Rising Wealth, Rising Debt: The Effect of Liquidity Constraints on Consumption Smoothing

by

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ABSTRACT

Using permanent income life-cycle theory, I analyze the effects of liquidity constraints on the household's ability to smooth life time consumption due to a change in housing and stock market wealth. Using data from the Canadian national accounts and chartered bank balance sheets I test if improved access to housing wealth due to fundamental shifts to the banking industry in the 1980s has lowered liquidity constraints and improved the household's ability to smooth consumption.

LIST OF ABBREVIATIONS USED

ABS – Asset Backed Securitization
DSR – Debt Service Ratio
EMS – European Monetary System
GDP – Gross Domestic Product
GNP – Gross National Product
LTV – Loan-to-value
MBS – Mortgage Backed Securities
MPC – Marginal Propensity to Consume
OBS – Observation
OECD – Organization for Economic Cooperation and Development

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CHAPTER 1 - INTRODUCTION

After the worst financial crisis and recession since the Great Depression, 2011 is likely to be a year of reflection for financial markets globally. The most recent recession was not just a crisis of confidence, but a great unwinding of credit that had built up to unsustainable levels over the past decade. The United States, Greece, and Ireland are some of the prominent victims of the financial fallout to the global economy after the sub-prime mortgage bubble burst in America.

While other countries struggle with high unemployment, sagging home prices and burdensome sovereign debt levels, Canada has emerged from the financial crisis in a much better position. According to Statistics Canada, nearly all of the jobs lost during the recession have been regained, while the Canadian housing market has remained robust. Canada's fiscal deficit is manageable, with the country on a more realistic path towards a balanced budget than its neighbours to the south.

However, despite Canada's economic strength, this recovery comes at a cost. Household debt to income stands at 147% and has surpassed the United States for the first time in history (Egan, 2011). Consumption dominates Canada's total gross domestic product, and for the first time in Canadian banking history, personal loans surpassed business loans as a share of total bank loans in 2008 (CANSIM #1760011, 2011). Interest rates sit at all time lows but so does the Canadian savings rate.

The governor of the Bank of Canada and the Minister of the Department of Finance have both sounded the alarm, and even taken steps twice through the recession to throttle back housing demand, and consequently retail mortgages (Department of Finance Canada, 2011). Yet in the absence of robust credit markets and a vehicle to inject cash in to the economy like a mortgage going forward may lead to weak economic growth in a consumption driven economy like Canada's. Furthermore, under the presence of constraints which stand as obstacles to a household's ability to access their wealth, debt is a suitable substitute.

The Canadian chartered banks have been systematically lending a smaller share of their total loans to businesses since the early 1980s. According to Statistics Canada Chartered Bank data (2011), mortgages and personal loans now make up almost 75 percent of the chartered banks lending, while business loans have dropped from 62 percent to 26 percent (CANSIM #1760011, 2011). Is this cause for concern, or is this feature of the data simply a representation of households' borrowing against their rising wealth?

But what does this really mean for Canada? Does the typical Canadian household have the capacity to absorb more debt? Do the banks fear expanding lending any further to households who may no longer be able to repay, especially if interest rates rise? With households servicing so much debt where will they find the means to save for retirement or invest in their own businesses?

In light of these questions the purpose of this research is to better understand how Canada has reached this level of consumer debt by analyzing the wealth effect on personal debt and consumption. Is household debt accumulation a rational phenomenon or is their inability to effectively forecast the future problematic? In light of rising household borrowing, is this money flowing in to consumption or investment?

CHAPTER 2 - LITERATURE REVIEW

This thesis adds to a growing field of work on households' use of debt. My research expands beyond the traditional discussion to incorporate the dynamics of a banking industry whose profitability model has changed dramatically since the early 1960s. Furthermore, banking and lending research tends to focus on American data, so a Canadian study, especially in light of the country's financial system surviving the financial crisis in a relatively strong position, adds valuable insight to existing work.

Cox and Jappelli (1993) studied the effects of liquidity constraints on consumer borrowing while research in the area was still in its infancy. Studying panel data from the American survey of consumer finance, their hypothesis was that due to liquidity constraints, actual borrowing is lower than desired borrowing. They assume that the demand for debt is a function of wealth and demographic characteristics of the households. Their findings indicate that liquidity constrained households are younger and have less income than un-constrained borrowers. Those with no debt tended to be older and less educated than debtors and less of this group hold full time jobs. All else being equal, "blacks, city dwellers, and households with large families are less likely to be unconstrained." In the absence of liquidity constraints, Cox and Jappelli find that total debt in the sample would expand by 9 percent. Amongst the most constrained groups however, debt would have to expand by 75 percent to reach the desired level. My research shows that falling liquidity constraints (as in Cox and Jappelli) in Canada have contributed to a significant rise in personal debt and changes in debt's use as a consumption financing option.

Japelli and Pagano (1994) begin with the hypothesis that liquidity constraints raise the savings rate, strengthen the effect of growth on savings, and support productivity growth in models with endogenous growth. Liquidity constraints refer to obstacles such as capital gains tax or bank credit rationing that limit an individual's ability to access liquid capital. Using a sample of OECD countries, they compare their loan to value ratios (LTV) which shows the average level of a mortgage relative to its housing collateral. They show that countries with lower LTV ratios exhibit higher savings rates and vice versa. They also find that in countries that have more tightly rationed credit, like Korea, this has a positive effect on growth, while loosely rationed credit standards and higher debt levels, like in the United States, slow growth. Average savings over the time period declined from an average of 15.1 percent in the 1970s to 10 percent in the 1980s. Increases in average LTV ratios contributed to 23 percent of this decline, with the largest change in countries who deregulated financial markets the most. I provide a table of Canadian data to supplement Jappelli and Pagano's Canadian data since 1994 to show how dramatically the country's housing wealth and debt figures have changed since Jappelli and Pagano published their findings.

Schmitt (2000) analyzed the hypothesis that rising consumer debt would lead to future recessions. Theory posits that as borrowers, high marginal propensity to consume (MPC) households, repay their loans, the funds are being transferred to low MPC households. Thus an initial expansion of credit will cause an economic boom as credit grows through the transfer of funds from low MPC to high MPC households. However, the trough of the

business cycle happens when high MPC households begin to repay their loans back to the low MPC lenders. She shows that the ratio of consumer instalment credit to disposable income leads the business cycle. When households begin to reduce their debt to income ratios, a recession typically follows. In light of Canada's very high debt to household income ratio, this suggests Canada, like the United States could be headed for a long protracted down turn. Granger causality tests are used to see if a debt indicator causes another economic indicator such as consumption. If yes, then a vector autoregression is estimated, and used to generate impulse response functions for a shock to debt. Her results indicate that consumer debt does not signal future recessions but rather that business cycle expansions give rise to higher consumer debt levels. Her analysis only considers the effect of debt on consumption and omits changes in interest rates or wealth. Given her conclusions however, expansion of her analysis in a Canadian context is interesting and valuable. I will also be testing the relationship between past debt and future consumption, but unlike Schmitt, I will be analyzing more than one pair of variables (debt and consumption) for causality. I have chosen to include data for residential structures and stock index returns to analyze the effect of shocks to wealth on debt and consumption.

Palley (1994) explored the use of a multiplier-accelerator model to generate business cycles and tested the central argument that "household borrowing initially served to increase aggregate demand and output, but debt service payments subsequently served to reduce aggregate demand and output." He expounds on the idea of "financial tranquility where agents become more optimistic and leverage ratios are allowed to increase." Unlike Schmitt, Palley's research suggests that debt and debt service burdens can have an

effect on economic indicators, namely GNP. The model in my thesis uses an assumption that is shared with Palley, namely that household debt does have an influence on economic performance. My focus though is to show if debt actually has an adverse effect on consumption rather than GNP.

