable incomes or tax rates) of individuals or groups of individuals (Ruggeri and Bluck, 1990; National Council on Welfare, 1990; Grady, 1990, Dungan et al., 1990). The focus of studies, at least in part, seemed to be targeted at the governments claim that low and modest income individuals would be better off as a result of the switch from the MST to the GST and that the tax system would become more progressive. Greenbaum (1991) points out that the Minister of Finance stated "[O]nce the GST is in place, the federal tax system will be more progressive and lower and modest income Canadians will be better off. This will be achieved through the new refundable GST Credit" (page 280).

Several authors have pointed out that the data does not support this guarantee that modest and lower income individuals would actually be better off. Kessleman (1994) calculates that for households consisting of a married couple and children the GST is highly regressive in 1992. For the lowest income households (< $10,600/year) GST payments account for 11.1% of their total income, the top income households (>$372,800/year) GST payments account for 2.1% of their income[7]. Ruggeri and Bluck (1990) find that the GST, sans the sales tax credit, is more regressive than the MST for families with incomes under $30,000. They estimate that a sales tax credit large enough to ensure families with incomes under $25,000/year were as well off under the GST as they were under the MST would cost the federal government $98 million, requiring a surtax of 0.15% of gross incomes for families with incomes over $50,000/year[8].

Grady (1990) estimates average changes in consumable income by income category and

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[7] This figure does not include the sales tax credits.

[8] Ruggeri and Bluck use data from Statistics Canada's 1986 Family Expenditures Survey.

family type using data from Statistics Canada's Social Policy Simulation Database and Model (SPSD/M). He finds that the introduction of the GST package, including the new sales tax, sales tax credit increases, and surtaxes, is slightly progressive[9] for families with incomes under $35,000 per year and proportional for those with incomes above. Low-income single-parent families with children suffer, on average, the smallest absolute decreases (actually see small increases) in consumable income. Surprisingly, of the households with incomes below $25,000/year two-parent families suffer the highest absolute losses in consumable income, on average. Grady claims that, on average, families earning less than $30,000/year will pay $20 more in taxes with the implementation of the GST (including the sales tax credit). He concludes that if the government intends on keeping its commitment of seeing low-income families better off due to the GST than it had better increase the sales tax credits.

The Government of Canada's National Council on Welfare find that low-income families will initially be better off after the introduction of the GST than they were under the MST. However, the claim that partial indexation of the sales tax credit and tax brackets has left low-income families off in 1991 than they were in 1984 and they will be worse off in 1992 than they were in 1991. The partial indexation will result in an erosion of the sales tax credit, the mechanism the government is using to ensure the welfare of low and modest income individuals.

The analyses of micro data, presented thus far, utilize the same expenditure patterns as those found in some period pre-GST (typically 1986) and the price changes due to the new tax to calculate the additional taxes individuals and families would have to pay given set expenditure

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[9]Grady defines progressivity/proportionality in terms of decreases in consumable income as a percentage of consumable income.

patterns. Banks et al. (1997) argue that distributional evaluation of indirect tax policy reform necessitates the inclusion of both price and income effects. Thus, utility based demand models are important for this type of analysis. To our knowledge this type of analysis has not undertaken to evaluate the effects of the introduction of the GST and this study fills that gap.

It was our primary intention to investigate effects of the change to the GST from the MST on children, particularly children in low-income households. However, Phipps (1999) argues that if we wish to investigate the well-being of children then standard utility maximization approach may be inappropriate for two reasons. First, it is reasonable to believe that children's preferences are in the process of being formed and so can not taken as "given". Secondly, although children may exercise some choice over the allocation of resources within a family it is unlikely that they have control over their own consumption. Thus estimating household demand systems may not give us as much information about the welfare of children as it does about the welfare of the parents of children or households containing children. As well, Browning and Chioppori (1998) show that although the assumption is widely imposed it is not clear that many-person households share a single utility function[10].

As a result of data limitations we resort to investigating the welfare changes of households with children. We note that much of research into child poverty assesses the existence of poverty based on family (household) status. We also follow the common assumption that the household can be treated as a single identity and incorporate the unitary model [11].

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[10]For an excellent discussion and presentation of the "Collective Model" see Browning and Chiappori (1998).

[11]We utilize the unitary model but as this research progresses we intend to incorporate the collective model put forth by Browning and Chiappori (1998).

III. Methodology

Demand system analysis has its origin in the Working-Leser form of Engel curves. In their work, Engel curves relate budget shares to the logarithm of outlays.

$$w_i = \alpha_i + \beta_i \ln(x) \quad (1)$$

where $w_i$ is the budget share of good i, ln(x) is the log of total expenditure and $\alpha_i$, $\beta_i$ are parameters; the $\sum w_i=1$. Adding up is satisfied if $\sum \alpha_i =1$ and $\sum\beta_i=0$. The i $^{th}$ good is a luxury if $\beta_i>1$ and is a necessity if $\beta_i<1$. It was upon this form of Engel Curves analysis that Deaton and Muellbauer (1980) built their Almost Ideal (AI) demand system in order to estimate consumer demand. They specify the cost function as:

$$\log c_k (u,p) = a(p) + ub(p) \quad (2)$$

where $a(p)=\alpha_0+ \sum_h \alpha_h \log p_h + 1/2 \sum_j \sum_i \gamma_{ij}^* \log p_h \log p_i$

$b(p)=\beta_i A\, p_h^{\beta h}$.

A budget share is derived for each good by taking the partial derivative of the cost function with respect to the log price of that good (i.e. $\partial \log c(u,p)/\partial \log p_i=w_i$). Thus, the AI demand system is:

$$w_i=\alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(x/P) \quad (3)$$

Where $\log P =\alpha_0 +\sum \alpha \log p_k +1/2 \sum_k \sum_l \gamma_{kl} \log(p_k) \log(p_l)$

$\gamma_{ij} =1/2(\gamma_{ij}^*+\gamma_{ji}^*)=\gamma_{ji}$

Adding up requires that $\sum \alpha_i=1$, $\sum_i \beta_i=0$, and $\sum_i \gamma_{ij}=0$. Homogeneity is satisfied if and only if $\sum \gamma_{ji}=0$ for all j. Symmetry is satisfied if $\gamma_{ij}=\gamma_{ji}$.

In this model, once an appropriate price index is selected (for example, the Stone's price index, $\exp(\sum w_k \log p_k)$), the model becomes linear and easily estimated by conventional methods.

One of the concerns with the AI system is that it is based on the strict assumption that the Engel Curves are monotone. Through nonparametric analysis Bank et al. (1997) show that this restriction may be too limiting. They develop a demand system, descriptively named the

Quadratic Almost Ideal Demand System (QUAIDS), which introduces flexibility that allows for some goods to be necessities at some points of the income distribution and to be luxuries at others. The authors find that goods that appear to fit this category include alcohol and clothing.

The QUAIDS model developed by Bank et al. has an indirect utility function of the following form:

$$\ln V=\{ [(\ln m - \ln a(p))/b(p)]^{-1} + \lambda_i(p)\}^{-1} \quad (4)$$

From which the following cost function can be derived:

$$c_i = \exp\{ \ln a(p) - (\ln V * b(p)) / (\ln V * \lambda_i(p)-1)\} \quad (5)$$

The budget shares are then defined as:

$$w_i=\alpha_{i12}+ \sum_j (_{ij}\ln(p_j) +\beta_i \ln[m/a(\mathbf{p})]+\lambda_i/b(\mathbf{p})\{\ln[m/a(\mathbf{p})]\}^2 \quad (6)$$

The QUAIDS form nests the AI demand system; when $\lambda_i=0$ the QUAIDS model collapses to the AI demand system where the Engel curves are monotone.

It is likely that total expenditure and its square are endogenous. Following Bank et al. (1997), Browning and Chiappori 1998, Browning and Meghir, 1991 we instrument total expenditures and its square with net income and net income squared. As well we instrument for labour force participation in samples that are heterogenous in this characteristic. Depending on the subsample, the number of labour participation variables varies from zero (in the case of full-time workers) to two, weeks worked full time and weeks worked part time, for singles who do not work full time and to four, weeks worked full time and weeks worked part time for each

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[12] we include demographic variables, $\alpha_{2i}z_h$ and labour force participation variables, $\alpha_{1i}d_h$. We assume they are shift variables.

partner, (in the case of couples who do not each work full time throughout the year). Therefore, a minimum of three instruments and up to five instruments are required for the labour variables in order to identify the system and to test our instruments. We use the head of the household's and his/her spouse's, if applicable, education, occupation and age squared as instruments for labour force participation. By this choice, we implicitly assume that education and occupation does not affect preferences once total expenditure is controlled for (Browning and Meghir, 1991).

Two separate tests for exogenetic of total expenditures and labour participation are performed. First, we use the 'residual stuffing' method, in which the budget shares are regressed as in equation(6), but the errors from the auxiliary equations of expenditure and labour participation are added. Total expenditure and/or labour participation are deemed endogenous in the budget share if the t-statistic on their respective errors are significant and exogenous otherwise.

Second, we perform the standard Hausman test focussing on one possible endogenous variable at a time. The budget shares in equation (6) are estimated assuming exogeneity (EX) and then by using instruments variables (EN). A chi-squared test was performed on the comparison of the two estimates. This test is as follows:

$$P^2 \ (df) \sim (\$^{ex}-\$^{en})'\text{inv}[\text{var}(\$^{en})-\text{var}(\$^{ex})](\$^{ex}-\$^{en}) \qquad (7)$$

where: $\$^{ex}$ and $\$^{en}$ are the coefficients on the possible endogenous variables assuming it is exogenous and endogenous, respectively.

var($\$^{ex}$),var($\$^{en}$) are the variances on $\$^{ex}$ and $\$^{en}$, respectively.

The number of degrees of freedom is equal to one. If the statistic is in the rejection range, the two estimates are significantly different and the estimation should be done by instrumental variables.

For each set of endogenous variable we use one additional instrument in order to identify

the system and test over-identifying restrictions. To test for over identification, we regress each budget share on the endogenous and exogenous variables. Next, the residuals are regressed on the exogenous variables and the instruments. The $R^2$ is multiplied by the number of observations to obtain a $P^2$ statistic. In most cases the $P^2$ statistic is significant indicating we do not have perfect instruments. However, Cyrus (1999) points out that even almost perfect instruments may have trouble passing this test when there are large numbers of observations. She suggests that "any correlation of the instruments, no matter how small, will cause the instruments to fail the test if the sample size is sufficiently large." We follow her example and take note of the equation $R^2$. Since in every case the $R^2$ was less than 0.02, and conclude that the instruments have little predictive power in explaining the error term. We also performed an omitted variable test and this supported our decision to use these variables as instruments.

To test for homogeneity the errors were calculated from the system of equations and regressed log price of the numaraire (in our case, the log of the price tobacco). The cross-equation restrictions are also tested to indicate whether or not symmetry holds.

Estimation

Symmetry and homogeneity are imposed and the analysis is performed in two steps. A feature of the QUAID system is that is that, conditional on a(p) and b(p), the budget share equations are linear. In the first step we chose starting values for a(p) and b(p) as per Bank et al. (1990). Three stage least squares estimation is utilized to allow for instrumenting, cross-equation restrictions and the correlation of errors across budget equations. We perform iterated three stage least square estimations on the pre-GST data (1982 - 1990). On each iteration a(p) and b(p) are updated and the system is re-estimated. We continue this process until the estimation converges on values of a(p) and b(p), this usually takes 5 or 6 iterations. The household's pre-GST indirect utility levels are calculated based on the estimated coefficients, the 1990 prices and expenditures.

The second step includes calculating post GST prices using estimated percentage changes

in prices due to the implementation of the GST (Grady, 1990) (see appendix one); 1990 prices are increased by the appropriate percentage. The estimated coefficients, indirect utilities and the "post GST prices" are used to calculate the expenditure necessary to maintain 1990 indirect utility levels with 1991 prices. The compensating variation (CV), $c(p^0, z, u^0)-c(p^1, z, u^0)$, is computed for each household. We compare the CV[13] to the increase in sales tax credits that was instituted to ensure that low-income Canadians would not be made worse off by the implementation of the GST and the added surtax on families with higher incomes needed to support the additional tax credits. ((CV-credit+surtax) (negative of) is our final measure as to whether a household is better or worse off as a result of the GST package. A household is better off if the additional expenditure needed to maintain their 1990 level of indirect utility is more than offset by the increases in tax credits they received[14]. Finally, the change in expenditure needed to maintain 1990 indirect utility levels as a percent of 1990 expenditure is calculated to examine the progressivity/regressivity of the tax change (as in Grady, 1990).

## IV. Data

Our data are obtained from the Family Expenditure Surveys, 1982, 1984, 1986 and 1990. All households containing a single economic family with no more that 2 adults (individuals over the age of 16) are used in the study. We use four different samples to estimate the demand systems. The data is first partitioned by labour force participation. Two groups are identified, households where all adults work full time and households where one or both adults does not work full time. These two subsamples are further divided by the number of adults in the household. Thus four subsamples are isolated: i) households with two adults, both working full

[13]Because the vast majority of households are worse off after the implementation of the GST we use the negative of the CV for illustrative ease. As a result individuals who are worse off have positive scores in our graphs and visa versa.

[14]One individual, a 64 year old, single female, had a positive CV indicating she was better off after the introduction of the GST prior to consideration of credits.

time[15]; ii) households with a single adult working full time; iii) households with two adults, one or both not working full time; and iv) households with a single adult not working full time. This was done in order to include all household types while maintaining a population as homogenous as possible and a large sample.

For all our demand systems we control for owning a home, gender of head of household, whether the head speaks french, age of head of household, urban versus rural residence, spouse of head of household speaks french (for couples), age of spouse, the number of children under 16 years of age, Region of residence and year of survey. We were unable to control for ownership of a car as the information was missing in the 1982 data.[16]

## V. Results

Table 1 below provides a first look at the budget shares of couples who both work full-time.[17] One can see that, with the exception of groceries, the allocation of total expenditure has changed significantly since the institution of the GST.

Appendix Two presents the estimated coefficients from the QUAID system. Appendix Three contains the test results of tests for homogeneity, endogeneity, and the instruments. We do not reject homogeneity or symmetry at conventional levels, however we do reject symmetry at the 6% level for two-adult households where both adults work full time.

Graphs 1 through 24 present our final analysis of household welfare. Each set of three graphs represents different household composition and labour force participation patterns. We focus on households with children but present the results for households without children for completeness. Graphs 1-12 (13-24) present results for families with children (no children): graphs

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15 We define full-time as 46 weeks of full-time employment.

16 Expenditures on private transportation, such as gasoline and repairs is available in all years. However, there variables proved not to be a reliable indication of car ownership.

17 Similar results are found in the three other subsamples.

1 to 3 (13-15) demonstrate results for two-adult households where both adults are working full time; graphs 4-6 (16-18) are for single adults working full time; graphs 7 - 9 (19-21) contain results for two-adult households where one or both adults does not work full-time; and graphs 10-12 (22-24) are for lone parents who do not work full-time. The first graph in each triplet indicates the ratio of 1991 to 1990 expenditure necessary to maintain 1990 levels of indirect utility. These figures do not take into account any increases in tax credits or surtaxes. The second graph in each group presents -(CV- tax credits + surtaxes), the income, in addition to any increased credits, that would be necessary to cover the additional expenditures necessary to maintain 1990 levels of indirect utility (a negative value indicates the added tax credit more than offsets the increase in expenditure). The third graph illustrates the necessary additional expenditures as a percentage of 1990 expenditures.

