

# Precautionary Wealth Accumulation: Evidence from Canadian Microdata<sup>1</sup>

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## **Abstract**

This paper estimates the effect of labour income uncertainty on wealth accumulation using two data sources. Wealth information is obtained from the master files of the new Canadian Survey of Financial Security 1999 (SFS). Labour income risk proxies are constructed by industry using the Canadian Survey of Labour and Income Dynamics (SLID) between 1996 and 2001. The empirical results suggest the presence of a strong precautionary saving motive among Canadian households for broad definitions of wealth. Furthermore, consistent with the buffer stock saving model, the level of precautionary funds significantly increases when households face liquidity constraints.

# 1 Introduction

Several empirical regularities regarding household consumption and saving behaviour have given rise to extensive debates about the presence and economic importance of the precautionary motive for saving. The main notion is that early in the life cycle, households save mostly to buffer consumption since they do not have much accumulated wealth and they face substantial earnings and career risks. Combined with borrowing constraints, the precautionary motive for saving offers much promise to explain consumption and asset accumulation behaviour, especially of young and less affluent households<sup>1</sup>.

Empirical research on consumption insurance shows that individuals do indeed face substantial background risk that cannot be completely pooled<sup>2</sup>. Background risk, in particular labour income risk, has serious theoretical and empirical implications for wealth accumulation. Theoretically, such a risk motivates buffer-stock saving behaviour and households accumulate precautionary funds to smooth their consumption as markets do not offer full insurance<sup>3</sup>. Given decreasing absolute risk aversion, the effect of labour income uncertainty on the level of wealth accumulation is unambiguously positive.

Although the implications of the standard life cycle model under an uncertain income stream are now well understood, the empirical evidence on the strength of the precautionary motive is at best mixed. While Kuehlwein (1991), Dynan (1993), Guiso et al. (1992) and Starr-McCluer (1996) find little or no evidence, Merrigan and Normandin (1996), Carroll and Samwick (1997), Engen and Gruber (1997), Kazarosian (1997) and Lusardi (1997) find evidence of a significant precautionary motive. Some of these authors use subjective income risk measures, some use variability in household expenditure and some use ex-post income variance as a proxy for income uncertainty. Carroll et al. (2003) find a significant but weak precautionary response using unemployment probabilities as the risk measure. As empirical

research on precautionary saving has produced mixed results, new evidence from new data sources is surely needed.

This paper explores the ways in which uninsurable labour income risk affects the level of household wealth. The paper offers new evidence on the link between labour income uncertainty and wealth accumulation using a high quality income panel survey and a newly available wealth survey, the Canadian Survey of Financial Security 1999 (SFS). The empirical approach involves constructing labour income risk proxies (ex-post conditional labour income variance) for industry categories using the Canadian Survey of Labour and Income Dynamics (SLID) and then modelling the wealth to permanent income ratio as a function of conditional labour income variance. The paper contributes to the existing literature in terms of the quality of the income data and by accounting for liquidity constraints using a good measure of liquidity constraints available in the SFS.

The empirical results suggest a strong and significant precautionary saving motive among Canadian households. The results are particularly strong when real assets such as housing equity are taken into account. They seem to weaken when pension wealth is included. These findings are perfectly in line with the fact that Canadian households can borrow against their housing equity whereas borrowing against pension wealth is virtually impossible. According to the findings, a 10 percent increase in the conditional variance of the logarithm of labour income causes Canadian households to increase their wealth to permanent income ratio by 0.052 (approximately 2.5 weeks of income). Moreover, consistent with the buffer stock saving model, the effect of income risk on financial wealth accumulation is found to be much stronger for the households that face borrowing constraints. Finally, the results suggest that income uncertainty does not play any significant role in the wealth accumulation of self employed households. This result is consistent with the notion that self employed households have a

fundamentally different attitude toward risk and possibly different budget constraints (for example, they may have business assets and/or easier access to credit markets).

The empirical investigation involves regressing the wealth to permanent income ratio (constructed several different ways) on the ex-post conditional income variance and permanent income while controlling for relevant household characteristics. Unobserved taste variables such as tolerance for risk are likely to be correlated with financial risk taking and in turn wealth accumulation. Moreover, these unobservables may be correlated with income risk via occupational or educational choices. More specifically, households with higher risk tolerance may choose to have riskier jobs and engage in riskier investments (with ex-ante higher returns) which in turn may lead to a higher wealth accumulation. In such a case, we may observe a spuriously strong positive impact of income variance on wealth accumulation. Given these problems, and lack of panel data (to control for unobserved individual effects), I use the two-sample instrumental variables estimation method where conditional labour income variance is instrumented by industry affiliation. This particular estimation strategy is undertaken because labour income variances can only be constructed outside the SFS.

## 2 Data

The estimation is performed using the master files of the Survey of Financial Security 1999<sup>4</sup>. The survey information was obtained by personal interviews in May and June of 1999. It is supplemented by 2,000 households selected from geographical areas with a larger concentration of high income households. Sample weights provided by the survey are used to make the data representative of the Canadian population as a whole. The information used in estimations comes from two major files. The information on wealth is obtained from the family files whereas the demographic, detailed employment and education information on all members of the family

come from the person files. The total number of households is 15,933. Household head is defined as major income earner in the survey year and for the estimations, characteristics of the head whose age is between 21 and 60 are used. Households whose heads did not report at least one of the characteristics used as a right hand side variable are excluded from the sample. Finally, the households whose heads did not report any industry affiliation are also dropped. The final estimation sample size is 9,692 households among which 1574 households are coded as self employed.

Theoretically, it is not clear what the correct wealth measure should be in terms of assessing the strength of precautionary motive. Even though it is tempting to argue that saving for precautionary reasons is more likely to be channeled into more liquid, easy to convert financial assets, the possibility of borrowing against some illiquid real assets like housing certainly provides a convincing counter argument. It is important to note that institutional barriers regarding borrowing against illiquid financial and real assets differ across countries. For instance, borrowing against pension wealth is, in general, not possible in Canada therefore one can expect weaker precautionary response when the wealth measure includes pension wealth.

I use four different measures of wealth. The first one is non-pension financial wealth and it includes all publicly and privately traded shares, bonds, money market securities, managed trust funds and mutual funds. The second measure is non-pension financial plus nonfinancial wealth and it is constructed by adding real assets (real estate including the principle residence, vehicles, and valuable contents of principle residence, not including business equity) to financial assets. The third measure is non-pension networth. This variable is constructed by subtracting total value of pension wealth (total value of pension plus major retirement funds, and less common funds like RRSPs and LIRAs) from household's networth (total assets minus total liabilities). The final measure is total networth. The mean and median values of

financial wealth for the estimation sample is 37,806 and 4,100 Canadian Dollars respectively. For financial plus non financial wealth the values are 166,622 and 130,944, for non-pension networth 195,696 and 91,500, finally for networth they are 303,475 and 158,140.