Campbell and Cocco (2004) studied the effect of house prices on consumption. Their estimates suggest that consumption responds to predictable increases in house prices, suggestive of relaxed borrowing constraints in a rising housing price environment. Using UK data they find that credit constrained borrowers consumption responds more strongly to housing prices than others, and that UK house prices are related to the ease of borrowing generally. Since liquidity constraints play a fundamental role in the economic model I present here, when constraints on access to home equity fall, like Campbell and Cocco discuss, we should see rising wealth have a decreasing impact on the accumulation of personal debt for consumption smoothing. As liquidity constraints fall households should be able to bypass the need for personal loans, and utilize mortgage loans as a more cost effective substitute.

Brady (2007) analyzes structural breaks in the use of consumer debt for U.S. data from 1959 to 2005 to test the hypothesis that households smooth consumption over time. His research was motivated by the question of whether rising consumer debt is making households more vulnerable to economic shocks. However, if rising consumer debt is the result of better access to credit, lower interest rates and the ability to better smooth out consumption over the household income lifecycle, then credit access may actually reduce

macroeconomic shocks. Brady mentions that research by Gross and Souleles (2002) use credit card data to show an empirical failure of the Life-Cycle-Permanent-Income hypothesis. To counter their results, Brady uses the following:

$$\Delta c_t = \mu + \lambda E_{t-1}\Delta y_t + \pi E_{t-1}\Delta r_t + \alpha E_{t-1}\Delta d_t + e_t$$

where y is income, r the real interest rate, d credit growth, E the expectations operator, and e_t the error term.

By identifying structural breaks in the data, Brady shows that post 1983 data displays much different trends than pre 1983 data. Post 1983 is typically identified as the "Great Moderation" era in American financial markets, subject to less macroeconomic volatility than the past due to more "efficient" credit markets. Pre 1983 data shows that consumption is excessively sensitive to income growth and consumer credit. Post 1983 however, none of the determinants of consumption are significant, indicating that consumption smoothing is more abundant. He concludes by saying that in a more deregulated financial environment, it becomes easier to access credit and smooth consumption, consistent with the Life-Cycle-Permanent-Income hypothesis. Similarly to Brady (2007) I separate the data in two different periods to illustrate a structural break in Canadian consumption patterns differ before and after 1986, a year during which the Canadian banking industry experienced a number of important changes.

Krueger and Perri (2005) discuss the use of two different models and regarding the effect of debt on consumption. They indicate that consumption models with debt constraints differ significantly from models which assume households can smooth consumption over time. They test iterations of each model against consumer expenditure data from the United States and find that neither model provides a good empirical explanation, and a mixed approach may be best. The credit constrained model includes the presence of unemployment insurance, which predicts that consumption responds much less to income shocks than observed in the data. The unconstrained model on the other hand does not include any type of insurance and ends up over-estimating how much consumption will respond to income shocks. Compared to Brady (2007), Krueger and Perri's analysis does not break up their data set in to cohorts, to analyze the effects of the model under different time states. I argue that the credit market present in 2003 varies significantly from that present in 1980, implying that a constrained model is appropriate for the early part of the data, while an unconstrained model is better for the latter half.

Benjamin and Chinloy (2007) test the positive correlation between debt and consumption, motivated by startling observations in U.S. housing data. U.S. housing equity increased by $9.6 trillion during the period of 2001 to 2004, of which $425 billion per year of equity on average was extracted. From 1996 to 2000 equity extraction only averaged $177 billion per year. Preliminary analysis of the data indicates that households borrow against their home equity more as this equity rises. In other words, as household wealth increases, they extract this wealth to fund both consumption and investment. Rising wealth decreases liquidity constraints. Kishor (2005) estimated that 98% of the change in

household wealth is permanent, compared to only 55% for financial wealth. Thus the housing wealth effect should be about double the effect from stocks. Other authors across different countries, such as Carrol et al. (2006), support Kishor's results. It's important to note however, that households with higher stock holdings are wealthier and have a lower marginal propensity to consume and also represent a much smaller percentage of the population, which likely influences this result. An interesting finding in their research is that increased mortgage borrowing actually alleviates rather than creates liquidity constraints imposed by housing payments, retirement and insurance accounts. Benjamin and Chinloy conclude by stating that the "housing market offers homeowners the opportunity to stabilize and smooth their consumption over the business cycle". The financial crisis subsequent to their research calls this last statement in to question.

Nothaft (2004) indicates that households have two key reasons to extract or refinance home equity in the event of rising home prices. The first reason is to reduce debt servicing costs if interest rates have fallen, freeing up cash flow which can be used to fund extra consumption, essentially allowing for improved consumption smoothing. The second reason is through cash-out refinancing, using the tax-free extracted equity to consolidate higher interest rate debt, fund larger consumer purchases, home renovations, automobiles or other investments. Nothaft's statements imply that in an environment of rising house prices and lower liquidity constraints, we should see a lower reliance on personal loans for consumption, as households gain easier access to a cheaper source of credit.

Hurst and Stafford (2004) study home equity extraction data from 1991 – 1994 in the United States, a period of falling interest rates. They find that liquidity constrained households utilize 60 cents of every dollar extracted to fund current consumption, while non-liquidity constrained households used equity extraction as a means to rebalance their portfolio. LaCour-Little et al. (2010) also find that in their sample of households from 2000-2006 in the United States, 5 percent of households used extracted equity to purchase a second home. They also find that marginal equity extraction per extra dollar of home appreciation declines as the initial value of the house rises. Hurst and Stafford's findings support my hypothesis that changes in household wealth play an important role in consumption behaviour.

Telyukova and Wright (2007) look at the puzzling situation where households hold balances on their high interest credit cards despite having liquid assets, such as low interest checking account balances. Arbitrage opportunities suggest that households should be paying off their credit card balances, yet the American data says otherwise. They begin by suggesting that several contingencies or emergencies may exist where paying with a credit card is impractical. Furthermore paying for rent or a mortgage payment using a credit card is also impractical. They build a model based on the rate of return dominance puzzle: why would an individual hold non-interest bearing assets when liquid interest bearing assets are available for purchase. Their model flips this line of thought on its head to ask why an individual would pay interest on debt when they have liquid assets available to pay off this debt. Their model proves their original position, that liquidity constraints on the use of credit necessitates holding money balances, even if it is

costly to do so. Liquidity constraints will be a main feature of the model discussed in my research.

Bywaters and Thomas (2006) develop a new approach to measuring the effect of risk-free and risky assets on household consumption. They utilize portfolio theory derived from the field of finance (the Capital Asset Pricing Model) in combination with a Cobb-Douglas utility function, as oppose to an additive utility function presented in my research. Their theoretical framework allows for the analysis of consumption, indebtedness and the holding of assets under conditions of uncertainty. Their model "shows how an investor should acquire wealth (or loans) as a holding of a share of the market portfolio of risky assets, together with risk-free assets or liabilities." I will be analyzing not only housing wealth, but also the effect of changes in stock wealth on the accumulation of personal debt. Bywaters and Thomas provide an additional explanation to why Canadian households are acquiring loans, based on expected rates of return on financial assets. I argue that rising stock wealth leads to rising debt, not only due to the relaxation of liquidity constraints (such as wealth held within a tax sheltered retirement plan), but also because as interest rates have fallen over time, the expected return to stocks has begun to outpace the cost of personal debt.