We plot all results against net income for two reasons. First to illustrate whether or not the claim, by the Finance Minister, that no individual or family with an income of less than $30,000 per year would be made worse off as a result of the switch to the GST was true. Secondly to ascertain whether the GST was progressive or regressive in terms of the percentage of expenditure needed to maintain 1990 indirect utility levels. All graphs show a vertical line indicating $30,000 net income and a horizontal line demonstrating the point at which the household is just as well off in 1991 as they were in 1990.

Graph 1 indicates that in 1990 very few (6 of 242) two-parent families, with both parents working full time, have incomes under $30,000. All households need higher expenditures in 1991 to maintain 1990 indirect utility levels. Households with income of $30,000 or less (more than $30,00) need between 1.023 (1.021) and 1.032 (1.047) times their 1990 expenditures. Even after accounting for additional tax credits available under the new system all families remain worse off after the introduction of the GST. The added expenditure (over and above additional credits, surtaxes), shown in graph 2, necessary to maintain the households 1990 level of welfare is between $166.87 and $2230 in absolute terms. The absolute amount needed to maintain welfare increases with income. Graph 3 indicates the change in expenditure, as a percentage of 1990

expenditures, necessary to maintain welfare at 1990 levels. The minimum percentage change is 2.06 and the maximum is 4.72. The percentage change indicates that the tax change was progressive, in these terms, for incomes below approximately $60,000 (percentage change increases) and then neutral after that (percentage change appears to be constant).

The picture for lone parents is somewhat different. First, few lone parents in the survey work full time in 1990 (59 households). Sixty four percent of the lone parents who work full time have net incomes below $30,000. As in the previous case all families are made worse off by the switch from the MST to the GST before increases in tax credits or surtaxes are considered. Families with incomes equal to or below $30,000 (greater than) need between 1.030 (1.031) and 1.038 (1.042) of their 1990 expenditures to maintain there indirect utility level in 1991. Graph 5 illustrates that for 34% of the lone-parent families, with a head working full time, the increase in tax credit offsets the added expenditure necessary to maintain welfare levels. However, two points are worth emphasizing here, some of the poorest families in this group (net incomes <=$18,000) are not included in those who are better off and 47% of the families with net incomes under $30,000 are worse off. Finally, graph 6 illustrates that the GST regime is somewhat regressive at very low levels of net income (<$20,000), progressive between $20,000 and $40,000 and approximately neutral for households with net incomes over $40,000.

Graphs 7 through 12 illustrate our results for families with children where one or both parents do not work full time. There are substantially more two-parent families in this group, 27%, whose incomes fall below $30,000 in 1990. Aside from this, the picture is fairly similar to that of two-parent families with both parents working full time. Graph 7 indicates that all households are worse off before tax credits and surtaxes are taken into consideration. Households with incomes greater than (less than) $30,000 need between 1.022 (1.015) and 1.048 (1.040) of 1990 expenditures to maintain their indirect utility levels after the implementation of the GST. The magnitude increases with net income until approximately $60,000 and then is stable. The picture does not change substantially when tax credits and surtaxes are added; only 3.5% of the households with net incomes of less than $30,000 are not worse off as a result of the

GST (graph 8), in fact some households with net incomes as low as $10,000 are worse off. Graph 9 indicates that the GST is highly progressive until approximately $30,000 and then becomes much less so at higher levels of income.

Lone-parent families in which the head does not work full time are the poorest group of our samples, 97% have net incomes below $30,000 in 1990, however, they appear to fare relatively better than other household/labour force participation types as far as the GST is concerned. Although all the households are worse off before the tax credits and surtaxes are considered (graph 10), 93% of these households are better off post tax credit and surtaxes and 96% of the households with net incomes below $30,000 receive transfers that more than offset the additional expenditure necessary to maintain their welfare at pre-GST levels.

Graphs 13 through 24 demonstrate the impact of the GST on households with no children. Although this is not a focus of the study we briefly review the results. Households containing couples, both working full time, with no children are all worse off before the added transfers are considered (graph 13) and even after the change in transfers is accounted for only one household is better slightly off (graph 14). The GST appears to be somewhat progressive until higher income levels and then it becomes neutral (graph 15). The story is similar for couples without children, where one or both adults are not working full time (graphs 19-21).

Singles with no children, working full time, fare better than couples but they are also poorer, 68% had net incomes below $30,000 in 1990 (graph 16). All the households of this type were worse off before tax credits and surtaxes were included. Post tax credit/surtax 31% of all the households and 45% of households with net incomes below $30,000 were better off after the implementation of the GST (graph 17). Again the GST is progressive in terms of percentage of 1990 expenditure needed to maintain welfare levels until approximately $30,000 and then is neutral after that (graph 18). The picture is basically identical for singles, not working full time, without children (graphs 22-24) except that one individual in this group (a 64 year old female with net income of $6791.52 in 1990) is better off even before tax credits/surtaxes are accounted for.

## V. Discussion and Conclusion

This study investigated the impact of the elimination of the Manufacturers Sales Tax and the implementation of the Goods and Services Tax. We estimated a Quadratic Almost Ideal Demand System in order to calculate household's indirect utilities in 1990, the year before the change in tax policy. We then obtained the expenditure increases necessary to maintain the 1990 levels of welfare under the price regime resulting from the switch from the MST to the GST. In all cases but one higher expenditures were needed to maintain indirect utility levels.

Single-parent families with heads who do not work full time appear to be the best off in terms of the GST. Almost all families of this type, in the data, have 1990 net incomes below $30,000. The vast majority of these families end up with sales tax credits that outweigh the increase in expenditure necessary to maintain 1990 welfare levels. Singles and couples (no children), in households where the head does not work full time, are relatively better off than couples with children, no matter what the labour force participation patters of the parents.

Before the receipt of tax credits all households, except one, are worse off as a result of the GST. Once the change in income available for additional expenditures (increased sales tax credits) is included we find that 83% of all households, 89% with children, are worse off after the move from the MST to the GST. Fifty seven percent of all households with incomes of less than $30,000, 64% with children, were made worse off by the imposition of the GST. We find that households with higher levels of total expenditure have bigger absolute losses. As well the tax is progressive for households with net incomes of less than $30,000 but appears to be substantially less progressive or neutral for households with net incomes over $30,000. Therefore, the introduction has likely been a factor in the federal government's inability to eliminate, or even decrease, child poverty. As well, the government seems to have missed the goal of ensuring that no Canadian family with an income below $30,000 would be worse off as a result of the

implementation of the GST.

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Table One

Budget Shares Before and After the Introduction of the GST

Households with One or Two Adults

All Adults work Full Time

| | Prior of Gst[2] (n=14177) | After GST[2] n=10573) | F-Statistic[3] (df=1,24749) |
|---|---|---|---|
| wfath | 26.82 | 26.98 | 0.923 |
| | (0.124) | (0.119) | (.337) |
| wrest | 8.48 | 7.600 | 98.158 |
| | (0.073) | (0.064) | (4.26e-23) |
| whouse | 10.72 | 12.98 | 704.828 |
| | (0.062) | (0.072) | (3.72e-153) |
| wrec | 12.58 | 14.97 | 440.576 |
| | (0.085) | (0.094) | (5.68e-97) |
| wcloth | 12.85 | 10.96 | 477.639 |
| | (0.071) | (0.062) | (6.85e-105) |
| wtob | 5.79 | 4.25 | 256.748 |
| | (0.079) | (0.069) | (1.71e-57) |
| walc | 4.66 | 3.21 | 447.545 |
| | (0.058) | (0.046) | (1.84e-98) |
| wtran | 18.10 | 19.06 | 57.686 |
| | (0.099) | (0.100) | (3.18e-14) |

[1] budget shares have been multiplied by 100.
[2] standard errors in brackets.
[3] p-values in brackets.

Two parents working full time

Consumption 1991/1990 (to maintain indirect utility level)