### **3 Estimation of the Income Variance**

As a proxy for income risk I use the ex-post conditional labour income variance<sup>5</sup>. The estimates in the next section necessitate constructing income risk proxies outside the SFS sample since the SFS is a single cross section and one needs reasonably long panel data on labour income to estimate an ex-post income variance for each household. The strategy is to combine income and wealth information from two separate surveys and use a generalized instrumental variable estimator ( two-sample IV) to estimate regression models of the level of precautionary saving. I estimate the conditional variance of the logarithm of income for each individual and then take industry averages (for 21 industries). For this estimation, I use after-tax labour income and the characteristics of the major income earner of the household. The resulting 21 average income variances are merged with the SFS using the IV procedure.

The data source for the variance estimation is the Canadian Survey of Labour and Income Dynamics (SLID). The SLID is a rotating longitudinal data set with 6 year windows<sup>6</sup>. The first panel covers the years between 1993 and 1998. The second panel started in 1996 and ended in 2001. Income data in the SLID refer to the previous year's income. Given the wealth data are available for 1999 I choose to estimate income process parameters for the sample period covering 1996 and 2001 (6 years).

I define non-financial family income broadly enough to account for possible insurance schemes available to households such as unemployment insurance and social assistance. Simply, total household nonfinancial income is total labour income plus unemployment insurance,

workers compensation, social security, supplemental social security, child support, and some other transfers of all family members. To calculate after tax income I first calculate the average tax rate using the information on taxable income and total taxes paid<sup>7</sup>. Then I apply this rate to gross labour income and obtain after-tax labour income. Real income data are calculated using the consumer price index with base year 1992.

The sample for the income risk estimation is selected so that the resulting panel is balanced. Families that split up during the sample period are excluded. Since there is no clear definition of "head" of a household in the survey, I define a person to be head if he or she is the major income earner of the family for at least four years out of six. Households that do not have such a person are excluded. I use characteristics such as occupation, age, education, marital status and sex of the head for the entire analysis. It is sensible to think that income variance parameters vary over time due to, for example, moving from a safer job to self employment or taking retirement or changing occupation and education status. In order to deal with this issue I restrict the sample to households whose industry affiliation, occupation and education did not change during the sample period. To test the robustness of my results to this sample selection I also estimate the income variances using a shorter (1999-2001) window (so that the second sample contains all individuals who did not switch industry/occupation/education over 3 - rather than 6 - years). Although this strategy results in very noisy income variance estimates, the main results of the paper regarding the strength of precautionary saving motive remain the same. Finally, since the focus is labour income risk, households whose heads are younger than 21 (mostly students) and older than 60 (mostly retirees) are excluded. The final sample size used for estimating income variances is 5,067 households (30,402 observations).

Following Carroll and Samwick (1997) and Vissing-Jorgensen (2002) I assume an income process that can be decomposed into permanent and transitory components. The logarithm

of permanent income  $p_t^i$  for each household follows a random walk with drift:

$$p_{it} = g_{it} + p_{it-1} + z_{it} \quad (1)$$

where  $p_{it}$  is the logarithm of permanent income of  $i$ th household in period  $t$ ,  $g_{it}$  is income growth (likely to be a function of individual characteristics and demographics) and  $z_{it}$  is mean zero iid shocks with variance  $\sigma_{z_i}^2$ . Then, the logarithm of current income  $y_{it}$  evolves as:

$$\ln Y_{it} = y_{it} = p_{it} + \varepsilon_{it} \quad (2)$$

$$y_{it} = g_{it} + p_{it-1} + z_{it} + \varepsilon_{it} \quad (3)$$

where  $\varepsilon_{it}$  is mean zero iid transitory shock with variance  $\sigma_{\varepsilon_i}^2$ . Assume that the errors  $z$  and  $\varepsilon$  are uncorrelated with each other at all lags. Above expression implies an MA(1) error structure in income growth<sup>8</sup>

$$y_{it} - y_{it-1} = g_{it} + z_{it} + \varepsilon_{it} - \varepsilon_{it-1} \quad (4)$$

and

$$y_{it} = y_{it-1} + g_{it} + z_{it} + \varepsilon_{it} - \varepsilon_{it-1} \quad (5)$$

It follows that the mean of the logarithm of income conditional on  $t - 1$  information is

$$E_{t-1} [y_{it} | y_{it-1}, X_{it-1}] = y_{it-1} + g_{it} \quad (6)$$

and the conditional variance is

$$V_{t-1} [y_{it} | y_{it-1}, X_{it-1}] = \sigma_{z_i}^2 + 2\sigma_{\varepsilon_i}^2 \quad (7)$$

where  $X_{it-1}$  are the variables observable at time  $t - 1$  and relevant for predicting  $g_{it}$ <sup>9</sup>.

To estimate the conditional income variance, I regress the logarithm of real after-tax labour income on its lag, age dummies, marital status, family size, education, sex, occupation and age-occupation and age-education interactions. The R-square from this regression is around 76%. The sample variance of the residuals for each household are used to estimate  $\sigma_{z_i}^2 + 2\sigma_{\varepsilon_i}^2$ . Table 1 presents industry averages of conditional variance of log income for both sample windows. Agriculture exhibits the highest earnings variability. Mining has the smallest overall variance, even lower than public administration. Not surprisingly, 1999-2001 window has yielded noisier estimates. This will naturally affect the precision of the second stage estimates that use this window.

## 4 Two-Sample Instrumental Variables Estimation

Because income variances come from outside the sample, I use two sample instrumental variable estimation to estimate the effect of this variable on wealth. Consider the following linear model

$$Y = X\beta + u \quad (8)$$

and a data set containing  $n$  observations on  $Y$ ,  $X$  and  $Z$ . The asymptotically efficient instrumental variable estimator minimizes the following quadratic form

$$nf_n(\beta)' \Omega^{-1} f_n(\beta) \quad (9)$$

where

$$f_n(\beta) = \frac{Z'(Y - X\beta)}{n} = \frac{Z'Y - Z'X\beta}{n} \quad (10)$$

Note that this formula does not include cross products of  $X$  and  $Y$ ; the idea behind the two-sample instrumental variable estimator (2SIV; Angrist and Krueger (1992) and Lusardi (1996)) is that the cross products  $Z'Y$  and  $Z'X$  can be calculated from two different data sets as long as the instrument ( $Z$ ) is common to both data sets. Formally, The 2SIV estimator combines two sets of sample moments. The first set is the cross product of the instruments and the dependent variable  $\frac{Z'_1 Y_1}{n_1}$ . The second set is the cross product of instruments and regressors  $\frac{Z'_2 X_2}{n_2}$ . The suffixes refer to data sets 1 and 2. The two sample IV estimator minimizes the following quadratic form

$$n_1 g_n(\beta)' \Phi^{-1} g_n(\beta) \quad (11)$$

where

$$g_n(\beta) = \frac{Z'_1 Y_1}{n_1} - \frac{Z'_2 X_2 \beta}{n_2} \quad (12)$$

and  $\Phi$  is the covariance matrix of  $\sqrt{n_1} g_n(\beta)$ . If both data sets are drawn from the same population and the moments estimated from one sample are independent of those estimated from the other sample the two-sample IV estimator is consistent.