Montgomerie (2009) expounds on the use of credit since the 1980s by households during an era of enhanced "financialization". She defines financialization as a conceptual tool used to make "empirical and theoretical sense of the tempestuous rise of finance in contemporary capitalism". Put differently, it focuses on how the domestic economy, from

firms to individuals, is increasingly "mediated by new relationships with financial markets". She posits that a high level of unsecured debt over income allows for the development of asset backed debt securitization (ABS), rather than the reverse causation that enhanced access to ABS leads to more consumer debt. As such ABS allows for new loans to be created from the same existing capital stock. She finds that weak wage growth and reductions in social safety nets in the United States have driven households to accumulate debt to maintain a consumptive behavior consistent with political and societal expectations. Decreasing liquidity constraints have facilitated households ability to achieve the expected level of consumption, but at a long run societal cost as insolvency and home foreclosures weaken the American economy. Montgomerie's discussion of securitization supports my choice of separating the data in to two different time periods. In 1986 mortgage backed securities were introduced to the Canadian market and have had a profound effect on residential mortgage debt since their adoption.

Steijvers and Voordeckers (2009) discuss the use of collateral in loan contracts. Although they focus on business loans rather than personal loans, the issue of asymmetric information prevails across both loan types. Interestingly, in an environment of loosening personal credit constraints in the United States, between 1987 and 2003, the pledging of personal collateral (outside the business) for small business loans increased from 28% to 53% while inside collateral rose to 45%. According to theoretical models, "the existence of information asymmetry gives rise to credit rationing if the information problem remains unsolved. Due to asymmetrical information, the expected banks' return increases non-monotonously when the interest rate is increased." Therefore, banks prefer to ration

credit to opaque firms rather than increasing the interest rate. Extending this line of thought, from observation of Canadian banks household lending practices we can see mortgage rates are generally similar across borrowers, while their credit rating and physical collateral play a larger role in determining a lending approval. Steijvers and Voordeckers research goes on to indicate that as banks become larger, the need to rely on objective information increases, as compared to small regional banks dealing with local firms or households. Thus the need for traditional collateral also rises. Canadian loan data supports their hypothesis. Since the early 1980s, the share of bank lending to businesses has declined while mortgage and personal lending has risen. Concurrently, a number of mergers have occurred in Canadian banking, with a less regional and more national focus. Additionally, households are more homogeneous across the country compared to heterogeneous businesses that rely on specific market niches. A review of studies on collateral show varying results, but ultimately, collateral acts as an important tool for disciplining against moral hazard or decreasing the incidence of adverse selection (i.e. those taking loans from the bank are the least likely to pay them back).

Following trends in Canadian banking data, it is clear that business lending as a share of total bank lending has been on the decline since its most recent peak of 62 percent in 1981. Now business lending as a share of total bank lending is only 24 percent (CANSIM #1760011). In light of that decline, it begs the question of whether businesses are sourcing financing from alternative means (demand side decline) or banks have shifted their lending preferences or underwriting requirements (supply side decline). Using U.S. financial data, Buera (2008) develops and tests a model of entrepreneurship that analyzes

the effects of borrowing constraints on savings behaviour in entrepreneurs. He finds that "the probability of becoming an entrepreneur as a function of wealth is increasing for low levels of wealth…but it is decreasing for higher wealth levels." He also finds that the welfare costs of borrowing constraints (undercapitalized entrepreneurs) can cause an up to six percent reduction in lifetime consumption. Entrepreneurs' main source of financing is through small business and commercial lending from banks or angel investors/venture capital. Raising financing through issuing shares or selling bonds can be difficult, impractical or impossible for small businesses, especially start-ups, so traditional bank financing sources are vital.

In his book, The Political Economy of Financial Crises, Stockhammer (2010) discusses the growing role of financialization in the global economy since 1980. In particular he notes that an increased focus on shareholder value and return on equity (which can be created through share buybacks financed by debt) has actually caused non-financial firms to reduce their overall investment in the "real" economy. He continues to expound on the effects of asset prices on household consumption (the wealth effect), like Campbell and Cocco (2004). He shows that housing price increases in particular lead to jumps in consumption since a house is frequently taken as collateral, while stocks are not. Mortgage credit is the dominant form of household credit globally. Stockhammer does not believe in using the term "wealth effect", since income growth has stagnated in the United States. Rather, he uses the expression "credit access effect" to describe unlocking the household's ability to borrow towards consumption. Even amongst banks, the process of financialization has led to a fee-generating business model where banks originate

loans, but distribute the loans to investors rather than holding them on their balance sheet. U.S. data shares similarities to Canadian observations; there has been a shift to lending to households rather than to firms. Mortgages are now by far the largest loan positions (Ertürk and Solari 2006, Lapavitsas 2008). Stockhammer's assessment is that "the finance-dominated accumulation regime has been characterized by a sluggish overall economic performance with increasing financial fragility due to rising debt levels." He concludes by noting that a series of major financial crises have occurred since sweeping financialization processes began in the early 1980s: the 1982 debt crisis, the savings and loans crisis in the US in the late 1980s, the EMS crisis of 1992, the Peso crisis of 1994, the Asian financial crisis of 1997, the Dot com bubble and the financial crisis of 2008/09. In spite of all this financial turmoil, supporters of financialization have called this period the Great Moderation, a period of increased stability, because risk can now be held by those most able to handle it.

I would argue that financialization has exacerbated risk in financial markets due to the increasing importance of moral hazard. Loan originators can now create any kind of loan if a buyer exists to purchase it, substantially inflating housing demand, consumption etc, since the original lender does not bear the risk of the borrowers defaulting on their obligations. If banks had to hold the loans they create, it is in their interest to maintain a low risk portfolio, which would lead to substantially less volatility in debt and financial markets. Furthermore, in the absence of asset backed securities, investors would be forced to search out other investment alternatives at comparable risk levels. Since there is

a limited market for asset backed securities, this capital would be more likely to find its way in to new venture creation or other forms of productive fixed capital.

Buyukkarabacak and Krause (2008) study the effect of lending composition on the trade balance. They use a generalized method of moments dynamic panel estimators on a sample of 18 emerging countries. Their results show that expansions in household credit lead to a fall in net exports, while expansions in firm credit lead to a rise in net exports. Canadian data generally supports their findings. As household mortgage credit rapidly expanded between 1985-1995, net exports declined to a low in 1992, before rocketing back upwards through to 2006. After 1995, mortgage credit as a share of bank lending hit a plateau while net exports rose rapidly. Continually consistent with this analysis is the financial crisis of 2008 which saw personal loans as a share of bank lending surpassed business loans for the first time in history. Concurrently, net exports fell sharply. Importantly, they conclude by saying that "the higher share of household credit in the total private credit can crowd out investment, especially in countries where stock and bond markets are not well developed to finance investment."

CHAPTER 3 – WEALTH EFFECT, LIQUIDITY CONSTRAINTS AND DEBT

Household consumption decisions are not always clear cut. Not only do households face a diverse array of choices amongst a broad group of goods and services, but they also must consider the impact of their consumption decisions over time. Due to a limited financial budget over a household's lifetime, increased consumption today comes at the expense of reduced consumption in the future. Savings behaviour acts as a means to smooth consumption over time when income is high during working years and low during retirement. By saving the household accumulates financial and durable assets such as stocks, bonds or real estate which can be liquidated upon retirement to finance a similar standard of living across the life cycle. Furthermore, young households can borrow against future income, which will likely grow over time, to smooth their consumption. Therefore the inter-temporal consumption decision will vary depending on the life stage of the household. This is known as the permanent income lifecycle hypothesis and it suggests that a household can use borrowing as a means to transfer future wealth and income to the present in order to smooth out their consumption over time.