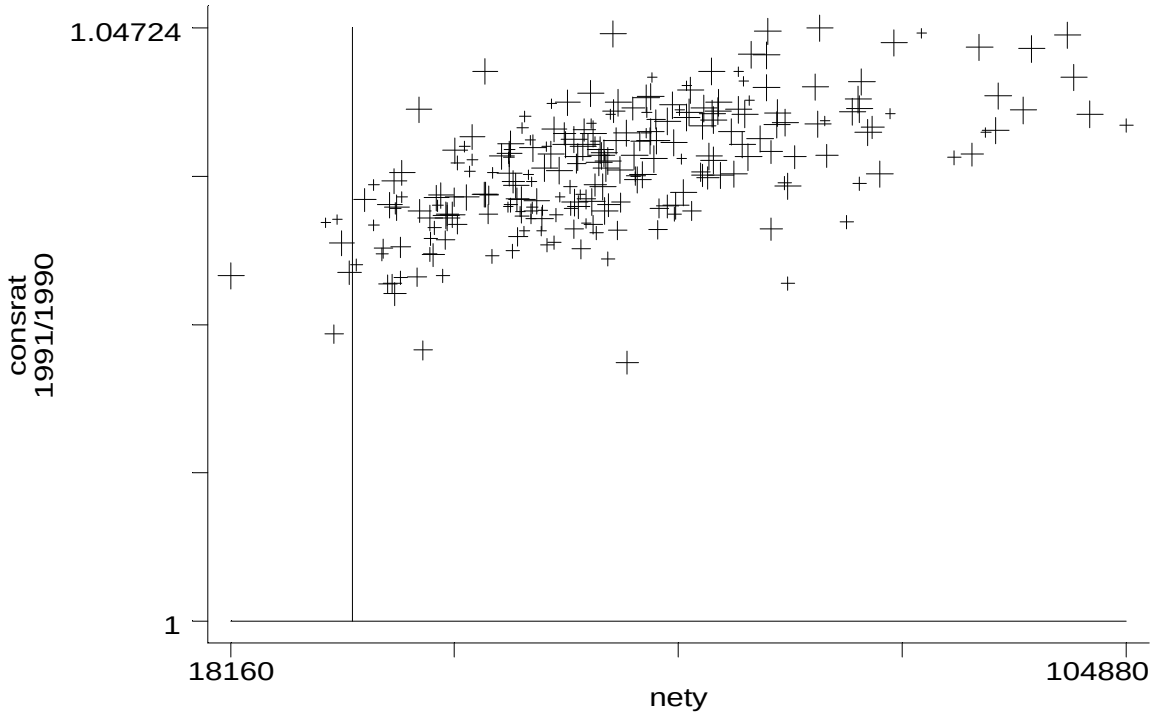



FIG 1: Ratio Consumption

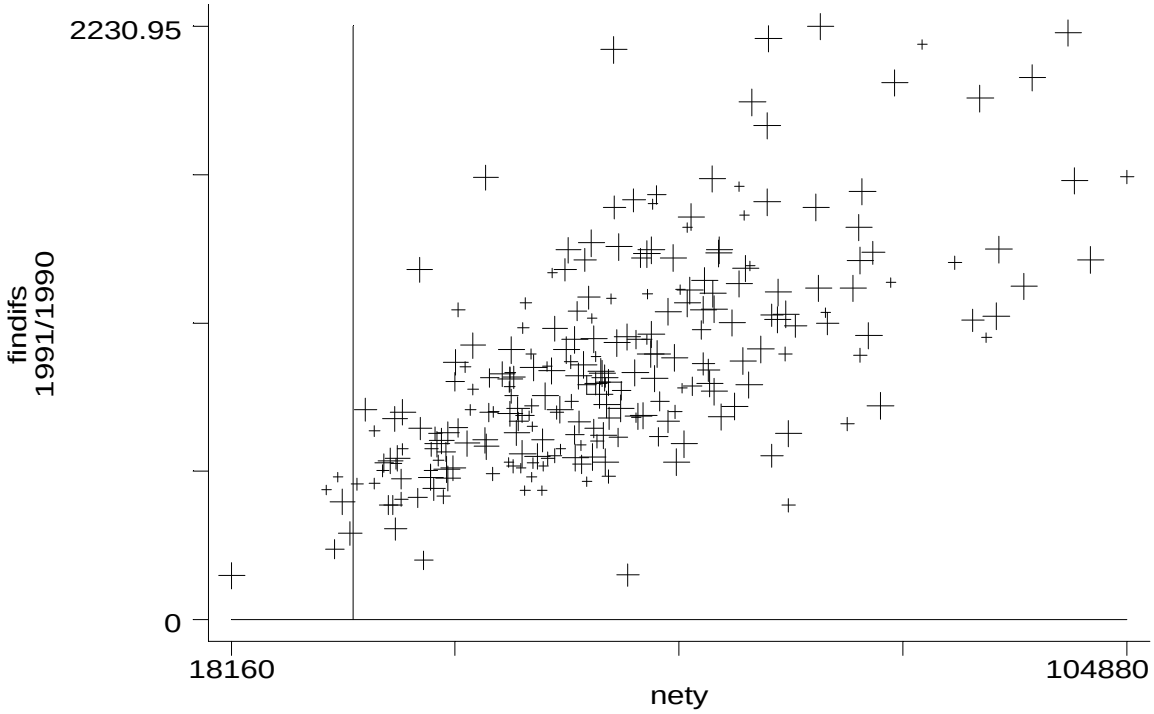



FIG 2: CV - Transfer

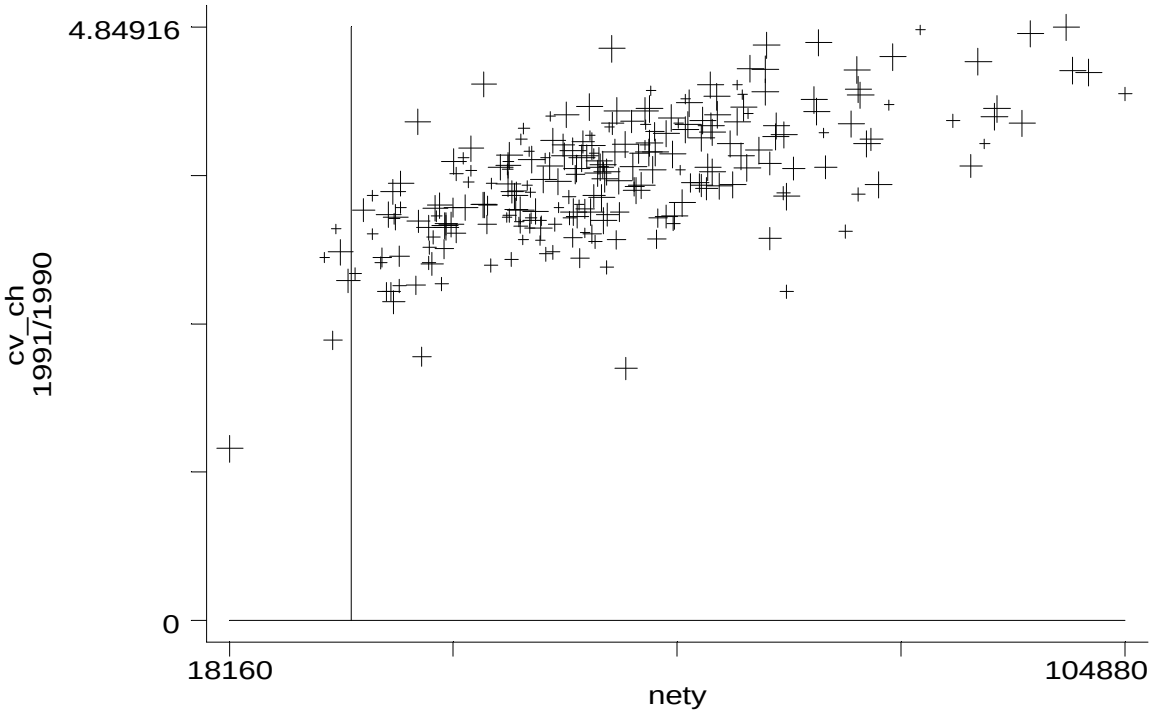



FIG 3:Percentage Change

Lone

Parents working full time

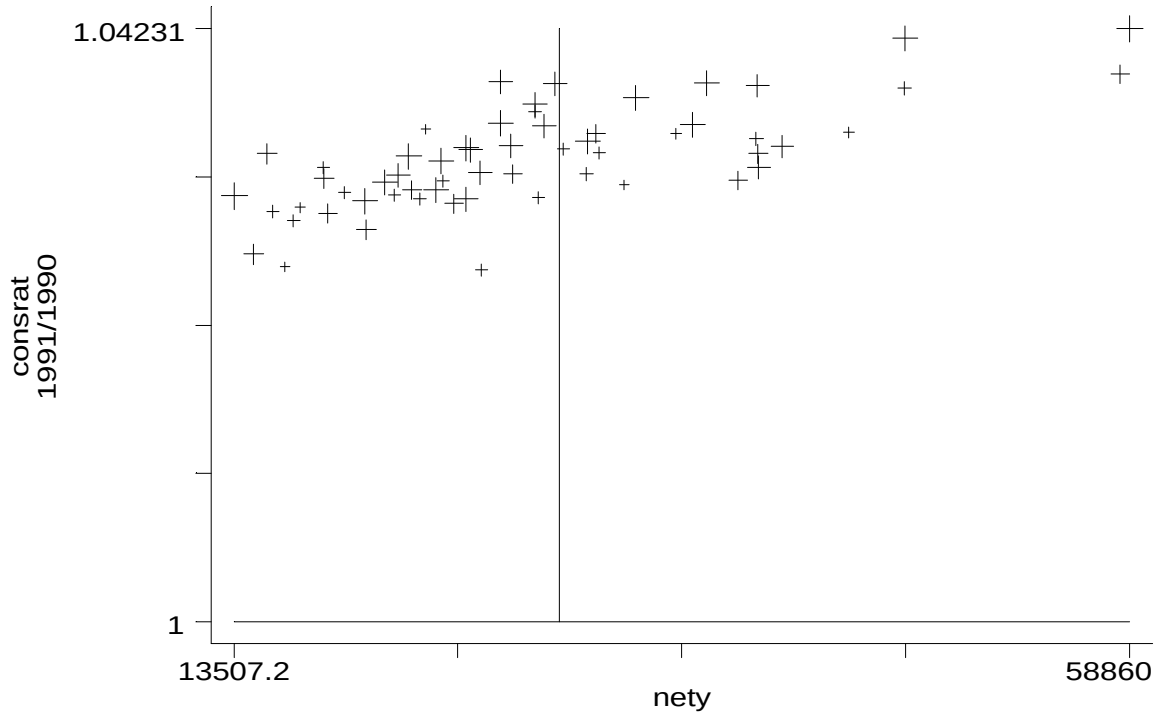



FIG 4: Ratio Consumption

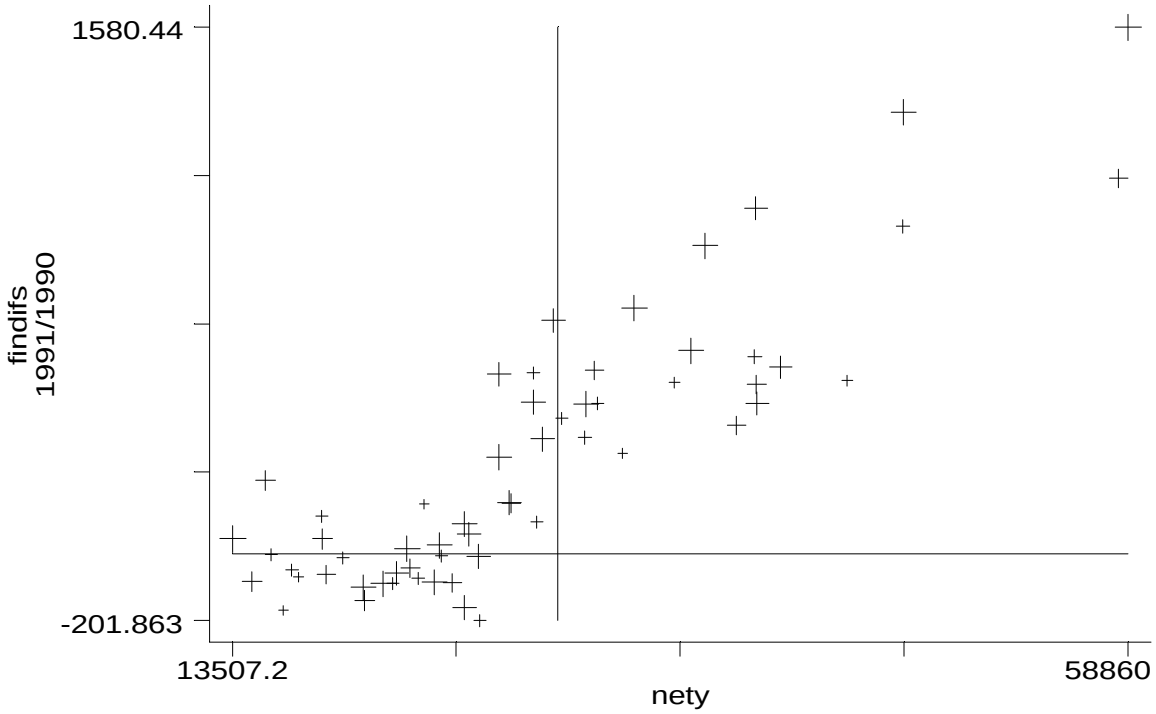



FIG 5: CV - Transfer

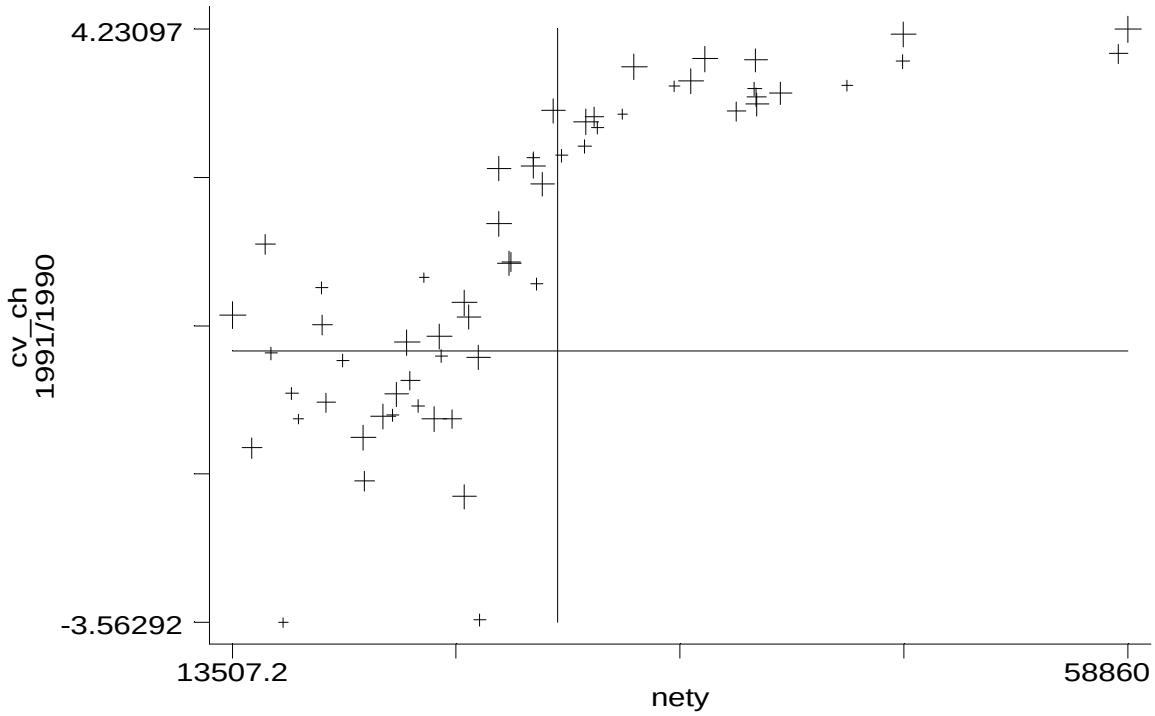



FIG 6: Percentage Change

Two

Parent Families - One or Both Adults not working full time

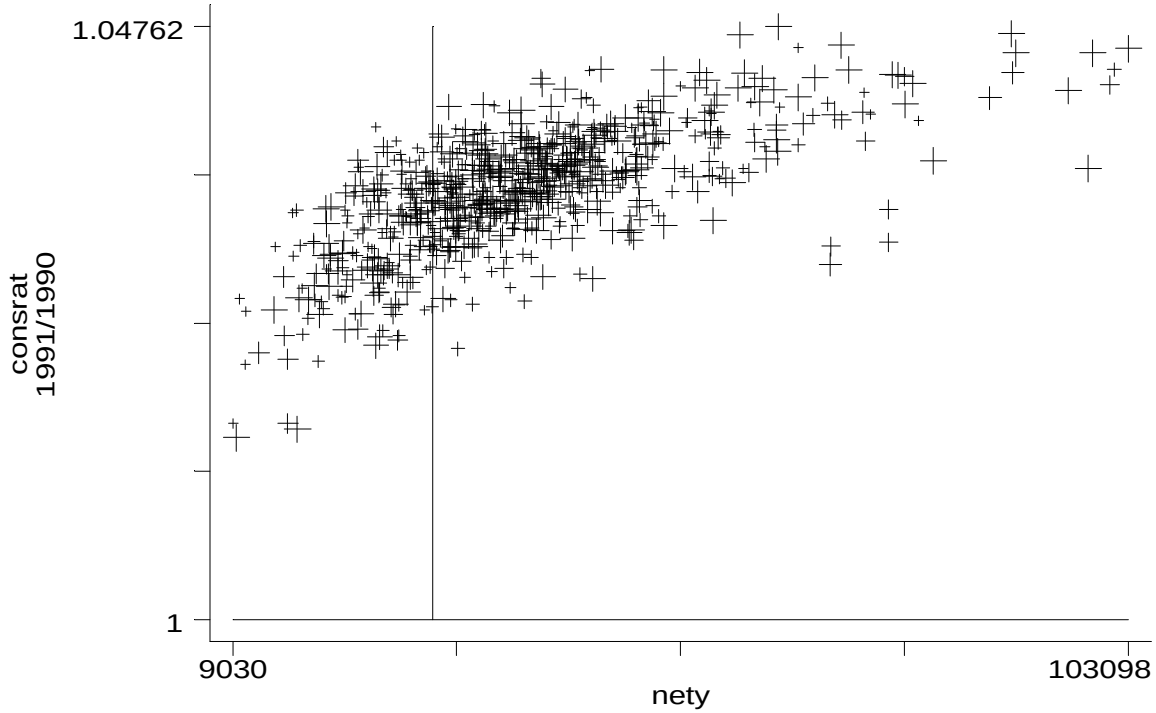



FIG 7: Ratio Consumption

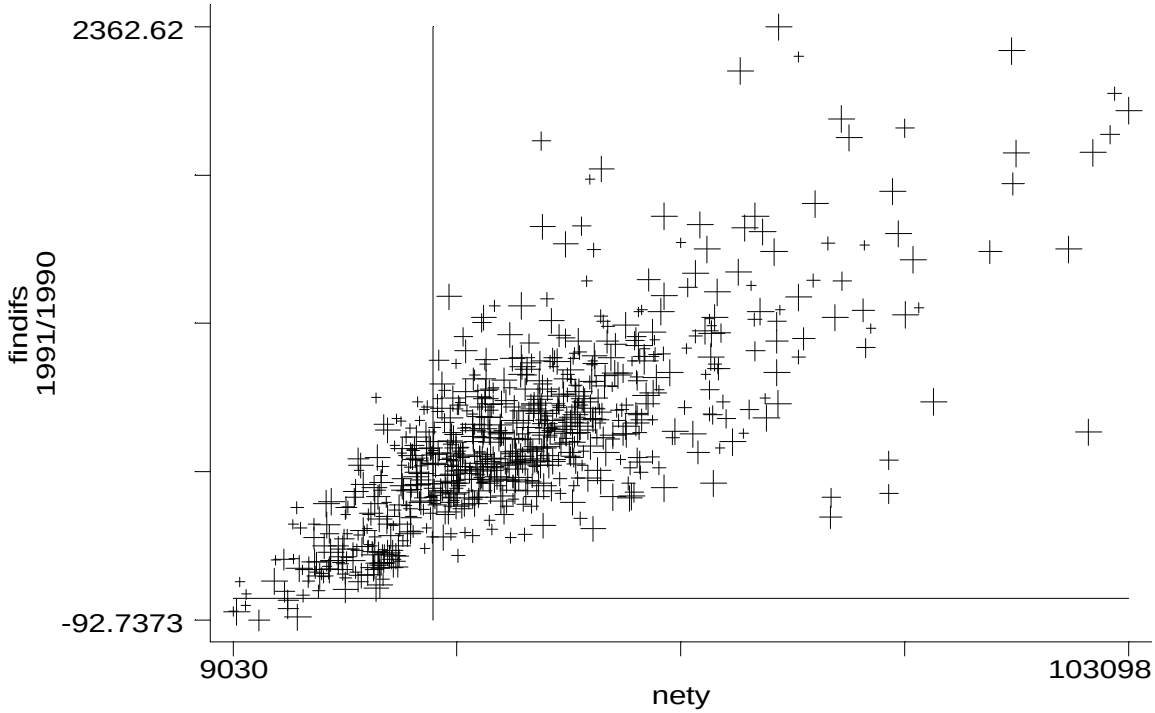



FIG 8: CV - Transfer

Lone Parents not working full time

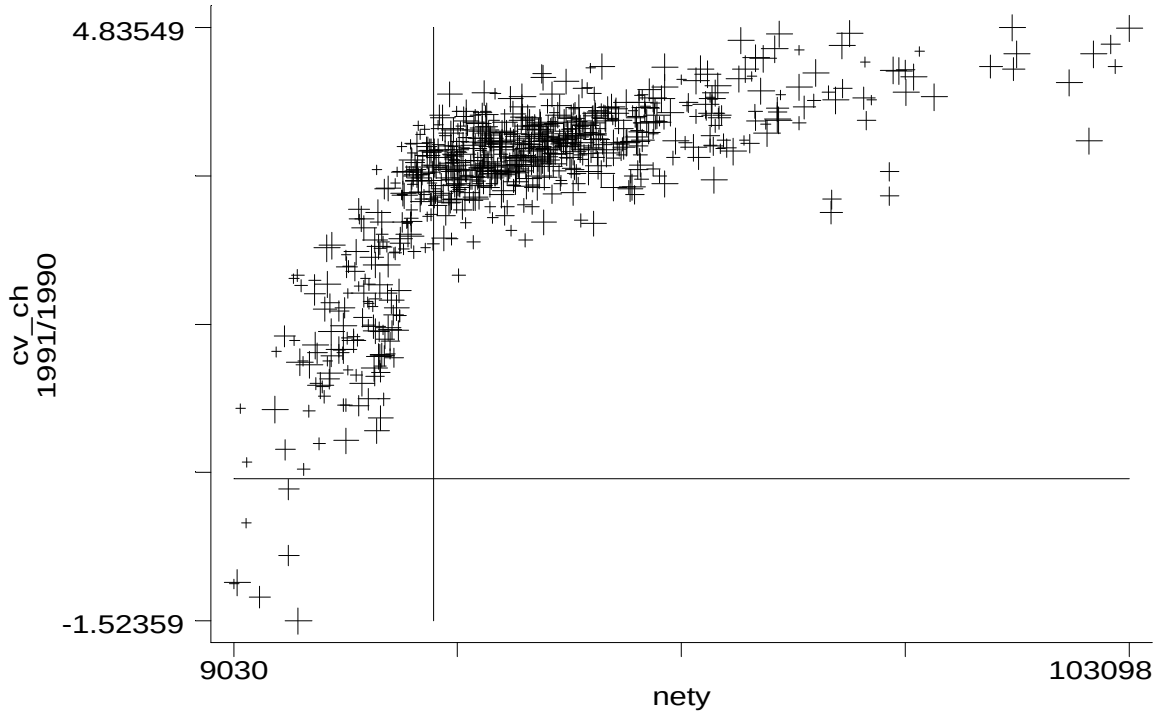



FIG 9: Percentage Change

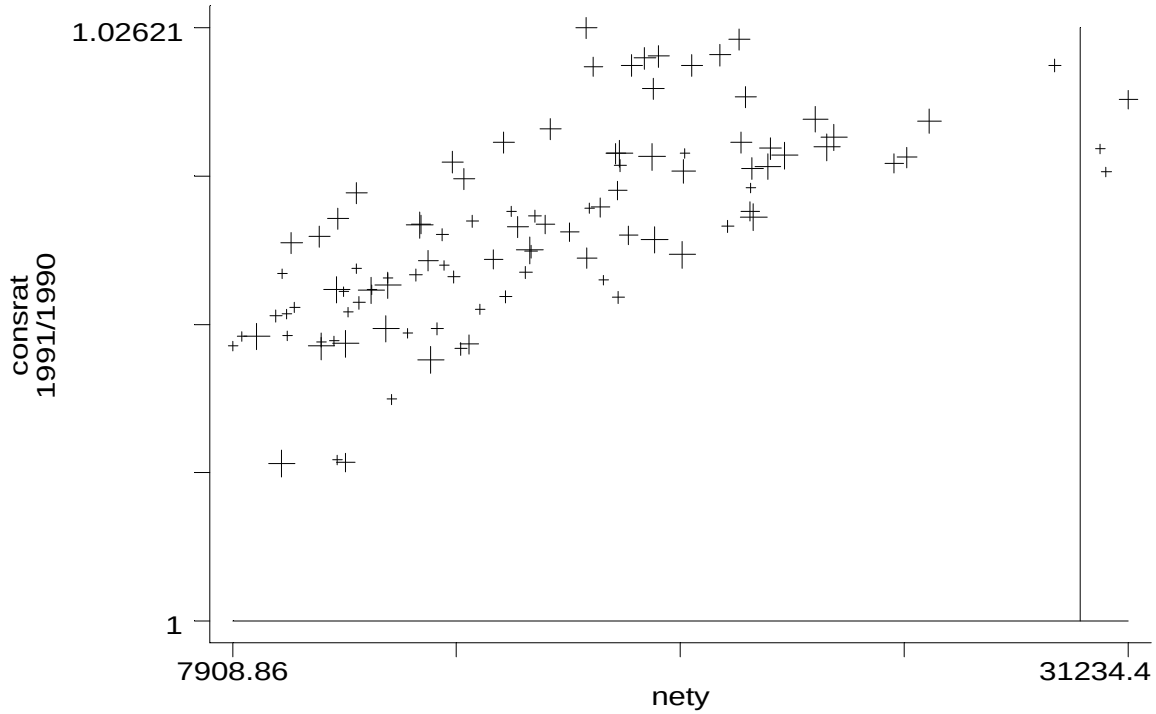



FIG 10: Ratio Consumption

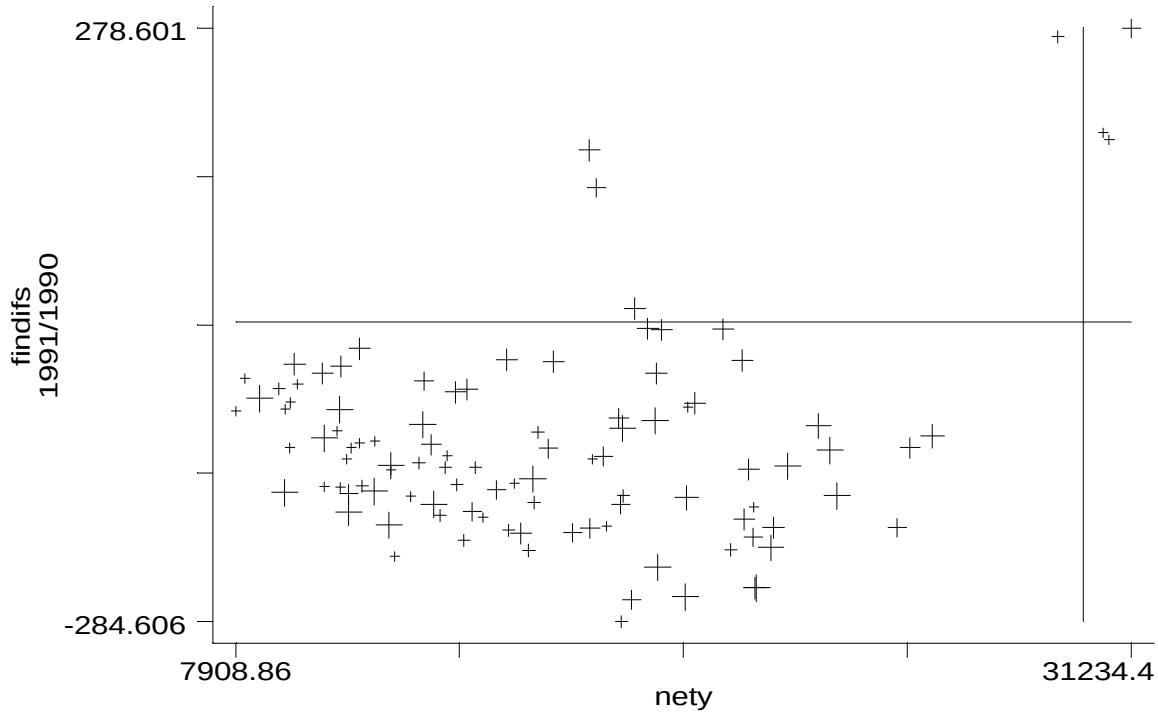



FIG 11: CV - Transfer

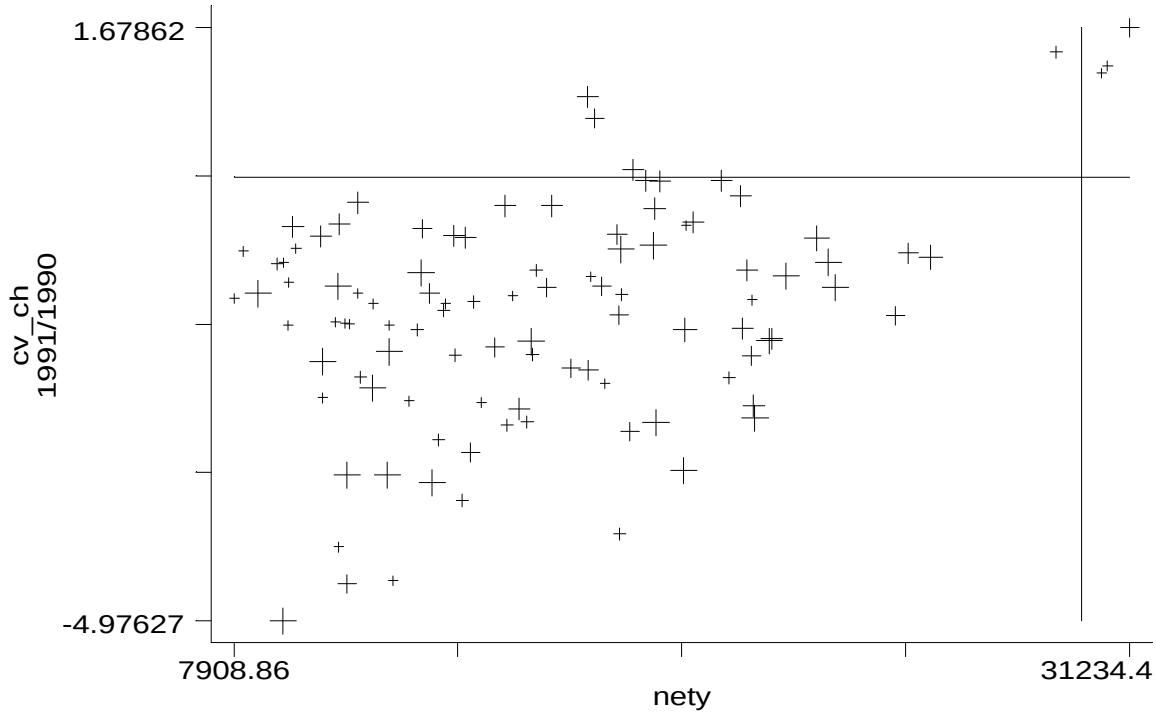



FIG 12: Percentage Change

Couples (no children) Both Full time

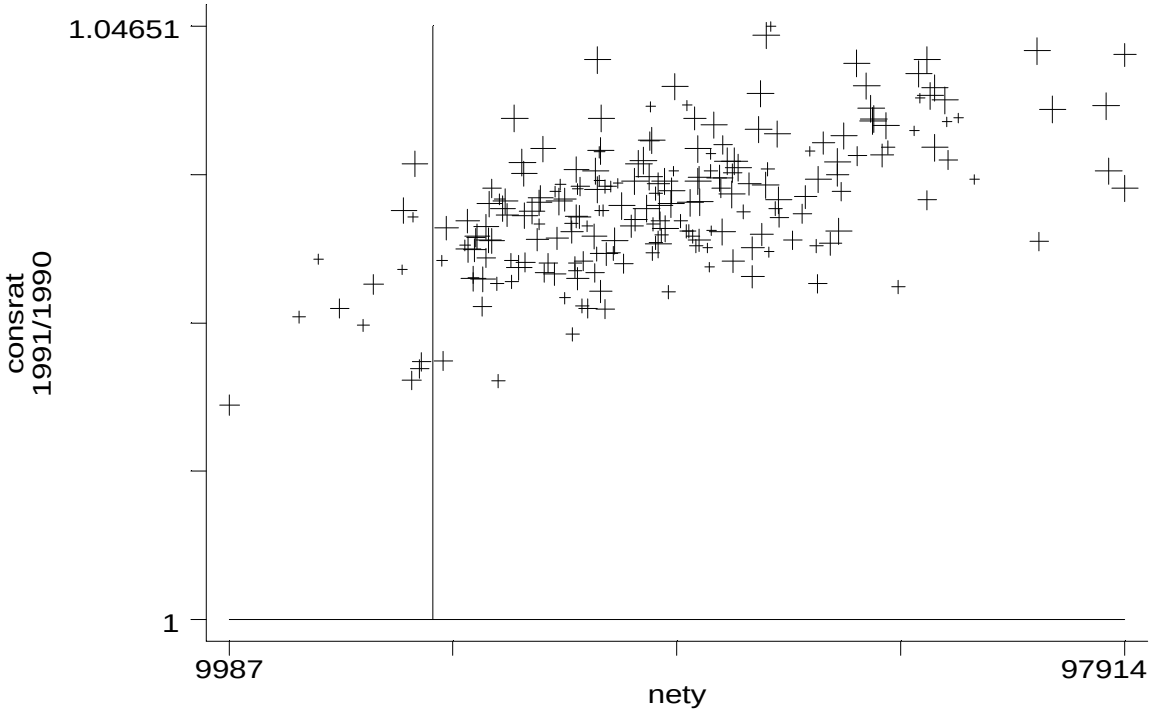



FIG 13: Ratio Consumption

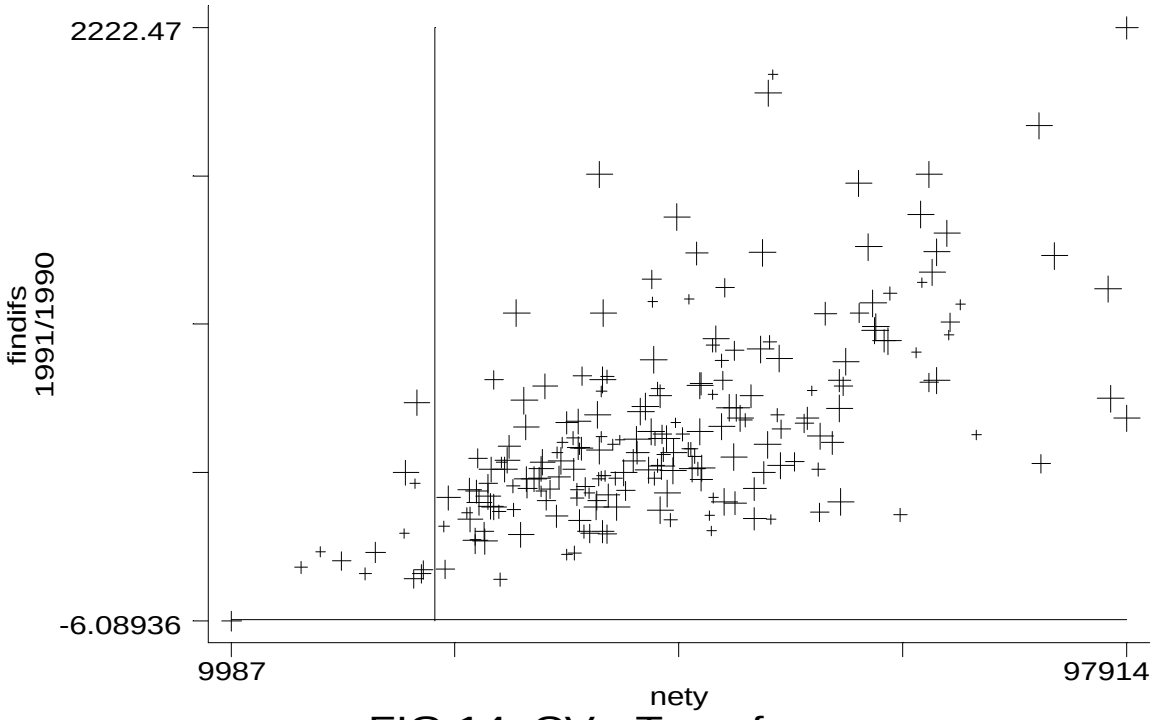



FIG 14: CV - Transfer

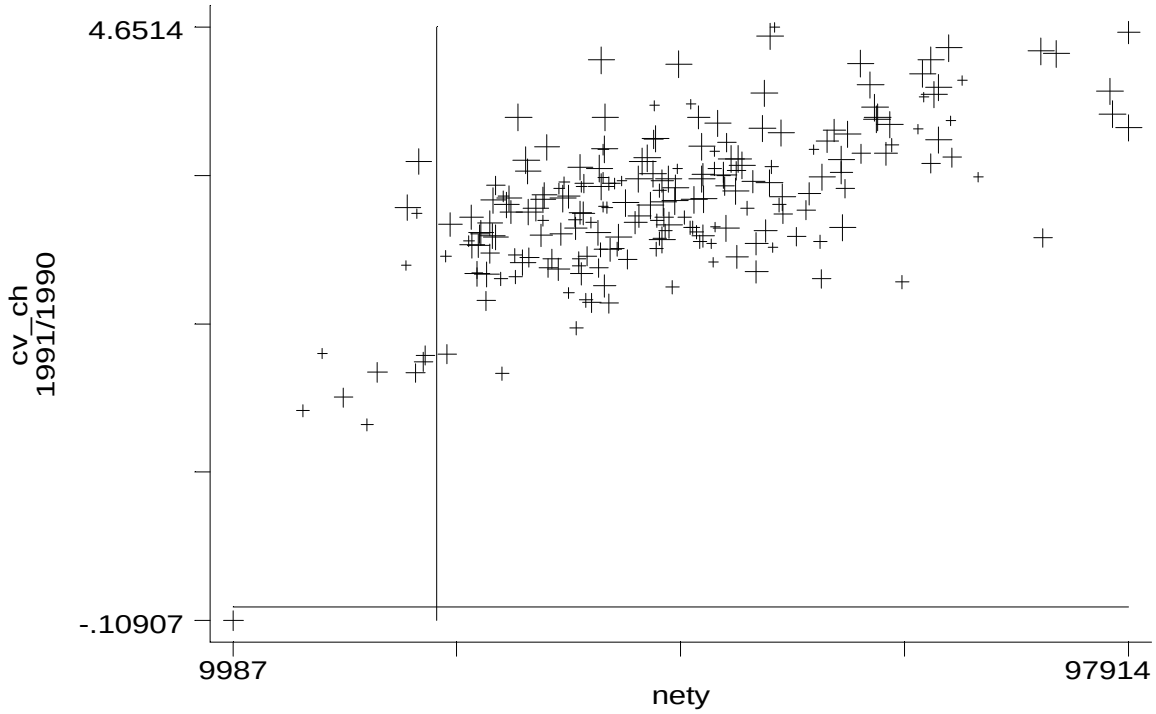



FIG 15: Percentage Change

Singles (no children) Full time

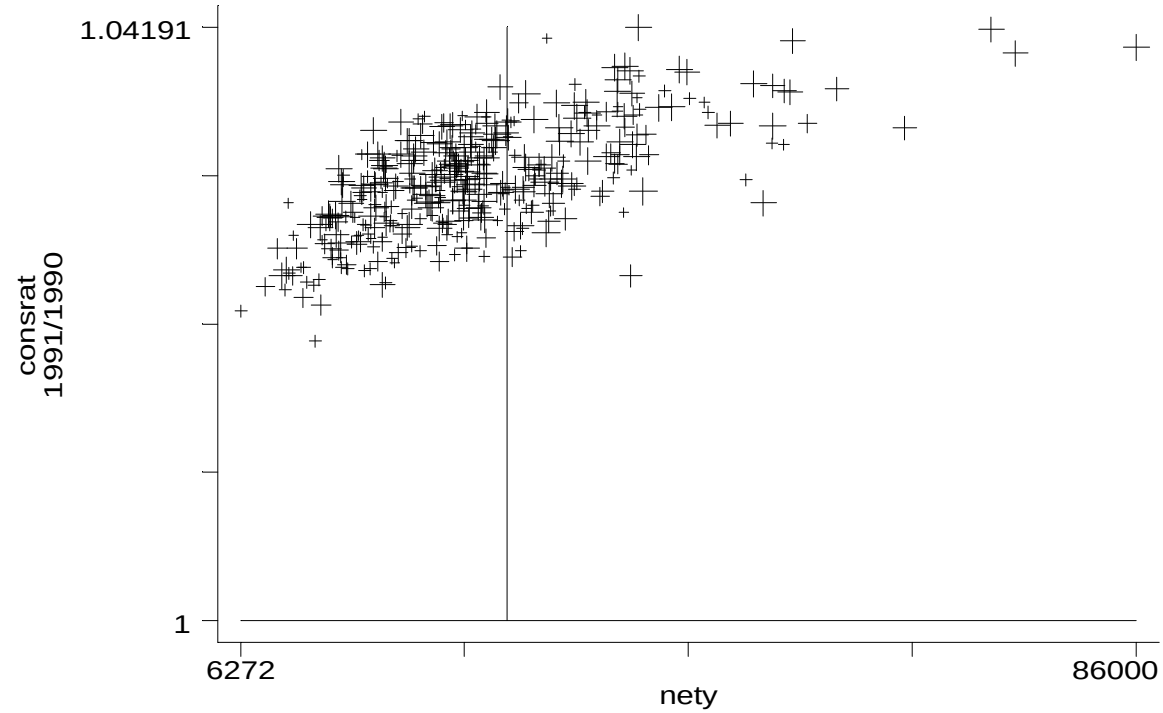



FIG 16: Ratio Consumption

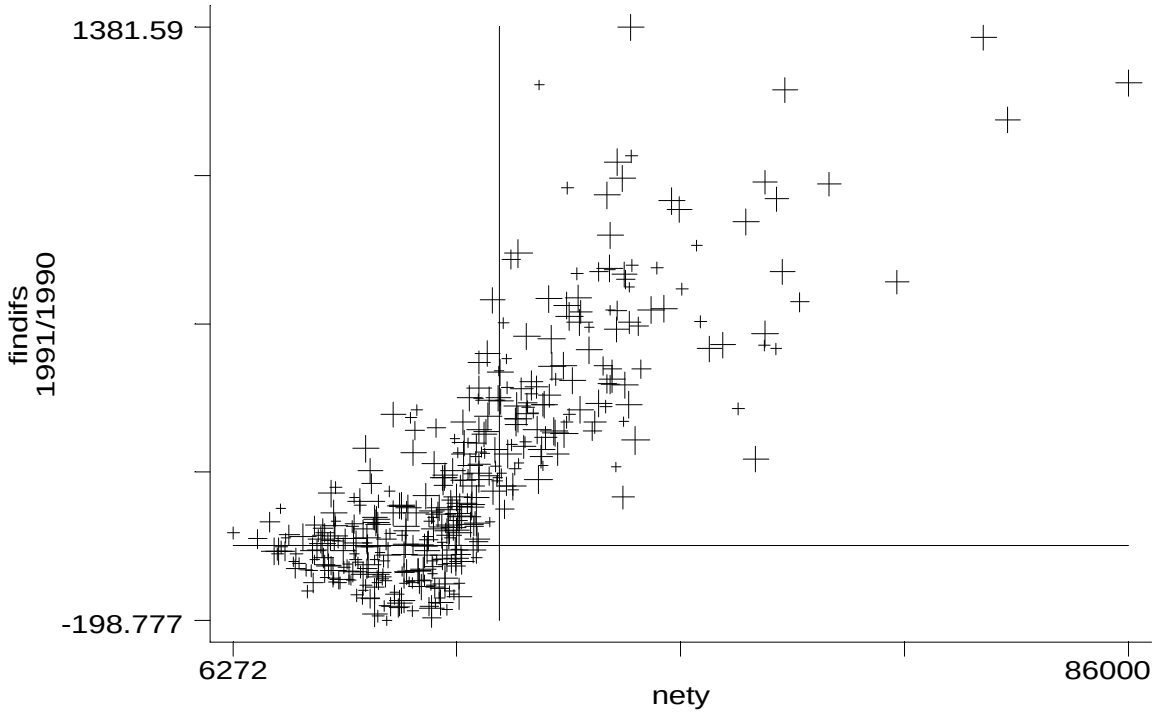



FIG 17: CV - Transfer

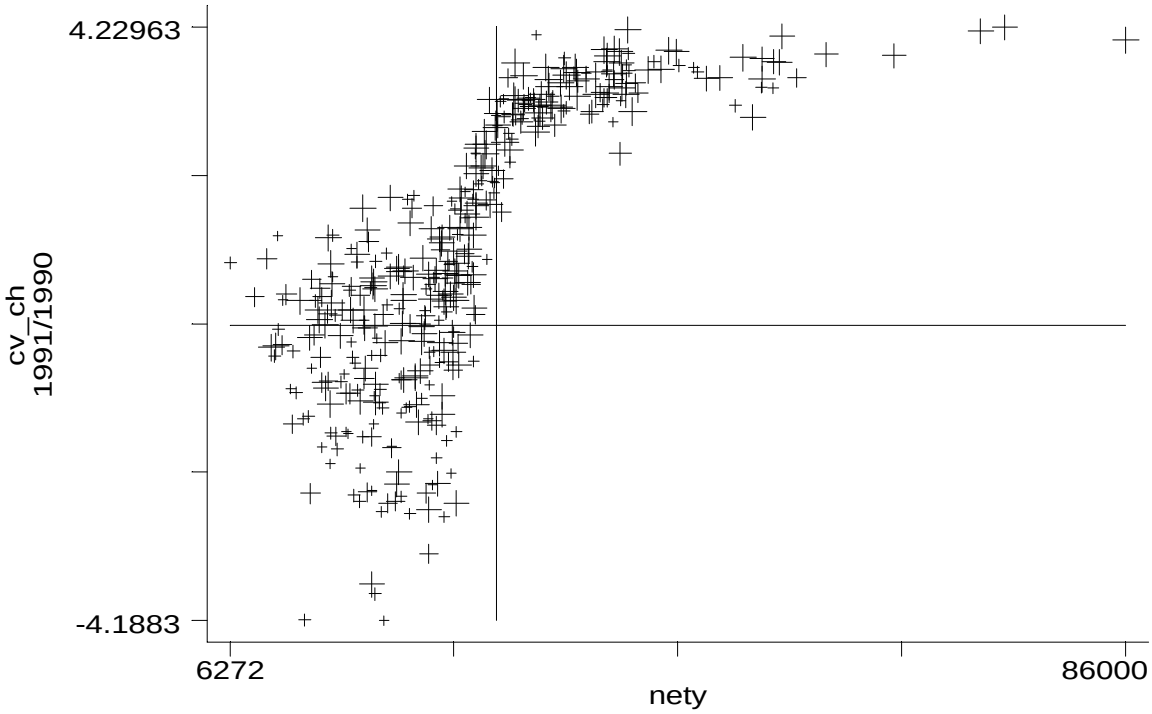



FIG 18: Percentage Change

Couples (no children) One or both adults not working full time

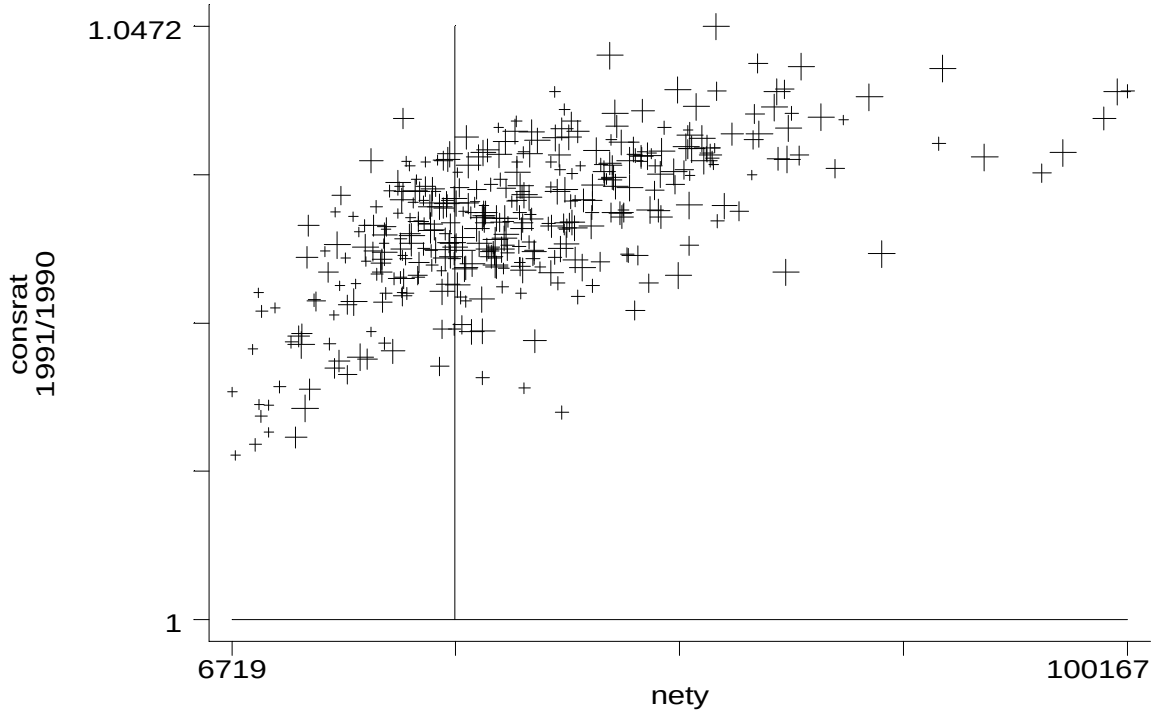



FIG 19: Ratio Consumption

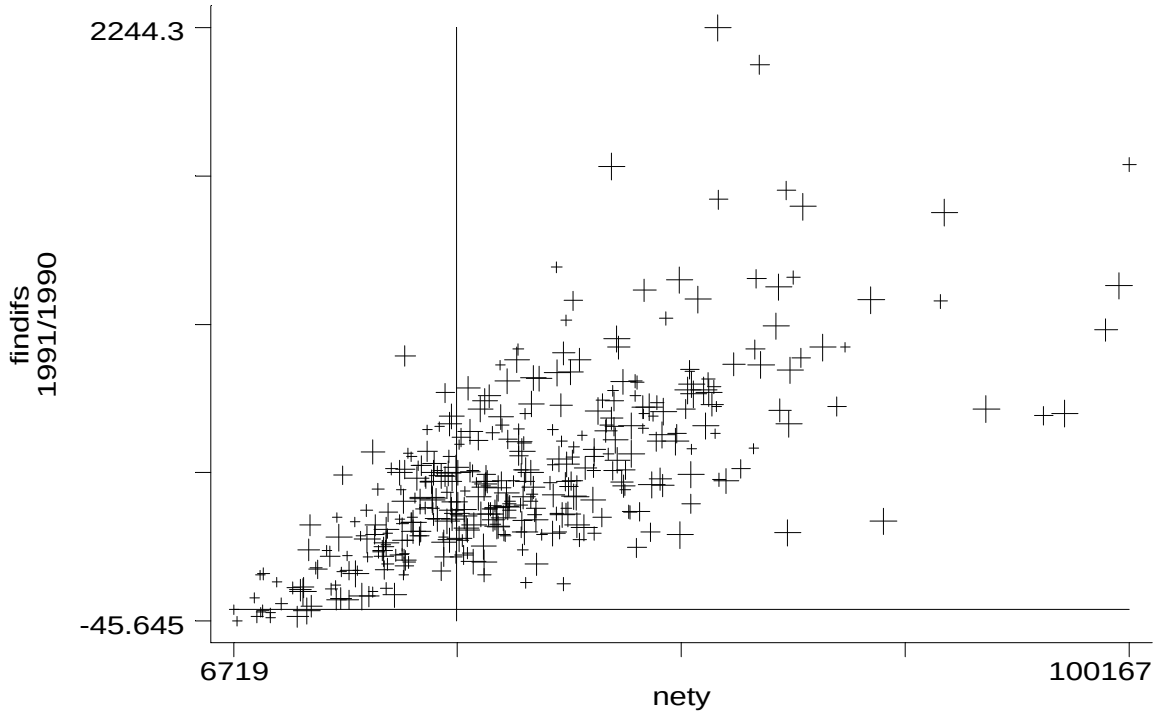