As noted above, for this estimator to work, the instruments must be available in both data sets. Conveniently, industry affiliation categories (my instrument set) in the SFS are identical to those in the SLID. In practice, the estimator is implemented as follows: I first regress income variances on the instrument set in the SLID; I then use the estimated parameters from this regression to impute or predict income variances in the SFS; finally the parameters of interested are obtained by regressing wealth on predicted income variances and other controls in the SFS. The formal IV interpretation of this imputation procedure facilitates inference and serves to

remind us that the variables used to match the two data sets are instruments: they must be excluded from the equation of interest.

As in the case of the conventional IV estimator, instruments should have two properties; they should be relevant i.e., correlated with the endogenous variable and they should be valid i.e., uncorrelated with the error term. In the case of a single instrument, validity is an untestable assumption. Relevance however, can be assessed, and I do so below. Finally, in the (likely) event that the effects of income variability on wealth accumulation are heterogenous, the interpretation of the IV estimate is instrument specific. I am estimating the effect of uncertainty caused by working in risky industries.

## 5 Precautionary Wealth Accumulation in Canada

In order to estimate the strength of the precautionary saving motive, the SFS files and the estimated income variances from the SLID are merged. The econometric modelling involves simply regressing the wealth to permanent income ratio on the conditional labour income variance and permanent income. Predicted income variances vary only across industries so industry dummies are excluded from the analysis. The main assumption is that industry choice is correlated with income risk but uncorrelated with the unobserved taste variables such as degree of risk aversion. Alternatively, occupation or education could be used to instrument income risk but it seems less plausible that these choices would be uncorrelated with risk tolerance. The basic econometric model is

$$\frac{W}{PI} = \beta_0 + \beta_1 \ln Var(Y) + \beta_2 \ln PI + Z\gamma + \varepsilon \quad (13)$$

where  $W$  is non-pension financial wealth ( $FW$ ) for the first equation, non-pension financial plus nonfinancial wealth ( $FnF$ ) for the second, non-pension networth ( $netW - P$ ) for the third, and total networth  $NetW$  for the fourth.  $Var(Y)$  is the conditional variance of after tax log labour income,  $PI$  is permanent income and  $Z$  is a matrix of control variables which includes age, education, marital status, sex, occupation, age-education and age-occupation interactions for the baseline cases. Every equation is re-estimated adding permanent income decile dummies interacted with the logarithm of the income variance to the baseline model. This addition is particularly relevant if we believe that some households, typically low permanent income households, simply consume their current income and therefore would not respond to income risk. Interaction terms are expected to capture the differential precautionary response of households with different levels of permanent income. This specification (referred as the "full specification" in all tables) also includes a liquidity constraint dummy interacted with the income variance.

The SFS contains a number of unique behavioral questions regarding the affordability of unexpected expenses. These questions have great potential to capture the liquidity constraints that households face. The variable I use to determine whether a given household is liquidity constrained indicates what the household would do if it is required to make an unexpected expenditure of \$500. Households that answer this question as "could not do it at all" are coded as liquidity constrained<sup>10</sup>. This is a much direct indicator of liquidity constraints than some approximate measures such as wealth cutoff points or debt-income ratios used in the literature<sup>11</sup>. The purpose of including the interaction between the liquidity constraint dummy and income variance in the regression equations is to investigate whether the effect of income risk on wealth accumulation is exacerbated when the household faces liquidity constraints as suggested by the buffer stock saving model.

Permanent income is proxied in two different ways: First, to be consistent with a large body of related literature, the main estimations are performed assuming that the permanent income is mean reverting. Hence, the proxy for the permanent income is simply the predicted values obtained from the regression of the logarithm of household labour income (recorded in the SFS family files) on age dummies, marital status, family size, education, sex, occupation and age-occupation, age-education interactions. The R-square from this regression is around 36%. Second, consistent with the income process described in Section 3.1, current income is used as a proxy to permanent income<sup>12</sup>.

Before estimating the strength of precautionary motive I perform some first stage regressions to assess the relevance of industry affiliation as an instrument for income risk. At this stage I also experiment with some alternative instruments. The first stage estimation involves regressing the constructed income variance on all exogenous variables used in the baseline second stage regression as well as the instruments. Naturally, this estimation can only be performed using the SLID data set with which income risk for each household is estimated. Table 2 presents summary results for the relevance of different instruments. The first row presents the performance of industry affiliation as an instrument for income variance which is constructed using the longest available time window in the SLID (1996-2001). The second row presents the same calculations except, the income variance now, is constructed using the time window 1996-2001. The last row presents the performance of the province of residence as an alternative instrument for the income variance.

It is quite clear from the table that the strongest instrument is industry affiliation. The instrument is particularly strong if the income variance is constructed using the longest possible window 1996-2001. For this case, the F-test based on the joint significance of the industry dummies results in a high value (31.10). Moreover, the inclusion of the industry dummies

raised R-square by 0.037. For this reason, the main second stage estimations are performed using the industry affiliation as an instrument for the income variance (constructed using the 1996-2001 window). Even though the F-test result is low for the second case (industry as an instrument, 1999-2001 window), I present some second stage results based on this case. Since the F-test statistic for the province of residence as an alternative instrument is extremely low, I do not perform any second stage regression based on this instrument. As noted in Section 4, the second requirement of an instrument is validity. My estimation strategy rests on the (untestable) assumption that industry affiliation is exogenous.

The second stage results for the precautionary wealth estimation (the whole sample) using the two sample IV and absolute t-ratios (calculated with the bootstrapped standard errors) are presented in Table 3. It is immediately clear from this table that the Canadian households display a strong precautionary saving motive when wealth is defined broadly. Consistent with the most recent literature, financial wealth does not seem to have a significant precautionary component. The coefficient of income variance although positive, it is not statistically significant. This result carries on even for the full specification where the liquidity constraints and the effect of income variance at different permanent income deciles are controlled for. The results become strikingly strong when non-financial assets are added to the financial assets. In both baseline and full specification cases, an increase in the variance of income significantly increases the wealth to permanent income ratio. More specifically, a 10 percent increase in the conditional variance of log after-tax income leads to an increase in the financial plus nonfinancial wealth to permanent income ratio by 0.052 (approximately 2.5 weeks of income). The effect of income risk on wealth accumulation appears stronger as the measure of wealth broadens. This confirms the argument that the precautionary funds are accumulated not only in the form of liquid financial assets but also illiquid financial and real assets against which borrowing is

possible. This is particularly evident when the wealth is defined as networth including pension wealth (last two column). The estimated precautionary effect is now weaker, consistent with the fact that borrowing against pension wealth, in general, is not possible in Canada.