The household borrowing versus saving decision is one representation of the substitution effect. The household can trade off current consumption in favour of future consumption by saving. Alternatively, it can increase current consumption at the expense of future consumption by borrowing. In its simplest form, this decision can be impacted by 2 factors, income and wealth. An increase in income can be used to increase consumption both now and in the future. The effect of an increase in wealth can also impact the

household's consumption decisions across time. As real estate and financial assets become more valuable, the household will become wealthier, forcing them to revaluate their desired consumption given a higher level of obtainable utility. Ultimately, this choice depends on household expectations regarding future income and wealth. Does the household have a particular target level of savings, which they were already on track to meet based on their past savings behaviour. In this case, the rise in income or wealth will be wholly consumed in the current period. However, if the household desires to reach a higher level of future income, then the increase in income or wealth will be saved or retained.

Households maximize their consumption over time based on the following model:

$$U(C_t, C_{t+1}) = u(C_t) + \frac{1}{1 + r_{t+1}} u(C_{t+1})$$

where $\frac{1}{1 + r_{t+1}}$ which is the discount rate, indicating that households prefer current consumption to future consumption across time periods since the rate of return is assumed to be greater than or equal to zero. The utility function is increasing and concave, representing diminishing marginal returns to consumption.

The consumption maximization is a subject to the following budget constraint:

$$Y_t + \frac{A_{t+1}}{1 + r_{t+1}} = C_t + \frac{C_{t+1}}{1 + r_{t+1}}$$

where
Y_t = Income in the current period
$A_{t+1} = H_{t+1} + S_{t+1}$
H_{t+1} = Liquidation value of the housing asset in the future period
S_{t+1} = Liquidation value of the financial asset in the future period
r_{t+1} = The rate of return on assets

First order conditions yield the following:

$$u`(C_t) = u`(C_{t+1})$$

where $u`(C_t)$ is the marginal utility of consumption in the current period while $u`(C_{t+1})$ is the marginal utility of consumption in the future period which implies that as the marginal utility of consumption in the current period changes, it must also change in the future to balance the equation which can occur due to changes in asset values or future consumption levels. This is a representation of life cycle consumption smoothing.

More explicitly we can see that as assets rise in value, the marginal utility of consumption in period t+1 falls, since future consumption will rise due to a higher liquidation value of the assets. However, households have the ability to borrow against the value of their assets, which is preferable since households prefer to smooth consumption over time.

$$\frac{u`(C_t)}{u`[(Y_t - C_t)(1 + r_{t+1}) + A_{t+1}]} = 1$$

Due to the concavity of the utility function, as assets rise in value, the denominator will decrease. In order to keep the identity balanced, the numerator will also need to decrease. This is represented by an increase in C_t.

In order for the identity to balance it must be the case that $\Delta A_{t+1} > \Delta C_t(1 + r_{t+1})$

By rearranging the budget constraint we can show:

$$C_t - Y_t = (A_{t+1} - C_{t+1})/(1 + r_{t+1})$$

where $D_t = C_t - Y_t$

Therefore we can see that:

$$\frac{\partial D_t}{\partial A_{t+1}} = 1/(1 + r_{t+1)}$$

which is greater than zero, indicating that as assets rise in value, households will borrow against their future financial wealth, but will borrow less as the opportunity cost of borrowing against those assets rise.

We will begin by focusing on the situation where the household chooses to increase current period consumption due to a rise in wealth. The household could choose to liquidate their new found wealth, converting it in to transactional power. Unfortunately, several factors prevent the household from liquidating this wealth. Regarding rising wealth from real estate, it is impractical to sell one's house to finance current consumption, since new living accommodations would need to be acquired. This is only reasonable if the household were choosing to downsize to a smaller residence. Since real estate values tend to rise broadly rather than on a house by house basis, even if the household sold their house, this source of funds would need to be used to purchase a new comparable home at a similar price level. Thus, the household would need to refinance their mortgage loan to make use of the new home equity.

Stocks face other deterrents to their liquidation. Since capital gains are subject to tax, selling an investment during your peak earning years when it is subject to a higher marginal tax rate may be unwise. Thus taxes act as a deterrent to asset liquidation (the same would apply to rental properties). Therefore, the household would be better off

borrowing if the cost of borrowing was less than the marginal tax rate plus the opportunity cost of forgone dividends on the stock.

In both regards, an increase in wealth will lead to a rise in consumer debt. Typically the household will use credit cards or lines of credit as a convenient means of financing the newly desired consumption. Subsequently, in the case of rising home equity, these debts can be paid off by refinancing their mortgage due to generally lower interest rates or longer payment time frames available on a mortgage.

Bank collateral requirements also play an important role in the household's ability to unlock home equity's transactional power. Regulators also play a role in defining collateral requirements, but for the sake of keeping the model simple, these effects will be ignored. As bank's collateral requirements fall the ability to refinance available home equity will rise.

Inherent in the model, which dictates the need for banks to hold collateral is the existence of moral hazard and asymmetric information advantages on the part of the borrower. Borrowers possess better knowledge of their ability to repay a loan than the bank. Furthermore, borrowers have the ability to discontinue repaying their loans through bankruptcy protection. Thus, banks typically need collateral in the form of physical assets like real estate or a vehicle, forcing the household to lose an asset if they discontinue paying, mitigating the effect of moral hazard. In the absence of collateral, banks will extend far less credit to households. The borrower's credit rating can also act as a form of

collateral. Households who intend to engage in future borrowing have a much greater incentive to repay their loans in order to maintain their "character" collateral, represented by a strong credit rating. Moral suasion and social norms also act as an incentive for those households without the need to maintain a strong credit rating to continue to repay their loans. Good character collateral can be earned over time, typically resulting in more favourable borrowing arrangements. The existence of uncertainty regarding future wealth and income acts as a further incentive to retain good character collateral. Without character collateral, credit cards and personal loans would not exist at a significant level.

$$1) \quad D_t \ = \ \Omega_0 + \ \Sigma\alpha_k S_{t-k} \ + \ \Sigma\beta_k H_{t-k} + \Sigma\pi_k Y_{t-k}$$

where $k = 1,..,n$ number of lags.

Now I can introduce my aggregate level economic model which implies that debt is always a positive number since one household's asset represents another household's liability. The wealth effect is represented by changes in stock values (S) and home equity (H). The α coefficient represents the capital gains tax deterring effect on equity liquidation. β represents the effect of collateral on debt accumulation. What we can see is that as physical collateral requirements rise (which are decided by the bank), β will fall, and less debt will be accumulated. As character collateral rises (determined by the borrower's credit history), β will rise, leading to more debt accumulation. Income (Y) is included to avoid the model having an omitted variable bias. The coefficient π falls as income rises, indicating that higher income households need to borrow less than low income households to achieve optimal consumption smoothing.

Households don't just accumulate debt to deposit to their bank accounts however. Personal debt is used for consumption and investment. Therefore the model will be extended to include a component measuring the effect of debt on consumption.

$$2)\ C_t\ =\ D_t\ +\ \mu Y_t$$

Equation 2 indicates that consumption (C) is financed by Debt (D) and Income (Y). μ represents the marginal propensity to consume out of income.

CHAPTER 4 – TRENDS AND OBSERVATIONS FROM CANADIAN DATA

With rising use of household debt in Canada since 1986 it is interesting to review how insolvency rates have changed over that time period. Furthermore, comparing the state of household insolvencies to business insolvencies provides some interesting observations regarding the changing composition of bank lending practices over time.