FIG 20: CV - Transfer

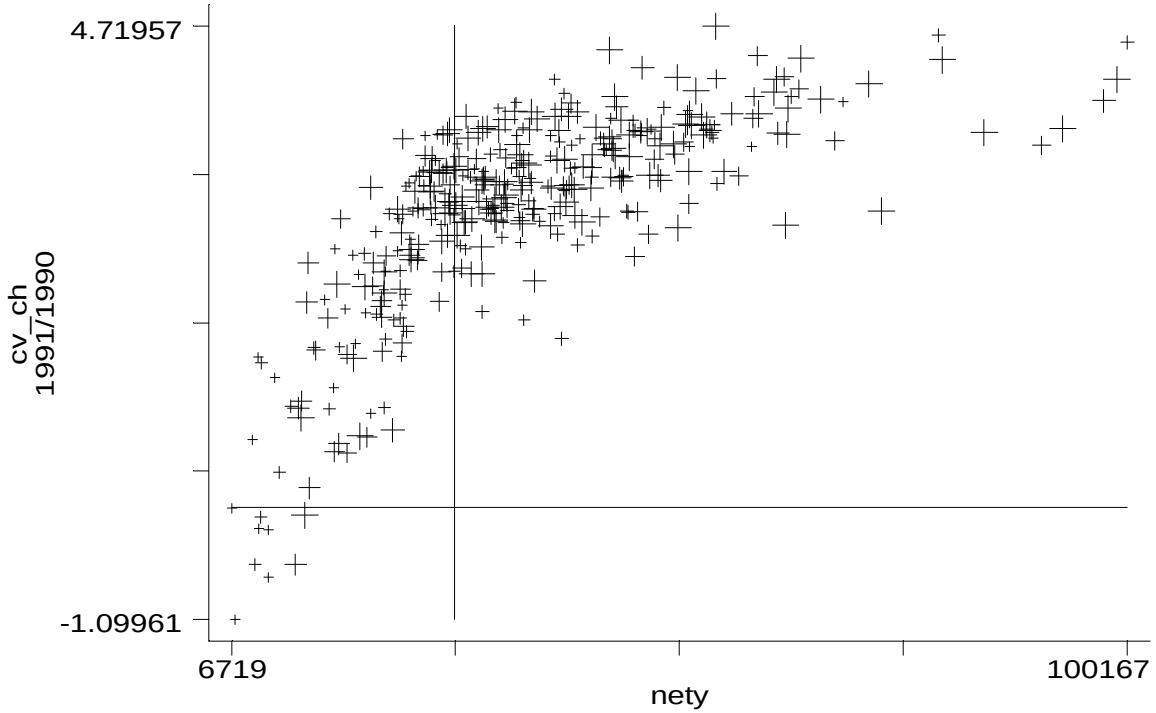



FIG 21: Percentage Change

Si n
gle s
(no children) Other Labour Force Participation

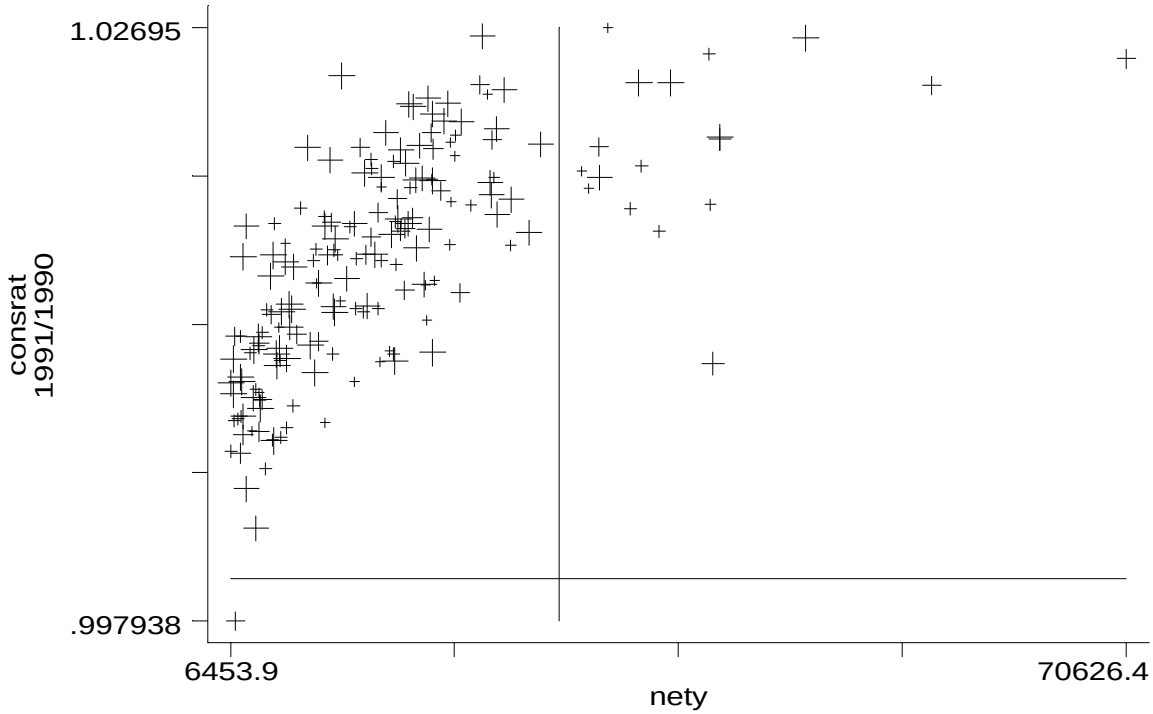



FIG 22: Ratio Consumption

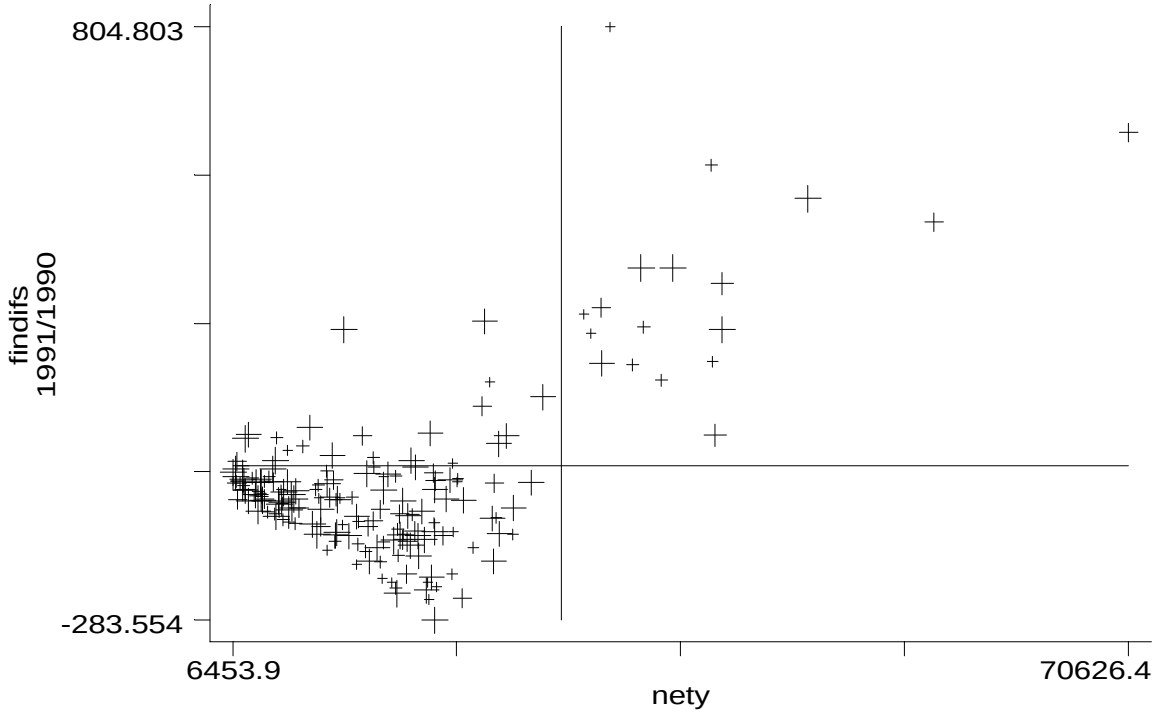
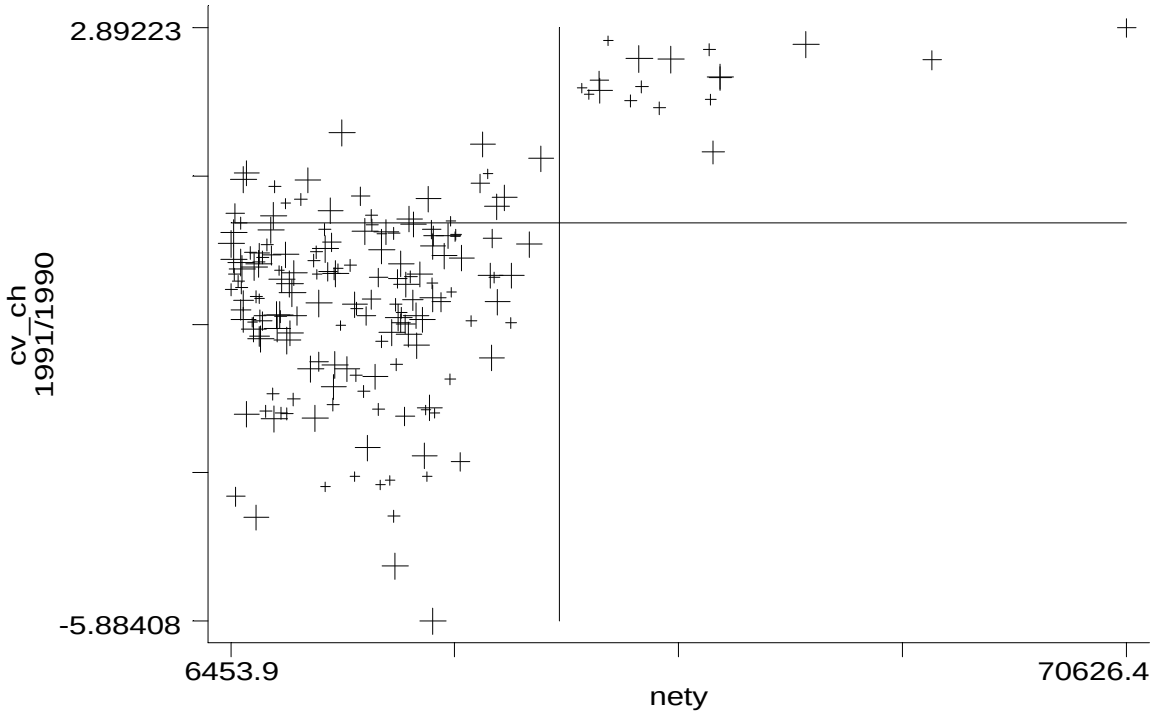



FIG 23: CV - Transfer




A pp

FIG 24: Percentage Change

endix One

Estimated Impact of Replacement of MST by GST on Prices (Grady, 1990 pp. 638)

| Categories of Consumer Expenditure | Percentage Change |
|---|---|
| **Prices Used in Demand System** | |
| Food and Non-Alcoholic Beverages | -0.2 |
| Expenditure on Restaurant and Hotels | +5.6 |
| Alcoholic Beverages | +0.0 |
| Tobacco Products | +0.0 |
| Clothing, Footwear and Accessories | +5.6 |
| Domestic & Child Care Services | +0.9 |
| Laundry and Cleaning Services | +5.5 |
| Other Household Services | +5.6 |
| Motor Vehicle Repairs and parts | +3.3 |
| Other Automobile services | +5.4 |
| Purchased Transportation | +3.4 |
| Recreational Services | +5.3 |
| Reading and Entertainment | +2.7 |
| Educational and Cultural Services | +0.5 |
| **Percentage Changes in Prices not used in the Demand System** | |
| Electricity | +6.0 |
| Natural Gas | +5.9 |
| Other Fuels | +5.2 |
| Furniture, Carpets and other | -1.4 |
| Household Appliances | -0.5 |
| Semi-Durable Household Furnishings | -0.2 |

Appendix Two - Estimated Coefficients from the QUAID system

Couples working Full time