As expected, income risk has a particularly strong effect when households are severely liquidity constrained. This result is strikingly robust across all wealth measures. The estimated coefficients on the interaction of liquidity constraint dummy and income variance are positive and significant for all equations. It is quite evident that income variance has particularly strong effect on the saving behaviour of these households that are usually labelled as "buffer stock savers".

Consistent with the assumption of homothetic preferences, permanent income does not seem to have any significant effect on wealth accumulation. Regardless of the wealth measure and the proxy used, the coefficient estimate is always insignificant (although persistently negative). This finding carries on for all sample restrictions and it is in parallel with the most recent evidence by Carroll et al. (2003). The effect of the income variance at different permanent income deciles display an interesting pattern. For all wealth measures, precautionary response becomes stronger as permanent income increases although the pure permanent income effect on wealth is negative. This result may reflect the possibility that at the lower permanent income deciles households may adopt "rule of thumb", that is, they simply consume their current income. Naturally, we would not expect to see a strong precautionary response for these households. Note however that the most of the coefficients of these interaction terms are not statistically significant.

Considering that the self employed may have a different attitude toward risk or fundamentally different budget constraint, regressions presented in Table 3 are re-run for the self employed and the self-employed-excluded sample separately. Table 4 and Table 5 present re-

sults for those regressions. The results suggest that the self employed do not have a significant precautionary saving motive. This is true across all wealth measures. One plausible explanation for this result is that this group may have easier access to credit markets due to their business equity.

The main results are not affected when the self employed sample is excluded. Although in all baseline models statistical significance of income variance disappeared, we still see very strong evidence regarding the positive effect of income variance on wealth accumulation and the effect becomes stronger as the wealth definition broadens. Using the net worth excluding pension wealth, a 10 percent increase in the log income variance leads to an increase in the wealth to permanent income ratio by .070 (approximately 3.5 weeks of income). Moreover, the buffer stock saving behaviour is still pronounced for all four measures of wealth.

The main results are largely unchanged when income risk is estimated using only 1999-2001 window in the SLID. Table 6 presents the results for this estimation. Even though the standard errors for the income variance coefficient are now much larger in baseline specifications, full specifications yield more or less the same results. For all wealth categories, the strength of the precautionary motive is very well pronounced, including now, for non-pension financial wealth. According to the findings, a 10 percent increase in the conditional log income variance leads to a significant increase in financial wealth to permanent income ratio by 0.027 i.e., approximately 1 week of income.

The final estimation is performed by using current after-tax labour income as a proxy for permanent income. Even with this modification, permanent income still does not appear to be significant determinant of wealth to permanent income ratio. Furthermore, with this measure of permanent income, the precautionary motive is not significantly present in most baseline specifications (except for non-pension networth), but is significant in all "full" specifications.

Overall, the results are very strong and robust across different wealth measures, sample selection and permanent income proxies. Although my results are in parallel with the most recent evidence by Carroll et al. (2003) (they find a significant precautionary response to unemployment risk especially for broad measures of wealth), it is not straight forward to make a quantitative comparison. The basic reason for this is that unemployment is generally viewed as a transitory rather than a permanent shock. Since it is well established that uncertainty regarding permanent income leads to a much bigger precautionary responses, the ex-post income variance may be a better proxy for over all income uncertainty than unemployment probability despite its own shortcomings. Nevertheless, the findings of both studies point to the same direction.

## **6 Conclusion**

This paper estimates the impact of labour income risk on wealth accumulation in Canada. Labour income risk is proxied by the conditional variance of ex-post after tax labour income and estimated using a 6-year balanced panel. The study intends to uncover the link between labour income risk and the level of precautionary saving. According to the empirical results Canadian households accumulate wealth partly for precautionary reasons. The results are particularly strong when illiquid assets that can be borrowed against are included in households' definition of wealth.

Consistent with the buffer stock saving model, the precautionary saving motive is more pronounced among households that face liquidity constraints. It is well known that constructing acceptable measures of current and expected liquidity constraints is quite challenging due to the lack of appropriate behavioural questions in most wealth surveys. Fortunately, in the SFS a series of behavioural questions regarding households' ability to absorb some unex-

pected expense shocks gives us a unique opportunity to construct good measures of liquidity constraints.

Two important caveats apply here. First, it is extremely difficult to control for unobserved taste variables that are potentially important determinants of wealth accumulation with a single cross section. Even though the income risk proxy used in the regressions is instrumented, if the instrument (industry affiliation) is not completely exogenous, then predicted income variances may still be correlated with unobserved tastes, particularly risk aversion. Fuchs-Schundeln and Schundeln (2005) show that failing to control for risk aversion will lead to underestimation of precautionary response since the error term in the regression is negatively correlated with the income risk. Without panel data on wealth, this particular issue cannot be addressed properly. Second, although the quality of income data used in the paper is very high, one can still question the quality of ex-post income variance as a proxy for expected income uncertainty. The same doubts arise when researchers use some subjective measure to proxy this variable. Unfortunately, the available theories provide no analytical measure of income uncertainty. In principle, optimal behaviour depends not only on the first and second moments but also on the entire income distribution.

Innovations in the financial sector and the presence of unemployment insurance reduce the extent to which financial markets are incomplete. However there is substantial evidence that individuals still face considerable earnings and career risk. Naturally, understanding the ways in which households handle this risk is crucial for policies that target financial and insurance markets. If precautionary savings comprise a significant portion of overall household savings, public insurance schemes may have some crowd out effect on aggregate wealth accumulation. Moreover, progressive tax policies that tend to reduce earnings variance may lower household saving. The results presented in this paper can provide a first step towards policies that are

better designed and implemented.

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## Notes

<sup>1</sup>See Carroll (1992), Carroll and Samwick (1997) and Gourinchas and Parker (2002).

<sup>2</sup>See Cochrane(1991) and Mace (1991).

<sup>3</sup>See Deaton (1991). These funds are accumulated in addition to retirement (life cycle) savings.

<sup>4</sup>Statistics Canada has released a public use version of the SFS 1999. However, the crucial information used in this paper such as occupation and industry is available only in the master files.

<sup>5</sup>Some studies including Lusardi (1997) and Guiso et al. (1992) used subjective self reported income risk. Such a variable or a similar one does not exist in the SFS.

<sup>6</sup>The public use version of the data supresses the panel aspect. The longitudinal data set is confidential.

<sup>7</sup>A progressive tax structure reduces the variance of income. Therefore one should construct income variances based on after-tax income.