Table 1: Number of financial insolvencies per 1000 Canadian individuals since 1987

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Insolvency	1.3	1.3	1.4	2.1	3.0	2.9	2.6	2.6	3.1	3.7	4.0	3.6
Bankruptcy	1.2	1.3	1.4	2.1	2.9	2.9	2.5	2.4	2.9	3.5	3.8	3.3
Proposal	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Insolvency	3.6	3.7	3.9	3.8	4.1	4.0	4.1	3.8	3.9	4.4	5.8	N/A
Bankruptcy	3.1	3.2	3.3	3.2	3.4	3.4	3.3	3.1	3.1	3.4	4.5	N/A
Proposal	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.8	1.0	1.4	N/A

Data Source: Office of the Superintendent of Bankruptcy Canada

From table 1 we can clearly see that the consumer insolvency rate has more than tripled since 1987 (the first year data was available) even when ignoring the effect of the 2008 financial crisis. Rising insolvency amongst consumers suggests they are overextended, and that although rising wealth predicts their choice to increase debt is a rational one, uncertainty regarding economic outcomes clearly shows that some individuals would have been better off postponing wealth induced consumption.

Figure 1: Insolvency rate per 1000 individuals or businesses

Figure 1 shows growth in the consumer insolvency rate reached a plateau in 1997, with the exception of a sharp rise in financial distress due to the most recent recession. Interestingly, over this period of time, business insolvencies have dropped sharply, sitting at only 2.9 out of every 1000 businesses, nearly 80 percent less than its level in 1997.

When we observe figure 2 we can see that in 1997 business lending as a share of total bank loans took a sharp jump upwards. However, it has continued its decline ever since, just like the business insolvency rate. However, we can see that as residential mortgage lending as a share of bank lending was rising at its fastest rate from 1986 to 1994, the consumer insolvency rate doubled. Furthermore, the sharp jump in the consumer insolvency rate in 2009 corresponds closely to personal loans surpassing business loans as a share of bank lending for the first time in Canadian history. Despite decreasing

interest rates since 1987 and rising incomes, financial insecurity for Canadians has risen, meaning that as banks change their lending composition, the economy has difficulty absorbing the changes without some casualties.

Figure 2: Changing dynamic of bank lending business
Share of total bank lending on left axis, total loans right axis
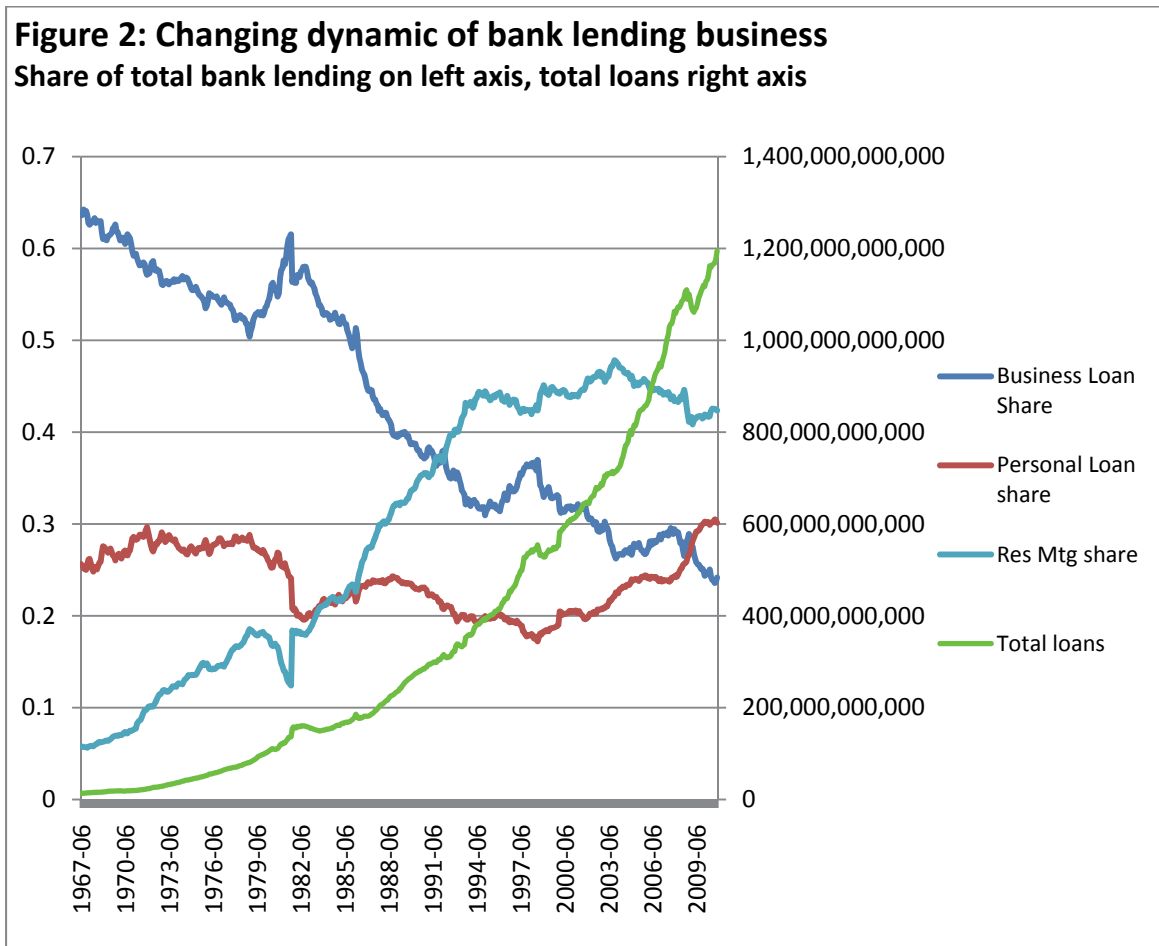
Data Source: Statistics Canada, Cansim Database

Over time despite the changing dynamics of bank lending composition, the growth rates of various elements of GDP have remained close to one another.

Figure 3: Growth rates across inputs to GDP remain tightly linked since 1967
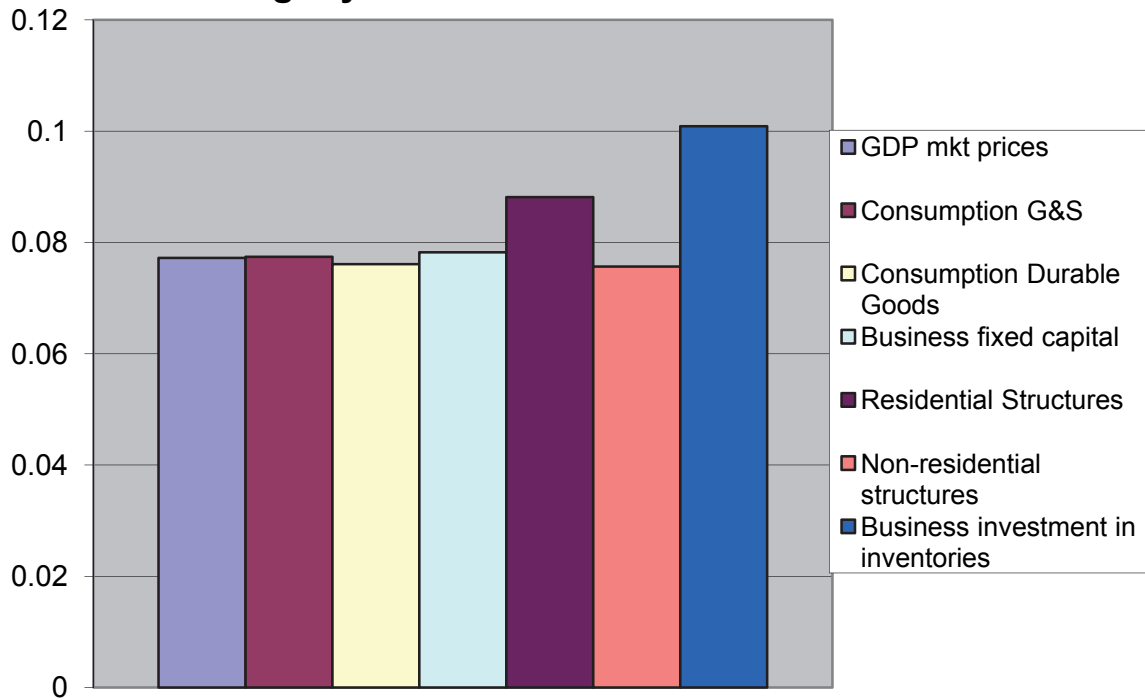
Data Source: Statistics Canada, Cansim Database

With the exception of residential structures and business inventories, the growth rates for numerous elements of gross domestic product remain tightly linked. Business fixed capital investment's growth rate actually slightly exceeds consumption of goods and services. However, when you consider the starting level for each category and the effects of exponential growth, the differences between consumption from the other pieces of GDP become quite startling.