| | Food | | Restaurant | | House Operations | | Recreation | | Alcohol | | Transportation | | Clothing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| lnpfath | -0.182 | 0.204 | 0.273 | 0.146 | -0.197 | 0.132 | -0.095 | 0.126 | 0.015 | 0.094 | -0.151 | 0.048 | 0.184 | 0.184 |
| lnprest | 0.273 | 0.146 | -0.307 | 0.144 | 0.193 | 0.110 | -0.043 | 0.106 | 0.021 | 0.074 | 0.099 | 0.044 | -0.084 | 0.170 |
| lnphouse | -0.197 | 0.132 | 0.193 | 0.110 | -0.069 | 0.163 | 0.181 | 0.114 | -0.105 | 0.079 | -0.005 | 0.044 | -0.122 | 0.161 |
| lnprec | -0.095 | 0.126 | -0.043 | 0.106 | 0.181 | 0.114 | -0.025 | 0.149 | -0.097 | 0.077 | 0.095 | 0.047 | 0.088 | 0.147 |
| lnpal | 0.015 | 0.094 | 0.021 | 0.074 | -0.105 | 0.079 | -0.097 | 0.077 | -0.003 | 0.073 | -0.028 | 0.029 | 0.149 | 0.099 |
| lnptran | -0.151 | 0.048 | 0.099 | 0.044 | -0.005 | 0.044 | 0.095 | 0.047 | -0.028 | 0.029 | -0.108 | 0.044 | 0.097 | 0.048 |
| lnpcloth | 0.184 | 0.184 | -0.084 | 0.170 | -0.122 | 0.161 | 0.088 | 0.147 | 0.149 | 0.099 | 0.097 | 0.048 | -0.300 | 0.278 |
| $ | -0.104 | 0.038 | 0.069 | 0.032 | -0.074 | 0.035 | 0.016 | 0.042 | -0.006 | 0.021 | 0.113 | 0.042 | -0.007 | 0.036 |
| 8 | -0.022 | 0.011 | -0.002 | 0.009 | 0.029 | 0.010 | 0.023 | 0.012 | 0.002 | 0.006 | -0.046 | 0.012 | 0.029 | 0.011 |
| home | 0.001 | 0.004 | 0.002 | 0.003 | 0.009 | 0.003 | 0.004 | 0.004 | 0.0001 | 0.002 | 0.012 | 0.004 | -0.005 | 0.004 |
| hmale | 0.002 | 0.004 | 0.002 | 0.004 | 0.005 | 0.004 | 0.001 | 0.005 | -0.002 | 0.002 | 0.0001 | 0.005 | -0.009 | 0.004 |
| hfrench | -0.007 | 0.007 | 0.010 | 0.006 | -0.003 | 0.006 | 0.007 | 0.007 | 0.002 | 0.004 | -0.023 | 0.007 | 0.003 | 0.006 |