<sup>8</sup>Since I use the sample variance of composite residuals to estimate the conditional variance of log income, the assumption regarding the structure of the transitory component of income is not crucial. In general, if one wishes to estimate the permanent and transitory component seperately as in Carroll and Samwick (1997), transitory term of order MA(2) would be more appropriate as evidenced by MaCurdy (1982) and Abowd and Card (1989).

<sup>9</sup>It follows immediately that the conditional variance of  $Y_t$  is

$$V_{t-1} [Y_{it}|Y_{it-1}, X_{it-1}] = e^{2(y_{it-1}+g_{it})+(\sigma_{z_i}^2+2\sigma_{\varepsilon_i}^2)}(e^{(\sigma_{z_i}^2+2\sigma_{\varepsilon_i}^2)} - 1)$$

As can be seen from the equation, the conditional variance term includes  $y_{it-1}$ . Since the households in the SLID (with which the conditional variance is estimated) are not the same households in the SFS, it is more appropriate to use the conditional variance of the logarithm of income instead of the level of income due to the fact that the former is time independent i.e does not include  $y_{it-1}$ .

<sup>10</sup>The same question is asked for the expenditure of \$5000. Results do not change significantly when the liquidity constraint variable is constructed based on this question instead.

<sup>11</sup>Use of wealth cutoffs is problematic simply because wealth is endogenous in the sense that higher wealth is associated with binding or expected-to-bind liquidity constraints. The problem with the debt to income ratio is that even though it represents credit market accesibility, it also represent desire to borrow which is in turn a function of risk.

<sup>12</sup>In the case of a multiplicative random walk with no transitory shocks, permanent income is just current income.

<b>Industry</b>	<b>1996-2001 window</b>	<b>1999-2001 window</b>
Agriculture	.315 (.025)	.366 (.082)
Forestry	.251 (.029)	.399 (.041)
Fishing, hunting	.069 (.012)	.095 (.023)
Mining	.022 (.004)	.029 (.014)
Utilities	.024 (.007)	.022 (.016)
Construction	.086 (.012)	.092 (.029)
Durables	.049 (.002)	.032 (.006)
Non-durables	.038 (.007)	.045 (.014)
Wholesale trade	.054 (.011)	.072 (.022)
Retail trade	.052 (.005)	.064 (.013)
Transportation	.052 (.006)	.056 (.011)
Finance, insurance	.062 (.014)	.055 (.019)
Real estate	.264 (.092)	.058 (.033)
Professional service	.114 (.071)	.072 (.115)
Management	.062 (.014)	.061 (.032)
Educational service	.039 (.004)	.034 (.009)
Health care	.063 (.018)	.059 (.019)
Information, recreation	.066 (.011)	.045 (.031)
Accommodation, food	.067 (.031)	.059 (.060)
Other service	.160 (.045)	.258 (.062)
Public administration	.041 (.008)	.052 (.010)

Standard errors are in parentheses. Source: SLID

Table 1: Average Conditional Variance of log Labour Income.

<b>Instrument</b>	<b>F-Test</b>	<b>R<sup>2</sup> with</b>	<b>R<sup>2</sup> without</b>
Industry Dummies, (1996-2001) window	31.10	.080	.043
Industry Dummies, (1999-2001) window	8.50	.032	.027
Province Dummies, (1996-2001) window	4.23	.057	.055

Note: The results are based on the baseline model. F-test is based on joint significance of instruments. Degrees of freedom is (19, 16514) for industry dummies, (9,16505) for province dummies. The dependent variable is the logarithm of the income variance.

Table 2: Summary of First Stage Results

**WHOLE SAMPLE ( 9692 Observations)**

Dep. Var: Variable	<i>FW/PI</i>		<i>FnF/PI</i>		<i>(NetW - P)/PI</i>		<i>NetW/PI</i>	
	Baseline	Full Sp.	Baseline	Full Sp.	Baseline	Full Sp.	Baseline	Full Sp.
$\ln(V)$	.09 (1.4)	.16 (1.3)	.52 (3.6)	1.1 (4.9)	1.36 (4.3)	2.03 (4.7)	.77 (2.3)	1.53 (3.3)
$\ln(PI)$	-.27 (1.2)	-.27 (.64)	-1.7 (2.3)	-1.4 (.99)	-2.1 (1.36)	-1.49 (1.2)	-3.5 (2.5)	-3.1 (1.3)
age	.04 (3.0)	.04 (3.2)	.09 (3.1)	.07 (3.0)	.10 (2.6)	.10 (2.6)	.23 (4.6)	.22 (4.7)
male	.001 (.2)	.02 (.29)	-.09 (.55)	.11 (.76)	.15 (.54)	.31 (1.1)	.34 (1.1)	.57 (1.8)
family size	.01 (.30)	.01 (.23)	.37 (4.5)	.22 (3.1)	.42 (3.4)	.31 (2.6)	.46 (3.3)	.32 (2.5)
married	.03 (.27)	-.02 (.19)	.72(2.7)	.35 (1.2)	1.0 (2.4)	.71 (1.6)	1.6 (3.7)	1.2 (2.5)
elem. educ.	.89 (1.6)	1.0 (1.8)	-1.6 (1.0)	-.64 (.50)	-1.3 (.70)	-.41 (.23)	-.90 (.43)	.24 (.12)
sec. educ.	.57 (1.3)	.69 (1.6)	-1.5 (1.3)	-.57 (.57)	-1.9 (1.4)	-1.0 (.80)	-1.4 (.99)	-.28 (.20)
high school	.86 (2.0)	.98 (2.2)	-.33 (.25)	.50 (.42)	-.31 (.20)	.41 (.28)	.47 (.28)	1.5 (.91)
post (nocert)	.53 (1.2)	.65 (1.4)	.33 (.24)	1.0 (.85)	-.40 (.20)	.34 (.17)	.83 (.35)	1.7 (.75)
post (cert.)	.74 (1.7)	.82 (1.9)	-.48 (.49)	-.16 (.18)	-.98 (.75)	-.62 (.49)	-.32 (.22)	.16 (.12)
$LC * \ln(V)$	-	.08 (5.06)	-	.41 (8.4)	-	.49 (6.4)	-	.66 (6.5)
$\frac{\partial W}{\partial \ln(V)}, PI, 10^{th}$	-	-.07 (.47)	-	-.85 (2.7)	-	-.98 (2.2)	-	-1.0 (2.1)
$20^{th}$	-	-.08 (.67)	-	-.94 (3.5)	-	-.96 (2.7)	-	-1.1 (2.7)
$30^{th}$	-	-.07 (.67)	-	-.83 (3.8)	-	-.97 (3.3)	-	-.99 (3.0)
$40^{th}$	-	-.12 (1.1)	-	-.78 (4.1)	-	-.83 (3.2)	-	-.99 (3.4)
$50^{th}$	-	-.06 (.69)	-	-.61 (3.7)	-	-.56 (2.6)	-	-.72(2.9)
$60^{th}$	-	-.06 (.72)	-	-.57 (3.6)	-	-.71 (2.6)	-	-.84 (2.8)
$70^{th}$	-	-.08 (.90)	-	-.45 (3.2)	-	-.43 (2.1)	-	-.57 (2.5)
$80^{th}$	-	-.12 (1.3)	-	-.39 (3.0)	-	-.47 (2.0)	-	-.61 (2.0)
$90^{th}$	-	-.05 (.72)	-	-.24 (2.2)	-	-.29 (2.0)	-	-.38 (2.3)
$R^2$	.03	.03	.05	.17	.04	.06	.06	.10

Absolute  $t$ -ratios calculated with bootstrapped standard errors in parentheses. Other controls for both specifications are education-age interactions, occupation dummies, occupation and age interactions.