Figure 4: GDP spending and the effects of exponential growth
Canadian economic indicators in cdn $ since 1967
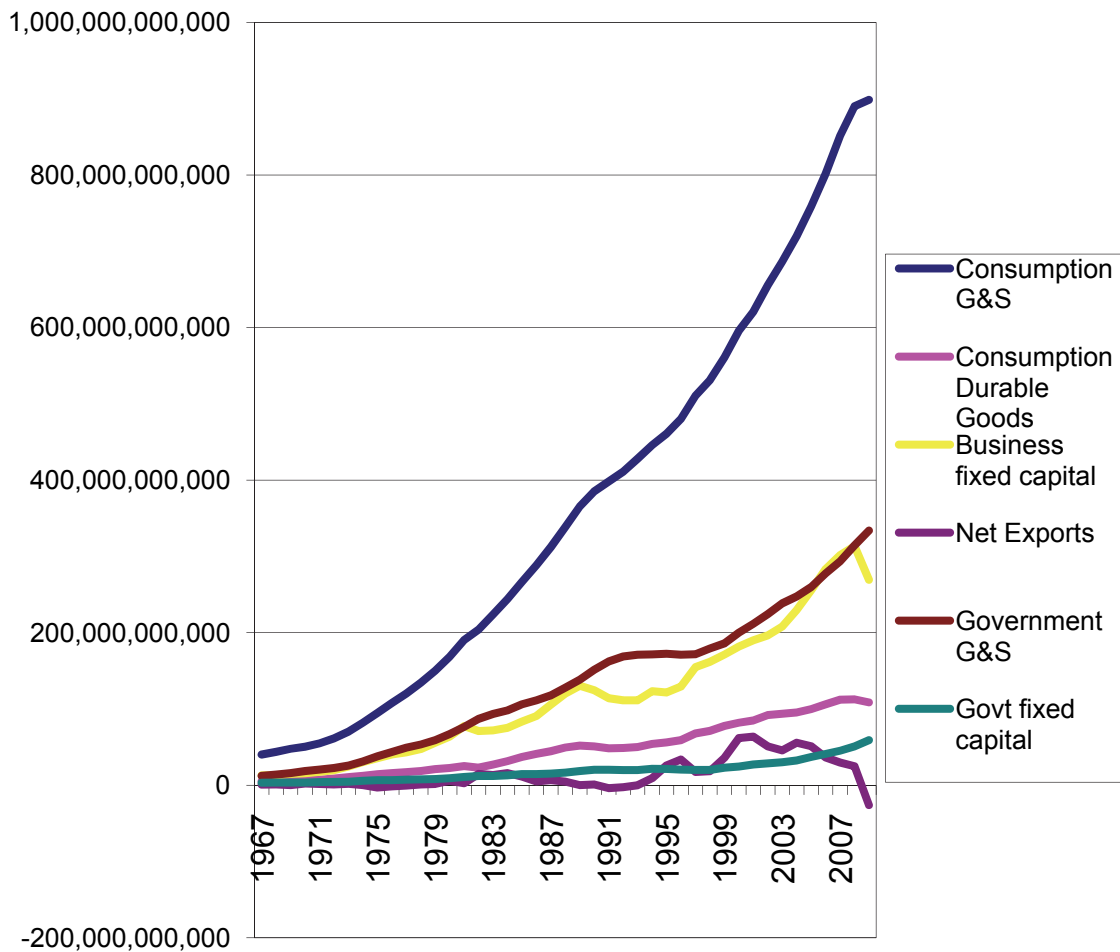
Data Source: Statistics Canada, Cansim Database

In light of such a wide differential between consumption and other measures, we can say that welfare for the household has increased, being able to acquire more goods relative to the need to save for investment purposes. When we compare the growth rate of consumption to the growth rate of personal income, we see that from 1961 to 1985 income growth exceeded consumption growth by 0.2 percent while after 1986 income growth lagged consumption growth by 0.1 percent with debt making up the differential. In light of rising insolvency rates, it appears that debt financed consumption is straining

individual borrowers, with the financial crisis of 2008 a sort of reckoning for the average household.

If we observe relative changes in shares of the key variables being analyzed in chapter 4 we can see how much the dynamics of wealth and debt have changed over time. The following graphs depict how potential funding sources for consumption have been changing over the time period being analyzed.

Figure 5: Composition of possible consumption funding sources in 1961

Legend: Res Structures, Income, Pers Loan, Stocks
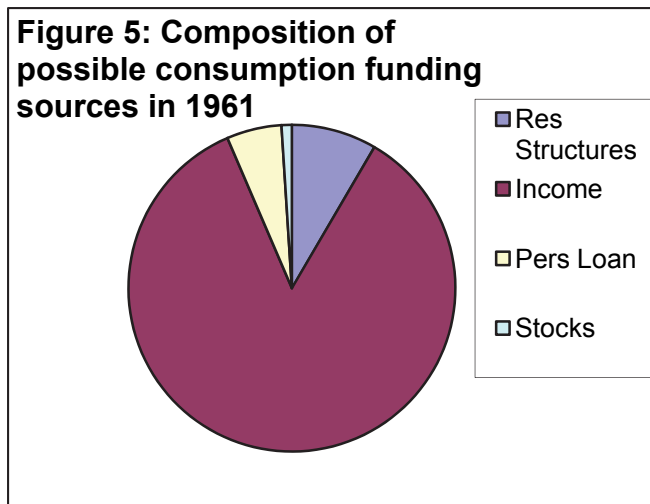
It is clear from the above graph that stock wealth was quite miniscule in relation to income and consumption, and even small compared to personal loans and residential structures.

Data Source: Statistics Canada, Cansim Database

Figure 6: Composition of possible consumption funding sources in 1980

Legend: Res Structures, Income, Pers Loan, Stocks
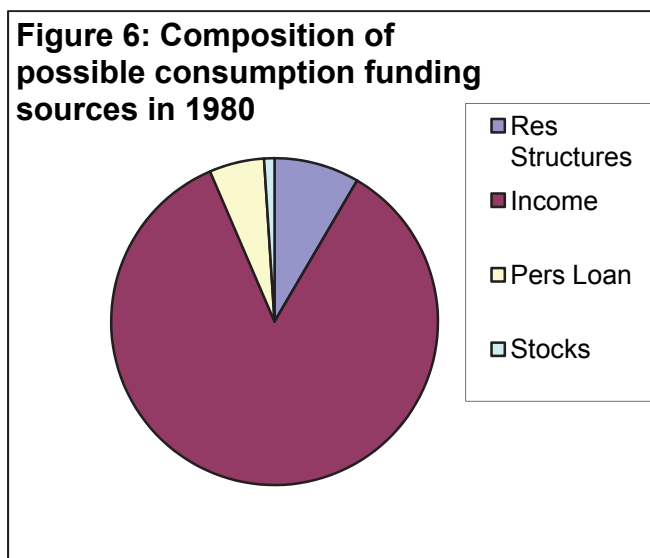
By 1980 little had changed. Personal loans had grown eating in to income's share, while residential structures and stocks remained relatively stable.