| hage | 0.002 | 0.0004 | 0.0002 | 0.0003 | -0.002 | 0.000 | -0.001 | 0.0004 | -0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0008 | 0.0004 |
| urban | 0.017 | 0.005 | 0.011 | 0.005 | -0.007 | 0.005 | -0.010 | 0.006 | 0.0008 | 0.003 | 0.009 | 0.006 | -0.020 | 0.005 |
| sfrench | -0.011 | 0.007 | 0.002 | 0.006 | 0.0008 | 0.006 | -0.017 | 0.007 | 0.009 | 0.004 | 0.007 | 0.008 | -0.005 | 0.006 |
| sage | 0.0009 | 0.0004 | -0.001 | 0.0003 | 0.0005 | 0.0004 | 0.0009 | 0.0004 | 0.00004 | 0.0002 | -0.0002 | 0.0005 | -0.0010 | 0.0004 |
| chlt16 | 0.041 | 0.002 | -0.025 | 0.001 | 0.020 | 0.001 | -0.005 | 0.002 | -0.009 | 0.0009 | -0.011 | 0.002 | -0.013 | 0.002 |
| Atlantic | -0.010 | 0.020 | 0.009 | 0.017 | -0.003 | 0.015 | 0.031 | 0.016 | 0.006 | 0.011 | -0.036 | 0.012 | -0.005 | 0.021 |
| Quebec | 0.024 | 0.012 | -0.007 | 0.010 | -0.0007 | 0.011 | 0.024 | 0.011 | -0.014 | 0.008 | -0.006 | 0.008 | -0.010 | 0.013 |
| Praires | -0.067 | 0.023 | 0.037 | 0.021 | 0.009 | 0.024 | 0.050 | 0.021 | -0.026 | 0.014 | -0.047 | 0.013 | 0.036 | 0.031 |
| BC | -0.044 | 0.016 | 0.039 | 0.015 | -0.010 | 0.014 | 0.039 | 0.014 | -0.008 | 0.009 | -0.026 | 0.010 | 0.010 | 0.016 |
| y2 | -0.002 | 0.018 | 0.020 | 0.015 | -0.033 | 0.014 | 0.010 | 0.014 | -0.015 | 0.010 | 0.003 | 0.008 | -0.009 | 0.018 |
| y3 | -0.023 | 0.041 | 0.055 | 0.034 | -0.055 | 0.036 | 0.049 | 0.032 | -0.031 | 0.023 | 0.016 | 0.016 | -0.049 | 0.040 |
| y4 | -0.010 | 0.075 | 0.103 | 0.061 | -0.118 | 0.065 | 0.064 | 0.059 | -0.048 | 0.040 | 0.037 | 0.027 | -0.118 | 0.073 |
| _cons | 0.367 | 0.044 | -0.026 | 0.038 | 0.192 | 0.045 | 0.027 | 0.045 | 0.101 | 0.026 | 0.169 | 0.041 | 0.094 | 0.048 |