Abbreviations:  $V$  : Income variance,  $PI$ : Permanent income,  $FW/PI$  : Ratio of financial wealth to permanent income,  $FnF/PI$  : Ratio of financial+nonfinancial wealth to permanent income,  $(NetW - P)/PI$  :

Ratio of non-pension networkth to permanent income,  $NetW/PI$  : Ratio of networkth to permanent income.

The variable  $LC * \ln(V)$  is the interaction of  $\ln(V)$  and the dummy for the affordability of unexpected \$500 expense.

Table 3: Precautionary Wealth Estimation Results for Whole Sample

**SELF EMPLOYED SAMPLE ( 1574 Observations)**

Dep. Var: Variable	<i>FW/PI</i>		<i>FnF/PI</i>		<i>(NetW - P)/PI</i>		<i>NetW/PI</i>	
	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.
$\ln(V)$	.10 (.90)	.09 (.46)	.26 (.49)	1.4(1.2)	.67(.70)	1.1 (.64)	.41 (.41)	1.1 (.60)
$\ln(PI)$	.40 (.47)	-.32 (.38)	-1.8 (.66)	.98 (.26)	-.94 (.16)	-.62 (.08)	-2.4 (.41)	-2.3 (.30)
age	.14 (3.1)	.15 (3.3)	.15 (.98)	.18 (1.2)	.18 (.63)	.24 (.92)	.46 (1.4)	.53 (1.7)
male	.01 (.08)	.13 (.63)	-.05 (.08)	.29 (.45)	1.2 (.93)	1.7 (1.2)	1.4 (1.0)	2.1 (1.5)
family size	-.01 (.14)	.03 (.36)	.21 (.74)	.18 (.67)	.23 (.400)	.27 (.51)	.22 (.37)	.33 (.59)
married	-.48 (.97)	-.54 (1.1)	1.1 (.80)	.49 (.34)	1.5 (.58)	.59 (.22)	2.5 (.95)	1.3 (.50)
elem. educ.	.50 (.31)	.60 (.37)	-8.2 (.99)	-6.5 (.92)	-21 (2.0)	-20 (2.0)	-18 (1.7)	-17 (1.8)
sec. educ.	.66 (1.3)	.95 (.67)	-8.1 (.95)	-5.5 (.78)	-12 (1.1)	-10 (1.0)	-11 (1.0)	-8.5 (.80)
high school	-.09 (.07)	.12 (.09)	-6.9 (.97)	-5.4 (.88)	-11 (1.1)	-9.9 (1.0)	-9.6 (.94)	-7.5 (.78)
post (nocert)	-.55 (.34)	-.41 (.25)	-5.5 (.70)	-5.7 (.85)	-26 (1.5)	-26 (1.5)	-26 (1.4)	-26 (1.5)
post (cert.)	.64 (.64)	1.0 (.93)	-7.9 (1.2)	-6.5 (1.1)	-17 (1.5)	-16 (1.5)	-15 (1.4)	-14 (1.3)
$LC * \ln(V)$	-	.13 (2.3)	-	.40 (2.1)	-	.82 (2.2)	-	1.1 (2.5)
$\frac{\partial W}{\partial \ln(V)}, PI, 10^{th}$	-	.23 (.72)	-	-2.5 (1.5)	-	-.76 (.30)	-	-1.0 (.39)
$20^{th}$	-	.10 (.43)	-	-2.6 (1.9)	-	-1.2 (.59)	-	-1.5 (.73)
$30^{th}$	-	-.06 (.28)	-	-2.1 (1.9)	-	-.58 (.82)	-	-1.8 (.94)
$40^{th}$	-	-.05 (.25)	-	-1.8 (2.0)	-	-1.4 (.91)	-	-1.9 (1.1)
$50^{th}$	-	-.01 (.09)	-	-1.6 (2.2)	-	-.39 (.28)	-	-.87 (.62)
$60^{th}$	-	-.06 (.40)	-	-1.7 (2.1)	-	-2.2 (1.1)	-	-2.5 (1.3)
$70^{th}$	-	-.05 (.38)	-	-1.0 (2.0)	-	-.01 (.02)	-	-.33 (.33)
$80^{th}$	-	-.13 (.99)	-	-.80 (1.9)	-	-.59 (.63)	-	-.94 (.97)
$90^{th}$	-	-.20 (.92)	-	-1.0 (2.2)	-	-.54 (.73)	-	-.83 (1.0)
$R^2$	.05	.06	.04	.10	.04	.05	.04	.06

Absolute  $t$ -ratios calculated with bootstrapped standard errors in parentheses. Other controls for both specifications are education-age interactions, occupation dummies, occupation and age interactions.

Abbreviations:  $V$  : Income variance,  $PI$ : Permanent income,  $FW/PI$ : Ratio of financial wealth to permanent income,  $FnF/PI$ : Ratio of financial+nonfinancial wealth to permanent income,  $(NetW - P)/PI$  :

Ratio of non-pension networkth to permanent income,  $NetW/PI$ : Ratio of networkth to permanent income.

The variable  $LC * \ln(V)$  is the interaction of  $\ln(V)$  and the dummy for the affordability of unexpected \$500 expense.