Data Source: Statistics Canada, Cansim Database

Figure 7: Composition of possible consumption funding sources in 2000

Legend: Res Structures, Income, Pers Loan, Stocks
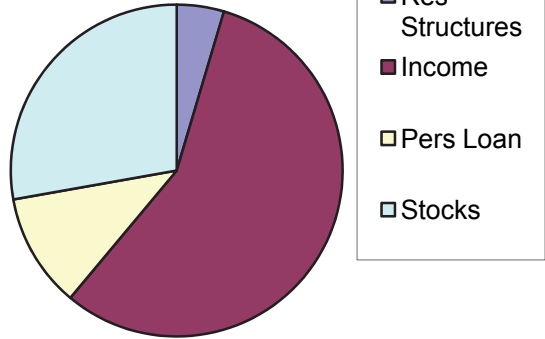
However, by the year 2000, near the peak of dot come bubble in the stock market, stocks rose dramatically in value relative to other sources of consumption funding. Residential structures and personal loans gave up some ground to stocks, but income clearly grew the slowest over this 20 year period.

Figure 8: Composition of possible consumption funding sources in 2010

Legend: Res Structures, Income, Pers Loan, Stocks
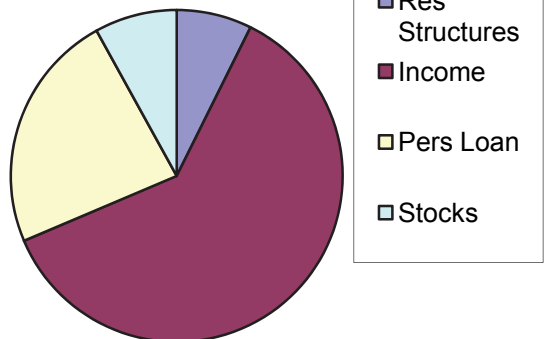
Ten years makes a big difference to the data, with stocks retreating dramatically as an available funding source for consumption, while personal debt grew quickly, putting it at its highest level in history. A caveat regarding the data; residential structures only represents transactions in residential structures each year rather than a measure of the value of Canada's total housing stock. In terms of transaction power however, this measure would be most appropriate as it represents housing stock that has been liquidated.

From the following graph we can see that not only has the composition of consumption financing changed since 1961, but the composition of consumption itself.

Figure 9: Services have steadily risen as a share of total consumption

Types of goods and services as a percentage of total personal expenditure
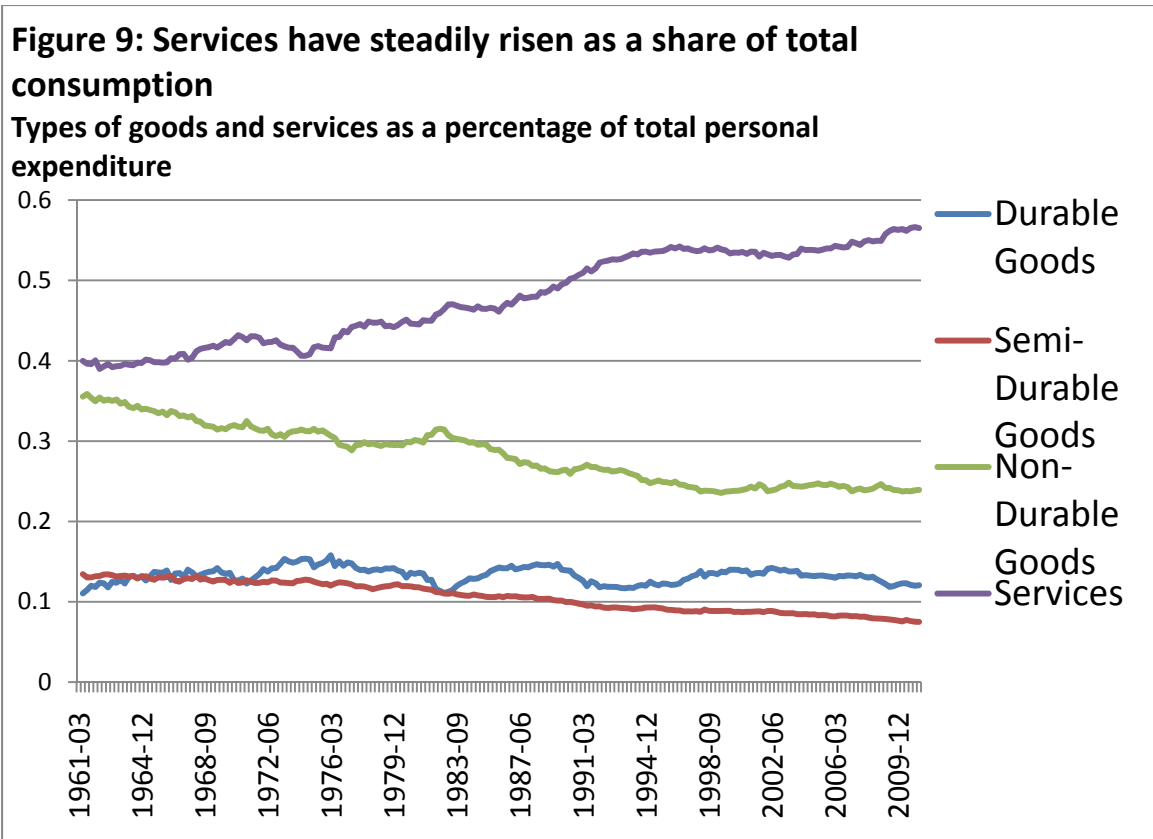
Data Source: Statistics Canada, Cansim Database

Durable and semi-durable goods have held a steady share of approximately 10 percent of total personal consumption across the data period, although semi-durable are on a slow downward trajectory. What we also see is a domestic economy increasingly focused on services, mainly at the expense of non-durable good consumption. Since the data represent a percentage out of 100 rather than a level, it is not the case that non-durable consumption is declining, but that its growth rate lags significantly behind service growth, which we can see from the graph below.

Figure 10: Growth in personal expenditure on services diverges from goods consumption
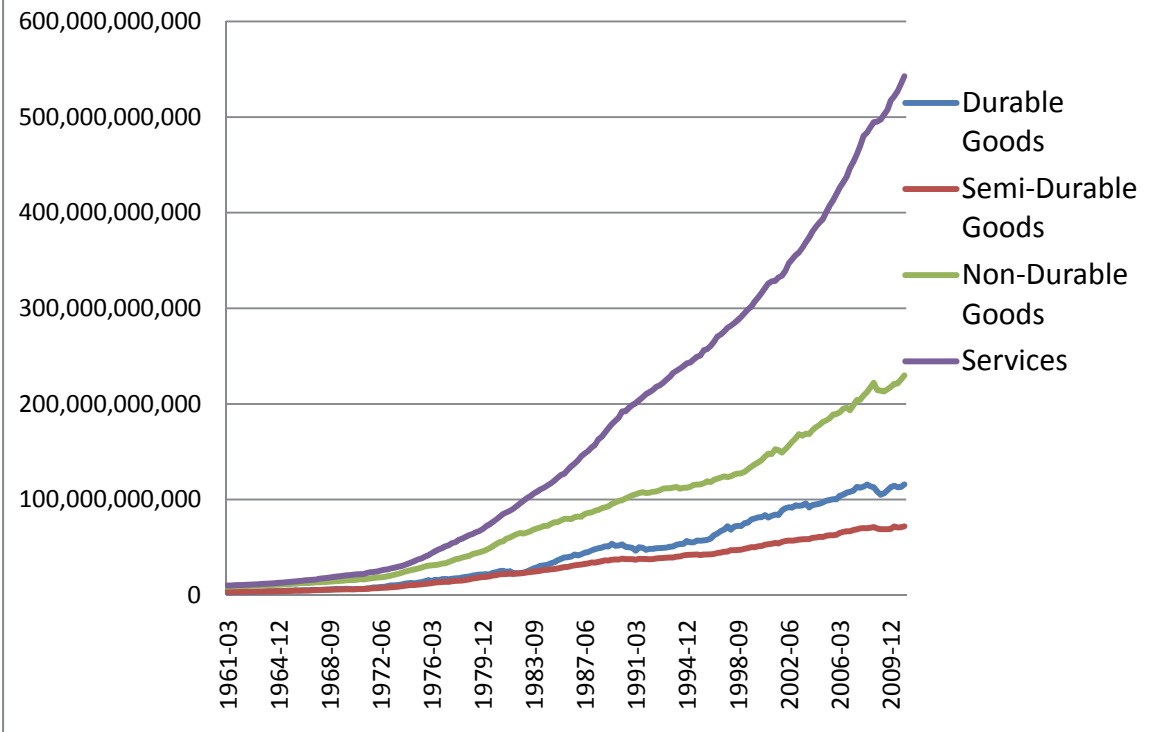
Data Source: Statistics Canada, Cansim Database