Lnpfath - log price food at home, Lnprest - log price food at restaurants, Lnphouse - log price of household operations, Lnprec - log price of recreation, Lnpap - log price food of alcohol, Lnptran - log price food of transportation, Lnpcloth - log price of clothing, $ - totexp, 8 - totexp squared, home - dummy for ownership of home, hmale- dummy=1 if head of household is male, hfrench- dummy=1 if head of household speaks french, hage- age of head of household, urban- dummy=1 if live in urban area, sfrench- dummy=1 if spouse of head of household speaks french, sage- age of spouse, chlt16 is the number of children under 16 years of age, Atlantic, Quebec, Prairies, BC are dummies for regions (Ontario is base) y2-y4 are dummies for 1984, 1986, 1990 (1982 is base).

Singles working Full time (n=2520)

| | Food | | Restaurant | | House Operations | | Recreation | | Alcohol | | Transportation | | Clothing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| lnpfath | -0.771 | 0.227 | 0.650 | 0.166 | 0.275 | 0.129 | -0.028 | 0.138 | 0.318 | 0.121 | -0.160 | 0.057 | -0.358 | 0.192 |
| lnprest | 0.650 | 0.166 | -0.659 | 0.174 | -0.113 | 0.112 | -0.016 | 0.126 | -0.208 | 0.100 | 0.103 | 0.061 | 0.378 | 0.181 |
| lnphouse | 0.275 | 0.129 | -0.113 | 0.112 | -0.258 | 0.136 | -0.182 | 0.105 | -0.132 | 0.085 | -0.011 | 0.039 | 0.371 | 0.158 |
| lnprec | -0.028 | 0.138 | -0.016 | 0.126 | -0.182 | 0.105 | 0.046 | 0.164 | -0.067 | 0.104 | 0.018 | 0.055 | 0.202 | 0.160 |
| lnpal | 0.318 | 0.121 | -0.208 | 0.100 | -0.132 | 0.085 | -0.067 | 0.104 | -0.226 | 0.111 | 0.064 | 0.043 | 0.263 | 0.115 |
| lnptran | -0.160 | 0.057 | 0.103 | 0.061 | -0.011 | 0.039 | 0.018 | 0.055 | 0.064 | 0.043 | -0.100 | 0.055 | 0.049 | 0.052 |
| lnpcloth | -0.358 | 0.192 | 0.378 | 0.181 | 0.371 | 0.158 | 0.202 | 0.160 | 0.263 | 0.115 | 0.049 | 0.052 | -0.830 | 0.293 |
| lnmap | -0.114 | 0.033 | -0.017 | 0.037 | -0.065 | 0.024 | 0.066 | 0.037 | 0.069 | 0.026 | 0.179 | 0.042 | -0.015 | 0.030 |
| lnmap2 | 0.0005 | 0.008 | 0.011 | 0.009 | 0.013 | 0.006 | 0.003 | 0.009 | -0.014 | 0.007 | -0.042 | 0.011 | 0.016 | 0.008 |
| home | 0.0010 | 0.004 | -0.010 | 0.004 | 0.013 | 0.003 | -0.001 | 0.004 | 0.003 | 0.003 | 0.019 | 0.005 | -0.017 | 0.004 |
| hmale | -0.0008 | 0.004 | 0.039 | 0.004 | -0.031 | 0.003 | 0.002 | 0.004 | 0.044 | 0.003 | 0.011 | 0.005 | -0.083 | 0.003 |
| hfrench | 0.002 | 0.006 | -0.0005 | 0.007 | -0.015 | 0.004 | -0.011 | 0.007 | 0.0086 | 0.005 | 0.009 | 0.008 | 0.0006 | 0.006 |
| hage | 0.002 | 0.0002 | -0.0004 | 0.0002 | -0.00003 | 0.0001 | -0.001 | 0.0002 | -0.0006 | 0.0001 | 0.0002 | 0.0002 | -0.0002 | 0.000 |
| urban | -0.010 | 0.009 | 0.029 | 0.010 | -0.003 | 0.006 | 0.025 | 0.010 | 0.003 | 0.007 | -0.061 | 0.012 | 0.009 | 0.008 |
| onepar | 0.032 | 0.011 | -0.020 | 0.013 | 0.090 | 0.008 | -0.025 | 0.013 | -0.025 | 0.009 | -0.056 | 0.015 | -0.002 | 0.010 |
| chlt16 | 0.053 | 0.007 | -0.018 | 0.007 | -0.018 | 0.005 | -0.011 | 0.008 | -0.0004 | 0.005 | 0.005 | 0.009 | -0.013 | 0.006 |
| Atlantic | -0.067 | 0.023 | 0.028 | 0.021 | 0.036 | 0.015 | 0.015 | 0.018 | 0.050 | 0.016 | -0.025 | 0.016 | -0.050 | 0.023 |
| Quebec | -0.014 | 0.014 | 0.018 | 0.013 | 0.013 | 0.010 | 0.022 | 0.013 | 0.010 | 0.012 | -0.030 | 0.009 | -0.025 | 0.014 |
| Praires | -0.007 | 0.025 | -0.015 | 0.024 | -0.048 | 0.021 | -0.007 | 0.023 | -0.011 | 0.017 | -0.012 | 0.016 | 0.080 | 0.032 |
| BC | -0.069 | 0.018 | 0.059 | 0.020 | -0.010 | 0.012 | 0.017 | 0.017 | 0.026 | 0.013 | -0.010 | 0.012 | -0.022 | 0.016 |
| y2 | -0.036 | 0.021 | 0.065 | 0.017 | 0.015 | 0.013 | -0.012 | 0.015 | 0.015 | 0.013 | -0.024 | 0.010 | -0.019 | 0.018 |
| y3 | -0.063 | 0.046 | 0.118 | 0.040 | 0.021 | 0.032 | -0.017 | 0.035 | 0.031 | 0.031 | -0.048 | 0.019 | -0.033 | 0.042 |
| y4 | -0.096 | 0.083 | 0.205 | 0.070 | 0.032 | 0.057 | -0.051 | 0.063 | 0.051 | 0.053 | -0.045 | 0.031 | -0.079 | 0.076 |
| _cons | 0.310 | 0.046 | 0.096 | 0.048 | 0.224 | 0.037 | 0.066 | 0.047 | 0.013 | 0.034 | 0.096 | 0.048 | 0.048 | 0.048 |

Lnpfath - log price food at home, Lnprest - log price food at restaurants, Lnphouse - log price of household operations, Lnprec - log price of recreation, Lnpap - log price food of alcohol, Lnptran - log price food of transportation, Lnpcloth - log price of clothing, $ - totexp, 8 - totexp squared, home - dummy for ownership of home, hmale- dummy=1 if head of household is male, hfrench- dummy=1 if head of household speaks french, hage- age of head of household, urban- dummy=1 if live in urban area, chlt16 is the number of children under 16 years of age, Atlantic, Quebec, Prairies, BC are dummies for regions (Ontario is base) y2-y4 are dummies for 1984, 1986, 1990 (1982 is base).

Couples; One or both do not work full time (n=7474)

| | Food | | Restaurant | | House Operations | | Recreation | | Alcohol | | Transportation | | Clothing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
| lnpfath | -0.024 | 0.231 | 0.066 | 0.095 | -0.118 | 0.147 | -0.141 | 0.099 | 0.074 | 0.070 | -0.034 | 0.071 | 0.204 | 0.113 |
| lnprest | 0.066 | 0.095 | -0.126 | 0.077 | 0.070 | 0.066 | -0.017 | 0.062 | -0.008 | 0.043 | -0.006 | 0.029 | 0.047 | 0.097 |
| lnphouse | -0.118 | 0.147 | 0.070 | 0.066 | -0.167 | 0.132 | 0.262 | 0.077 | -0.066 | 0.055 | -0.019 | 0.048 | -0.071 | 0.091 |
| lnprec | -0.141 | 0.099 | -0.017 | 0.062 | 0.262 | 0.077 | -0.112 | 0.087 | -0.031 | 0.048 | 0.123 | 0.036 | -0.012 | 0.085 |
| lnpal | 0.074 | 0.070 | -0.008 | 0.043 | -0.066 | 0.055 | -0.031 | 0.048 | -0.038 | 0.050 | -0.011 | 0.021 | 0.065 | 0.059 |
| lnptran | -0.036 | 0.071 | -0.006 | 0.029 | -0.019 | 0.048 | 0.123 | 0.036 | -0.011 | 0.021 | -0.114 | 0.040 | -0.020 | 0.031 |
| lnpcloth | 0.204 | 0.113 | 0.047 | 0.097 | -0.071 | 0.091 | -0.012 | 0.085 | 0.065 | 0.059 | -0.020 | 0.0312 | -0.145 | 0.154 |
| lnmap | -0.228 | 0.086 | 0.081 | 0.026 | -0.007 | 0.053 | 0.130 | 0.039 | 0.050 | 0.017 | 0.240 | 0.046 | 0.044 | 0.023 |
| lnmap2 | 0.012 | 0.016 | -0.007 | 0.0045 | 0.002 | 0.010 | 0.008 | 0.007 | -0.011 | 0.003 | -0.049 | 0.009 | 0.005 | 0.004 |
| hfull | -0.0002 | 0.001 | 0.0004 | 0.0002 | 0.0001 | 0.0004 | -0.001 | 0.0004 | 0.0002 | 0.0002 | -0.0009 | 0.0004 | 0.0002 | 0.0002 |
| hpart | -0.008 | 0.006 | 0.005 | 0.002 | 0.007 | 0.004 | 0.002 | 0.003 | -0.0005 | 0.001 | 0.005 | 0.003 | 0.002 | 0.002 |
| sfull | 0.0001 | 0.001 | 0.00002 | 0.0004 | 0.001 | 0.001 | -0.004 | 0.0007 | 0.0009 | 0.0003 | -0.0001 | 0.0008 | -0.0001 | 0.0004 |
| spart | -0.0003 | 0.001 | -0.00002 | 0.0004 | -0.0002 | 0.001 | 0.002 | 0.0006 | -0.0006 | 0.0003 | -0.0005 | 0.0007 | 0.0002 | 0.0004 |
| home | 0.002 | 0.007 | -0.003 | 0.002 | 0.007 | 0.005 | 0.001 | 0.004 | 0.00008 | 0.002 | 0.013 | 0.004 | -0.00005 | 0.002 |
| hmale | -0.034 | 0.063 | 0.023 | 0.020 | 0.060 | 0.040 | -0.046 | 0.031 | 0.011 | 0.015 | 0.054 | 0.034 | 0.007 | 0.021 |
| hfrench | -0.003 | 0.014 | -0.0001 | 0.004 | 0.003 | 0.009 | -0.001 | 0.007 | 0.0005 | 0.003 | -0.006 | 0.008 | 0.0002 | 0.004 |
| hage | 0.001 | 0.001 | -0.0002 | 0.0002 | -0.0003 | 0.0004 | -0.001 | 0.0003 | -0.0001 | 0.0001 | -0.0002 | 0.0004 | 0.00005 | 0.0002 |
| urban | 0.008 | 0.010 | 0.010 | 0.003 | -0.002 | 0.006 | 0.009 | 0.005 | -0.0009 | 0.002 | -0.017 | 0.005 | 0.0008 | 0.003 |
| sfrench | 0.009 | 0.014 | -0.007 | 0.004 | -0.010 | 0.009 | -0.013 | 0.007 | 0.003 | 0.003 | -0.004 | 0.008 | 0.001 | 0.004 |
| sage | 0.001 | 0.001 | -0.0002 | 0.0003 | -0.00002 | 0.001 | -0.001 | 0.0004 | 0.0003 | 0.0002 | 0.0002 | 0.0005 | -0.00004 | 0.0002 |
| chlt16 | 0.040 | 0.006 | -0.013 | 0.002 | 0.004 | 0.004 | -0.017 | 0.003 | -0.005 | 0.001 | -0.015 | 0.003 | -0.002 | 0.002 |
| Atlantic | 0.007 | 0.019 | 0.0002 | 0.010 | -0.010 | 0.012 | 0.037 | 0.010 | 0.004 | 0.007 | -0.047 | 0.009 | 0.005 | 0.013 |
| Quebec | 0.003 | 0.016 | 0.017 | 0.006 | 0.011 | 0.010 | 0.014 | 0.009 | -0.005 | 0.006 | -0.009 | 0.008 | 0.006 | 0.007 |
| Praires | -0.058 | 0.027 | 0.008 | 0.012 | 0.004 | 0.020 | 0.065 | 0.014 | -0.014 | 0.009 | -0.018 | 0.012 | -0.0010 | 0.017 |
| BC | -0.026 | 0.014 | 0.013 | 0.007 | 0.006 | 0.010 | 0.035 | 0.008 | -0.005 | 0.005 | 0.001 | 0.007 | -0.015 | 0.008 |
| y2 | 0.021 | 0.019 | 0.004 | 0.008 | -0.021 | 0.012 | 0.002 | 0.010 | -0.0006 | 0.007 | -0.010 | 0.008 | 0.004 | 0.010 |
| y3 | 0.037 | 0.036 | 0.015 | 0.018 | -0.050 | 0.025 | 0.019 | 0.021 | -0.004 | 0.014 | -0.026 | 0.015 | -0.002 | 0.022 |
| y4 | 0.070 | 0.061 | 0.031 | 0.033 | -0.109 | 0.042 | 0.046 | 0.036 | -0.004 | 0.025 | -0.032 | 0.024 | -0.001 | 0.040 |
| _cons | 0.649 | 0.134 | -0.098 | 0.043 | 0.070 | 0.087 | -0.027 | 0.064 | -0.016 | 0.029 | -0.033 | 0.071 | -0.010 | 0.044 |

Lnpfath - log price food at home, Lnprest - log price food at restaurants, Lnphouse - log price of household operations, Lnprec - log price of recreation, Lnpap - log price food of alcohol, Lnptran - log price food of transportation, Lnpcloth - log price of clothing, $ - totexp, 8 - totexp squared, hfull number of weeks head works full time, fpart number of weeks head works part time, sfull number of weeks spouse works fulltime, spart number of weeks spouse works part time, home - dummy for ownership of home, hmale- dummy=1 if head of household is male, hfrench- dummy=1 if head of household speaks french, hage- age of head of household, urban- dummy=1 if live in urban area, sfrench- dummy=1 if spouse of head of household speaks french, sage- age of spouse, chlt16 is the number of children under 16 years of age, Atlantic, Quebec, Prairies, BC are dummies for regions (Ontario is base) y2-y4 are dummies for 1984, 1986, 1990 (1982 is base).