Table 4: Precautionary Wealth estimation Results for Self Employed Sample

**SELF EMPLOYED EXCLUDED SAMPLE ( 8118 Observations)**

Dep. Var: Variable	<i>FW/PI</i>		<i>FnF/PI</i>		<i>(NetW - P)/PI</i>		<i>NetW/PI</i>	
	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.
$\ln(V)$	.04 (.67)	.11 (.85)	.26 (1.8)	.76 (3.9)	.70 (2.2)	1.1 (3.6)	.13 (.38)	.65 (1.4)
$\ln(PI)$	-.32 (1.3)	-.30 (.74)	-1.5 (3.0)	-1.7 (2.7)	-1.4 (2.0)	-1.5 (1.4)	-2.9 (2.5)	-3.3 (2.3)
age	.03 (2.3)	.04 (2.6)	.08 (3.3)	.07 (3.2)	.09 (2.9)	.08 (2.9)	.20 (5.2)	.19 (5.3)
male	-.01 (.14)	.01 (.07)	-.16 (.95)	.01 (.10)	-.25 (.94)	-.11 (.45)	-.02 (.09)	.15 (.52)
family size	.01 (.16)	.00 (.08)	.37 (4.3)	.21 (2.8)	.31 (2.8)	.20 (1.8)	.37 (2.8)	.23 (1.8)
married	.09 (.71)	.02 (.16)	.56 (2.3)	.18 (.79)	.51 (1.8)	.24 (.82)	1.2 (3.5)	.72 (2.0)
elem. educ.	.96 (1.5)	1.1 (1.7)	-1.2 (.92)	-.19 (.17)	.30 (.19)	1.2 (.80)	-.02 (.01)	1.2 (.67)
sec. educ.	.64 (1.3)	.78 (1.6)	-.76 (.86)	.02 (.04)	-.36 (.36)	.31 (.32)	-.21 (.18)	.77 (.66)
high school	1.0 (2.1)	1.1 (2.3)	.26 (.23)	1.1 (1.1)	.44 (.33)	1.1 (.91)	.97 (.63)	2.0 (1.3)
post (nocert)	.67 (1.4)	.81 (1.7)	.85 (.72)	1.7 (1.5)	1.8 (1.5)	2.5 (2.1)	3.0 (1.8)	4.1 (2.4)
post (cert.)	.81 (1.6)	.89 (1.7)	.33 (.43)	.57 (.85)	.21 (.22)	.50 (.50)	.65 (.56)	1.1 (.95)
$LC * \ln(V)$	-	.09 (8.4)	-	.30 (8.5)	-	.36 (9.0)	-	.54 (10)
$\frac{\partial W}{\partial \ln(V)}, PI, 10^{th}$	-	-.07 (.46)	-	-.50 (1.7)	-	-.43 (1.1)	-	-.47 (1.0)
$20^{th}$	-	-.07 (.60)	-	-.58 (2.7)	-	-.43 (1.5)	-	-.53 (1.6)
$30^{th}$	-	-.05 (.47)	-	-.56 (2.9)	-	-.51 (2.1)	-	-.53 (1.8)
$40^{th}$	-	-.11 (.99)	-	-.56 (3.2)	-	-.40 (1.8)	-	-.56 (2.1)
$50^{th}$	-	-.05 (.59)	-	-.42 (2.7)	-	-.31 (1.7)	-	-.46 (2.1)
$60^{th}$	-	-.04 (.52)	-	-.36 (2.6)	-	-.25 (1.5)	-	-.40 (2.0)
$70^{th}$	-	-.08 (.80)	-	-.32 (2.3)	-	-.28 (1.5)	-	-.42 (2.0)
$80^{th}$	-	-.11 (1.1)	-	-.31 (2.2)	-	-.30 (1.9)	-	-.44 (2.4)
$90^{th}$	-	-.02 (.39)	-	-.11 (1.2)	-	-.16 (1.4)	-	-.26 (1.7)
$R^2$	.03	.03	.05	.08	.04	.07	.08	.10

Absolute  $t$ -ratios calculated with bootstrapped standard errors in parentheses. Other controls for both specifications are education-age interactions, occupation dummies, occupation and age interactions.

Abbreviations:  $V$  : Income variance,  $PI$ : Permanent income,  $FW/PI$  : Ratio of financial wealth to permanent income,  $FnF/PI$  : Ratio of financial+nonfinancial wealth to permanent income,  $(NetW - P)/PI$  :

Ratio of non-pension networth to permanent income,  $NetW/PI$  : Ratio of networth to permanent income.

The variable  $LC * \ln(V)$  is the interaction of  $\ln(V)$  and the dummy for the affordability of unexpected \$500 expense.

Table 5: Precautionary Wealth Estimation for Self Employed Excluded Sample

**WHOLE SAMPLE ( 9692 Observations)  
ONLY 1999-2001 INCOME DATA**

Dep. Var:	$FW/PI$		$FnF/PI$		$(NetW - P)/PI$		$NetW/PI$	
Variable	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.
$\ln(V)$	.08 (1.1)	.27 (3.8)	.34 (1.3)	.95 (4.9)	.83 (2.8)	1.5 (4.8)	.55 (1.3)	1.3 (3.9)
$\ln(PI)$	-.08 (.51)	.17 (.86)	-2.2 (2.5)	-2.1 (2.4)	-2.7 (2.5)	-2.2 (2.0)	-2.5 (2.1)	-2.0 (1.6)
age	.03 (3.0)	.04 (3.3)	.08 (3.1)	.08 (3.5)	.09 (2.6)	.10 (2.9)	.19 (4.3)	.20 (4.5)
male	-.02 (.30)	.01 (.15)	.02 (.10)	.31 (1.3)	.27 (.87)	.52 (1.5)	.13 (.39)	.44 (1.2)
family size	-.01 (.37)	-.01 (.13)	.42 (3.7)	.33 (3.0)	.47 (3.4)	.42 (2.9)	.31 (2.0)	.24 (1.5)
married	-.03 (.32)	-.05 (.47)	.97 (2.4)	.75 (1.8)	1.2 (2.6)	1.1 (2.3)	1.3 (2.6)	1.1 (2.0)
elem. educ.	.88 (1.5)	1.0 (1.8)	-2.0 (1.2)	-1.1 (.82)	-2.0 (1.0)	-1.2 (.66)	-1.0 (.46)	.05 (.03)
sec. educ.	.56 (1.3)	.83 (1.9)	-2.0 (1.5)	-1.0 (.87)	-2.7 (1.8)	-1.6 (1.1)	-1.5 (.94)	-.17 (.11)
high school	.77 (1.9)	.97 (2.3)	-1.0 (.71)	.02 (.02)	-1.2 (.71)	-.26 (.15)	-.44 (.24)	.82 (.45)
post (nocert)	.55 (1.3)	.74 (1.7)	-.07 (.05)	.70 (.52)	-.90 (.43)	-.11 (.06)	.93 (.39)	1.8 (.81)
post (cert.)	.64 (1.6)	.82 (2.0)	-.75 (.75)	-.23 (.26)	-1.3 (1.0)	-.77 (.61)	-.77 (.54)	-.04 (1.3)
$LC * \ln(V)$	-	.09 (6.6)	-	.43 (8.3)	-	.53 (6.2)	-	.68 (6.2)
$\frac{\partial W}{\partial \ln(V)}, PI_{10}^{th}$	-	-.28 (2.7)	-	-.93 (3.3)	-	-1.0 (2.7)	-	-1.3 (3.0)
$20^{th}$	-	-.27 (3.5)	-	-1.0 (4.6)	-	-1.1 (3.4)	-	-1.3 (3.8)
$30^{th}$	-	-.25 (3.5)	-	-.96 (5.3)	-	-1.0 (3.7)	-	-1.2 (3.9)
$40^{th}$	-	-.19 (2.4)	-	-.89 (4.3)	-	-.87 (3.0)	-	-1.0 (3.4)
$50^{th}$	-	-.19 (2.9)	-	-.75 (4.5)	-	-.77 (2.1)	-	-.95 (2.6)
$60^{th}$	-	-.17 (2.4)	-	-.58 (4.3)	-	-.57 (2.5)	-	-.81 (3.4)
$70^{th}$	-	-.21 (1.7)	-	-.55 (3.7)	-	-.62 (2.2)	-	-.77 (2.8)
$80^{th}$	-	-.16 (1.6)	-	-.40 (2.9)	-	-.49 (2.2)	-	-.65 (2.9)
$90^{th}$	-	-.12 (1.4)	-	-.27 (1.9)	-	-.30 (1.4)	-	-.42 (1.8)
$R^2$	.03	.03	.04	.08	.03	.05	.06	.08