## Singles working Full time (n=2310)

| | Food | | Restaurant | | House Operations | | Recreation | | Alcohol | | Transportation | | Clothing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| lnpfath | -0.771 | 0.227 | 0.650 | 0.166 | 0.275 | 0.129 | -0.028 | 0.138 | 0.318 | 0.121 | -0.160 | 0.057 | -0.358 | 0.192 |
| lnprest | 0.650 | 0.166 | -0.659 | 0.174 | -0.113 | 0.112 | -0.016 | 0.126 | -0.208 | 0.100 | 0.103 | 0.061 | 0.378 | 0.181 |
| lnphouse | 0.275 | 0.129 | -0.113 | 0.112 | -0.258 | 0.136 | -0.182 | 0.105 | -0.132 | 0.085 | -0.011 | 0.039 | 0.371 | 0.158 |
| lnprec | -0.028 | 0.138 | -0.016 | 0.126 | -0.182 | 0.105 | 0.046 | 0.164 | -0.067 | 0.104 | 0.018 | 0.055 | 0.202 | 0.160 |
| lnpal | 0.318 | 0.121 | -0.208 | 0.100 | -0.132 | 0.085 | -0.067 | 0.104 | -0.226 | 0.111 | 0.064 | 0.043 | 0.263 | 0.115 |
| lnptran | -0.160 | 0.057 | 0.103 | 0.061 | -0.011 | 0.039 | 0.018 | 0.055 | 0.064 | 0.043 | -0.100 | 0.055 | 0.049 | 0.052 |
| lnpcloth | -0.358 | 0.192 | 0.378 | 0.181 | 0.371 | 0.158 | 0.202 | 0.160 | 0.263 | 0.115 | 0.049 | 0.052 | -0.830 | 0.293 |
| lnmap | -0.114 | 0.033 | -0.017 | 0.037 | -0.065 | 0.024 | 0.066 | 0.037 | 0.069 | 0.026 | 0.179 | 0.042 | -0.015 | 0.030 |
| lnmap2 | 0.0005 | 0.008 | 0.011 | 0.009 | 0.013 | 0.006 | 0.003 | 0.009 | -0.014 | 0.007 | -0.042 | 0.011 | 0.016 | 0.008 |
| home | 0.0010 | 0.004 | -0.010 | 0.004 | 0.013 | 0.003 | -0.001 | 0.004 | 0.003 | 0.003 | 0.019 | 0.005 | -0.017 | 0.004 |
| hmale | -0.0008 | 0.004 | 0.039 | 0.004 | -0.031 | 0.003 | 0.002 | 0.004 | 0.044 | 0.003 | 0.011 | 0.005 | -0.083 | 0.003 |
| hfrench | 0.002 | 0.006 | -0.0005 | 0.007 | -0.015 | 0.004 | -0.011 | 0.007 | 0.0086 | 0.005 | 0.009 | 0.008 | 0.0006 | 0.006 |
| hage | 0.002 | 0.0002 | -0.0004 | 0.0002 | -0.00003 | 0.0001 | -0.001 | 0.0002 | -0.0006 | 0.0001 | 0.0002 | 0.0002 | -0.0002 | 0.000 |
| urban | -0.010 | 0.009 | 0.029 | 0.010 | -0.003 | 0.006 | 0.025 | 0.010 | 0.003 | 0.007 | -0.061 | 0.012 | 0.009 | 0.008 |
| onepar | 0.032 | 0.011 | -0.020 | 0.013 | 0.090 | 0.008 | -0.025 | 0.013 | -0.025 | 0.009 | -0.056 | 0.015 | -0.002 | 0.010 |
| chlt16 | 0.053 | 0.007 | -0.018 | 0.007 | -0.018 | 0.005 | -0.011 | 0.008 | -0.0004 | 0.005 | 0.005 | 0.009 | -0.013 | 0.006 |
| Atlantic | -0.067 | 0.023 | 0.028 | 0.021 | 0.036 | 0.015 | 0.015 | 0.018 | 0.050 | 0.016 | -0.025 | 0.016 | -0.050 | 0.023 |
| Quebec | -0.014 | 0.014 | 0.018 | 0.013 | 0.013 | 0.010 | 0.022 | 0.013 | 0.010 | 0.012 | -0.030 | 0.009 | -0.025 | 0.014 |
| Praires | -0.007 | 0.025 | -0.015 | 0.024 | -0.048 | 0.021 | -0.007 | 0.023 | -0.011 | 0.017 | -0.012 | 0.016 | 0.080 | 0.032 |
| BC | -0.069 | 0.018 | 0.059 | 0.020 | -0.010 | 0.012 | 0.017 | 0.017 | 0.026 | 0.013 | -0.010 | 0.012 | -0.022 | 0.016 |
| y2 | -0.036 | 0.021 | 0.065 | 0.017 | 0.015 | 0.013 | -0.012 | 0.015 | 0.015 | 0.013 | -0.024 | 0.010 | -0.019 | 0.018 |
| y3 | -0.063 | 0.046 | 0.118 | 0.040 | 0.021 | 0.032 | -0.017 | 0.035 | 0.031 | 0.031 | -0.048 | 0.019 | -0.033 | 0.042 |
| y4 | -0.096 | 0.083 | 0.205 | 0.070 | 0.032 | 0.057 | -0.051 | 0.063 | 0.051 | 0.053 | -0.045 | 0.031 | -0.079 | 0.076 |
| _cons | 0.310 | 0.046 | 0.096 | 0.048 | 0.224 | 0.037 | 0.066 | 0.047 | 0.013 | 0.034 | 0.096 | 0.048 | 0.048 | 0.048 |

Lnpfath - log price food at home, Lnprest - log price food at restaurants, Lnphouse - log price of household operations, Lnprec - log price of recreation, Lnpap - log price food of alcohol, Lnptran - log price food of transportation, Lnpcloth - log price of clothing, $ - totexp, 8 - totexp squared, home - dummy for ownership of home, hmale- dummy=1 if head of household is male, hfrench- dummy=1 if head of household speaks french, hage- age of head of household, urban- dummy=1 if live in urban area, chlt16 is the number of children under 16 years of age, Atlantic, Quebec, Prairies, BC are dummies for regions (Ontario is base) y2-y4 are dummies for 1984, 1986, 1990 (1982 is base).

## Singles; Not working Full time (n=1953)

| | Food | | Restaurant | | House Operations | | Recreation | | Alcohol | | Transportation | | Clothing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE | Coef. | SE |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| lnpfath | -0.835 | 0.335 | 0.526 | 0.200 | 0.032 | 0.178 | 0.666 | 0.178 | -0.006 | 0.189 | -0.077 | 0.085 | -0.498 | 0.252 |
| lnprest | 0.5267 | 0.200 | -0.547 | 0.168 | -0.028 | 0.129 | -0.241 | 0.128 | -0.124 | 0.124 | 0.111 | 0.060 | 0.430 | 0.206 |
| lnphouse | 0.0321 | 0.178 | -0.029 | 0.129 | -0.139 | 0.176 | 0.039 | 0.127 | -0.160 | 0.125 | -0.005 | 0.051 | 0.180 | 0.188 |
| lnprec | 0.666 | 0.178 | -0.241 | 0.128 | 0.039 | 0.127 | -0.344 | 0.176 | -0.305 | 0.136 | 0.093 | 0.062 | 0.344 | 0.179 |
| lnpal | -0.006 | 0.189 | -0.127 | 0.124 | -0.160 | 0.125 | -0.305 | 0.136 | 0.268 | 0.178 | -0.059 | 0.060 | 0.303 | 0.153 |
| lnptran | -0.077 | 0.085 | 0.111 | 0.060 | -0.005 | 0.051 | 0.093 | 0.062 | -0.059 | 0.060 | -0.130 | 0.067 | 0.009 | 0.056 |
| lnpcloth | -0.4988 | 0.252 | 0.430 | 0.206 | 0.180 | 0.188 | 0.344 | 0.179 | 0.303 | 0.153 | 0.009 | 0.056 | -0.740 | 0.352 |
| lnmap | -0.229 | 0.051 | -0.013 | 0.032 | -0.011 | 0.028 | 0.010 | 0.039 | 0.105 | 0.033 | 0.274 | 0.049 | 0.013 | 0.030 |
| lnmap2 | 0.015 | 0.011 | 0.009 | 0.007 | -0.0009 | 0.006 | 0.018 | 0.009 | -0.019 | 0.007 | -0.043 | 0.011 | 0.005 | 0.007 |
| hfull | -0.0006 | 0.0002 | 0.0009 | 0.0001 | 0.0001 | 0.0001 | -0.001 | 0.0002 | -0.0002 | 0.0002 | 0.0003 | 0.0002 | 0.0002 | 0.0001 |
| hpart | -0.0009 | 0.0002 | 0.0007 | 0.0001 | 0.00006 | 0.0001 | 0.0003 | 0.0002 | -0.0003 | 0.0001 | 0.00007 | 0.0002 | 0.0003 | 0.0001 |
| home | -0.011 | 0.008 | -0.008 | 0.005 | 0.015 | 0.004 | -0.011 | 0.006 | -0.0003 | 0.005 | 0.040 | 0.007 | -0.013 | 0.004 |
| hmale | -0.021 | 0.007 | 0.027 | 0.004 | -0.047 | 0.004 | -0.013 | 0.005 | 0.063 | 0.004 | 0.006 | 0.007 | -0.055 | 0.004 |
| hfrench | 0.011 | 0.010 | -0.015 | 0.004 | -0.011 | 0.005 | -0.011 | 0.007 | 0.013 | 0.006 | -0.008 | 0.009 | 0.007 | 0.006 |
| hage | 0.002 | 0.0003 | -0.0004 | 0.0002 | -0.00003 | 0.0001 | -0.001 | 0.0002 | -0.0007 | 0.0002 | 0.0006 | 0.0003 | 0.00005 | 0.0002 |
| onepar | 0.066 | 0.014 | -0.024 | 0.009 | 0.036 | 0.008 | -0.014 | 0.011 | -0.027 | 0.009 | -0.059 | 0.014 | -0.009 | 0.008 |
| chlt16 | 0.046 | 0.007 | -0.003 | 0.004 | -0.008 | 0.004 | -0.018 | 0.005 | -0.004 | 0.004 | -0.011 | 0.007 | -0.0006 | 0.004 |
| urban | 0.004 | 0.011 | 0.023 | 0.007 | -0.0009 | 0.004 | 0.003 | 0.008 | 0.013 | 0.007 | -0.053 | 0.011 | 0.003 | 0.006 |
| Atlantic | -0.054 | 0.035 | 0.041 | 0.025 | 0.011 | 0.022 | 0.080 | 0.023 | -0.017 | 0.026 | -0.024 | 0.019 | -0.068 | 0.031 |
| Quebec | 0.036 | 0.021 | 0.016 | 0.014 | 0.013 | 0.014 | 0.027 | 0.016 | -0.035 | 0.018 | 0.003 | 0.012 | -0.030 | 0.017 |
| Praires | 0.029 | 0.035 | -0.014 | 0.026 | -0.015 | 0.027 | -0.014 | 0.026 | -0.050 | 0.024 | 0.012 | 0.018 | 0.057 | 0.038 |
| BC | -0.017 | 0.023 | 0.035 | 0.018 | 0.001 | 0.015 | 0.009 | 0.017 | -0.009 | 0.017 | 0.015 | 0.014 | -0.026 | 0.017 |
| y2 | -0.036 | 0.031 | 0.068 | 0.020 | -0.003 | 0.018 | 0.075 | 0.019 | -0.034 | 0.021 | -0.033 | 0.014 | -0.037 | 0.024 |
| y3 | -0.100 | 0.068 | 0.116 | 0.046 | -0.002 | 0.045 | 0.160 | 0.044 | -0.068 | 0.048 | -0.034 | 0.027 | -0.073 | 0.053 |
| y4 | -0.186 | 0.122 | 0.192 | 0.082 | 0.005 | 0.078 | 0.285 | 0.078 | -0.107 | 0.082 | -0.070 | 0.046 | -0.138 | 0.094 |
| _cons | 0.632 | 0.073 | 0.013 | 0.049 | 0.183 | 0.048 | 0.076 | 0.055 | -0.038 | 0.048 | -0.157 | 0.061 | 0.015 | 0.054 |

Lnpfath - log price food at home, Lnprest - log price food at restaurants, Lnphouse - log price of household operations, Lnprec - log price of recreation, Lnpap - log price food of alcohol, Lnptran - log price food of transportation, Lnpcloth - log price of clothing, $ - totexp, 8 - totexp squared, home - dummy for ownership of home, hmale- dummy=1 if head of household is male, hfrench- dummy=1 if head of household speaks french, hage- age of head of household, urban- dummy=1 if live in urban area, chlt16 is the number of children under 16 years of age, Atlantic, Quebec, Prairies, BC are dummies for regions (Ontario is base) y2-y4 are dummies for 1984, 1986, 1990 (1982 is base).

# Appendix Three

## Test for Homogeneity (n=1953)

| | Coefficient on log price of tobacco (standard error) |
|---|---|
| Food at Home | .0031759<br>(.0071307) |
| Restaurant Food | -.0014408<br>(.0043771) |
| House Operations | -.0007263<br>(.0036995) |
| Recreation | -.0051239<br>(.0053147) |
| Alcohol | .0011358<br>(.0043442) |
| Transportation | .0004207<br>(.0064293) |
| Clothing | .0011322<br>(.0039552) |

## Test for Over-Identification

R-squared in error regression with instruments

| | Sample 4 (n=1953) | Sample 2 (n=2310) | Sample 1 (n=2520) | Sample 3 (n=7474) |
|---|---|---|---|---|
| Food at Home | 0.0201 | 0.0191 | 0.0048 | 0.0057 |
| Restaurant | 0.0072 | 0.0111 | 0.0034 | 0.0068 |
| Home Operat | 0.0084 | 0.0172 | 0.0038 | 0.0093 |
| Recreation | 0.0634 | 0.0189 | 0.0128 | 0.0012 |
| Alcohol | 0.0289 | 0.0155 | 0.0182 | 0.0237 |
| Transportation | 0.0356 | 0.0077 | 0.0187 | 0.0057 |
| Clothing | 0.0203 | 0.0277 | 0.0119 | 0.0207 |

# Hausman tests

| | Expenditure (Probability chi-2 is greater) | Labour Participation (Probability chi-2 is greater) |
|---|---|---|
| Sample 1(n=2520) | 307.01017<br>(0.0000) | n/a |
| Sample 2(n=2310) | 317.39907<br>(0.0000) | n/a |
| Sample 3(n=7474) | 1414.1735<br>(0.0000) | 2615.7302<br>(0.0000) |
| Sample 4(n=1953) | 1371.1425<br>(0.0000) | 2080.3963<br>(0.0000) |