Absolute  $t$ -ratios calculated with bootstrapped standard errors in parentheses. Other controls for both specifications are education-age interactions, occupation dummies, occupation and age interactions.

Abbreviations:  $V$ : Income variance,  $PI$ : Permanent income,  $FW/PI$ : Ratio of financial wealth to permanent income,  $FnF/PI$ : Ratio of financial+nonfinancial wealth to permanent income,  $(NetW - P)/PI$ :

Ratio of non-pension networth to permanent income,  $NetW/PI$ : Ratio of networth to permanent income.

The variable  $LC * \ln(V)$  is the interaction of  $\ln(V)$  and the dummy for the affordability of unexpected \$500 expense.

Table 6: Precautionary Wealth Estimation for Whole Sample with only 1999-2001 Income Data

**WHOLE SAMPLE ( 9692 Observations)**  
**CURRENT INCOME AS A PROXY TO PERMANENT INCOME**

Dep. Var: Variable	<i>FW/PI</i>		<i>FnF/PI</i>		<i>(NetW - P)/PI</i>		<i>NetW/PI</i>	
	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.	Baseline	Full Spec.
$\ln(V)$	.05 (.61)	.50 (2.0)	.66 (2.2)	2.8 (3.5)	1.5 (4.1)	2.6 (3.1)	.78 (1.6)	2.7 (2.2)
$\ln(PI)$	-1.0 (2.2)	-1.3 (1.5)	-3.0 (2.8)	-3.3 (2.3)	-2.9 (2.7)	-2.1 (1.9)	-3.1 (2.0)	-2.2 (2.0)
age	.04 (2.8)	.04 (2.5)	.14 (3.1)	.08 (2.0)	.16 (3.0)	.11 (2.1)	.31 (4.3)	.25 (3.6)
male	.11 (1.1)	.11 (1.0)	.65 (1.7)	.71 (2.0)	.68 (1.6)	.72 (1.8)	.95 (1.8)	1.0 (1.9)
family size	.06 (1.7)	.03 (1.0)	.80 (5.4)	.43 (3.6)	.76 (5.0)	.46 (3.5)	.69 (3.9)	.31 (2.1)
married	.27 (2.1)	.20 (1.7)	2.6 (4.7)	1.7 (3.6)	2.3 (4.7)	1.6 (3.7)	3.3 (3.8)	2.3 (3.1)
elem. educ.	-.52 (.62)	-.37 (.47)	-.70 (.21)	.72 (.23)	2.1 (.40)	3.0 (.56)	7.0 (.97)	8.3 (1.1)
sec. educ.	-.38 (.52)	-.26 (.37)	-.43 (1.9)	-3.3 (1.4)	-4.1 (1.6)	-3.4 (1.3)	-1.9 (.60)	-.84 (.26)
high school	.25 (.41)	.43 (.74)	-1.0 (.54)	.61 (.33)	-.58 (.26)	.90 (.40)	1.7 (.64)	3.7 (1.3)
post (nocert)	-.56 (.62)	-.53 (.59)	-.95 (.37)	-.55 (.21)	-2.0 (.67)	-1.7 (.57)	.11 (.03)	.56 (.16)
post (cert.)	.28 (.40)	.35 (.50)	-2.2 (1.2)	-1.8 (1.1)	-1.7 (.91)	-1.5 (.80)	-1.6 (.62)	-1.1 (.46)
$LC * \ln(V)$	-	.16 (2.2)	-	1.1 (5.0)	-	1.1 (4.7)	-	1.5 (4.1)
$\frac{\partial W}{\partial \ln(V)}, PI, 10^{th}$	-	-.61 (.79)	-	-2.1 (1.2)	-	.36 (.18)	-	-1.2 (.47)
$20^{th}$	-	-.83 (1.6)	-	-4.1 (2.9)	-	-2.3 (1.5)	-	-4.0 (1.7)
$30^{th}$	-	-.68 (1.6)	-	-3.3 (2.7)	-	-2.1 (1.5)	-	-3.5 (1.7)
$40^{th}$	-	-.70 (1.9)	-	-3.3 (2.2)	-	-2.4 (2.1)	-	-3.6 (2.0)
$50^{th}$	-	-.28 (.86)	-	-2.0 (2.1)	-	-.55 (.47)	-	-1.5 (.97)
$60^{th}$	-	-.46 (1.7)	-	-2.5 (2.1)	-	-1.8 (1.9)	-	-2.5 (1.7)
$70^{th}$	-	-.45 (2.2)	-	-1.9 (2.9)	-	-1.6 (2.1)	-	-2.1 (1.8)
$80^{th}$	-	-.21 (1.3)	-	-1.3 (2.7)	-	-1.0 (1.5)	-	-1.0 (1.2)
$90^{th}$	-	-.16 (2.2)	-	-.23 (.34)	-	.40 (.39)	-	.80 (.73)
$R^2$	.04	.05	.11	.13	.09	.11	.10	.12

Absolute  $t$ -ratios calculated with bootstrapped standard errors in parentheses. Other controls for both specifications are education-age interactions, occupation dummies, occupation and age interactions.

Abbreviations:  $V$ : Income variance,  $PI$ : Permanent income (proxied by current income),  $FW/PI$ : Ratio of financial wealth to permanent income,  $FnF/PI$ : Ratio of financial+nonfinancial wealth to permanent income,  $(NetW - P)/PI$ : Ratio of non-pension networth to permanent income,  $NetW/PI$ : Ratio of networth to permanent income. The variable  $LC * \ln(V)$  is the interaction of  $\ln(V)$  and the dummy for the affordability of unexpected \$500 expense.

Table 7: Precautionary Wealth Estimation for Whole Sample.