As part of my analysis in Chapter 4 I will not only regress aggregate consumption, but also each component of consumption. I expect personal debt to have the strongest positive effect on durable consumption, since these goods, such as an automobile, make sense to finance over the life of the asset. Conversely, non-durable goods should have an insignificant relationship to personal debt, as these goods, like food, have a very short economic lifespan. An advantage of breaking out these elements of consumption is that we can better differentiate between long term "investment" and short term "consumption".

The following table shows a number of interesting Canadian financial indicators, which reveal how dramatically household borrowing has changed in just 20 years. We can see that debt to personal disposable income has risen 60 percent in 20 years, yet the Canadian debt service ratio has actually fallen from over 10 percent to 7.4 percent, highlighting how much lower interest rates have contributed to facilitating larger debt loads. Over the same time period however, Canadian net worth as a percentage of disposable income has risen nearly 200 percent. Although the media may sound the alarm regarding household debt in Canada, when put in to the context of rising net worth, we can see that although debt relative to net worth has risen, it is not at epidemic levels. According to the permanent income life-cycle hypothesis, the rise in debt is simply a function of consumption smoothing by households in response to rising wealth and follows rational behaviour.

Table 2: Indicators of Canadian Financial Health	1990-03	1995-03	2000-03	2005-03	2010-03
All values are percentages unless otherwise noted					
Debt to gross domestic product (GDP)	60.28	66.17	68.58	73.45	93.71
Debt to personal disposable income	88.59	101.08	110.45	124.21	148.58
Consumer credit and mortgage liabilities to personal disposable income	77.29	89.35	95.18	109.57	135.39
Net worth as a percentage of personal disposable income	425.63	499.22	602.69	597.73	615.91
Debt to total assets	17.6	17	15.9	17.31	19.49
Debt to net worth	21.35	20.48	18.9	20.94	24.21
Consumer credit and mortgage liabilities to net worth	18.53	18.08	16.19	18.39	22.03
Total assets to net worth	121.35	120.48	118.9	120.94	124.21
Financial assets to net worth	64.1	68.35	74.59	69.55	69.03
Financial assets to non-financial assets	111.95	131.12	168.32	135.36	125.09
Owner's equity as a percentage of real estate	69.24	66.7	66.41	69.93	68.06

Table 2: Indicators of Canadian Financial Health	1990-03	1995-03	2000-03	2005-03	2010-03
Credit market debt to personal disposable income	86.95	100.08	109.07	122.81	146.58
Credit market debt to net worth	20.94	20.25	18.66	20.69	23.89
Real estate as a percentage of personal disposable income	192.97	210.05	216.02	256.59	294.48
Debt service ratio (DSR) (percent)	10.21	8.88	7.76	6.91	7.4
Mortgage debt service ratio (percent)	5.99	5.78	4.25	3.78	3.97
Consumer debt service ratio (percent)	3.65	2.76	3.19	2.93	3.27
Mortgage and consumer debt service ratio (percent)	9.64	8.54	7.44	6.71	7.24

Data Source: Statistics Canada, Cansim Database

Although I will avoid discussing this issue in depth in this research, what the above table clearly misses is the impact of income inequality on the median household. Although overall net worth has increased, it would be interesting to see the distribution of that net worth. It is possible that the median household is in much worse financial shape today than these ratios would indicate.

CHAPTER 5 – DATA, STATISTICAL TECHNIQUES AND RESULTS

The dataset being used for this study was taken from Statistics Canada's CANSIM database across multiple surveys. The Canadian national accounts were used for data on consumption, including durables, semi-durables and non-durable goods, services and residential structures (CANSIM #3800002). Income data was taken from the income based Gross Domestic Product (CANSIM #3800001). Stock wealth was converted from monthly to quarterly observations using the 3 month average of the Standard and Poor's Toronto Stock Exchange Composite Index. Personal loans were taken from the monthly survey of Chartered Bank assets (CANSIM #1760011). The data was averaged across the 3 months per quarter to make it consistent with units being used in the remainder of the data set.

The quarterly time series spans from the first quarter of 1961 to the fourth quarter of 2010, for a total of 196 observations per variable. Using only a first difference process, it is clear that the data exhibits explosive variance so all data points were converted to their logarithmic form.

Due to the nature of the financial data being used, a clear upward trend was identified in each variable of the data set. The augmented Dickey-Fuller test was used for each variable to establish the existence of a unit root. The results of the augmented Dickey-Fuller tests can be found in the appendix. The logarithms of all variables exhibit a strong non-stationary trend with 1 lag except stocks, which only exhibits a non-stationary trend at the 4th lag at the 1% level. Therefore to eliminate the non-stationarity present in the

data, a first difference process was used on the logarithm of each variable to make the data stationary.

Dickey-Fuller tests on the first-differences of the logs show that the hypothesis that a unit root exists can now be rejected making the data ready for further estimation.

A Vector Autoregression (VAR) estimation technique was used to estimate the models discussed in Chapter 2 because VAR is capable of accommodating endogenous regressors in the interconnected fashion. Furthermore, in order to test statistical causation in the sense of Granger, a VAR model must be used.

Before proceeding it is important to indicate some of the limitations of the following analysis. Data necessary to test the model present in chapter 2 needs to be taken from a number of different surveys. As a result, in order to include a time series which stretches back as far as 1961, quarterly observations need to be used. Monthly observations for consumption, residential structures, and income were only available back to 1980. Furthermore, not all data is available in constant dollars, such as stocks and personal loans, so the effect of inflation underlies some percentage of the change in the variables under analysis. The final limitation of my analysis is that I am using aggregate data to model individual household behaviour. Although there are some disadvantages to this approach, mainly that my results lack some of the precision that large panel data surveys might offer, I believe aggregate data is still valuable. I want to focus on the impact of liquidity constraints on Canadian borrowing and consumption trends over a long time period. Furthermore, I want to break up this period to analyze the before and after effect

of mortgage policy decisions implemented by the Canadian government, such as Canadian Mortgage and Housing Corporation mortgage backed securities introduced in 1986 and the lowering of down payment requirements which began in 1991. Aggregate data will allow me to reach an answer to the question: do falling liquidity constraints change Canadian households' accumulation of personal debt or expenditure on goods and services.

The first regression being tested is the wealth effect's impact on personal debt. Specifically, personal loans is being regressed on the quarterly closing value of the stock market index and the quarterly amount of residential structure spending, which includes real-estate and land transactions, residential construction, building materials and mortgage and home insurance. Values for the average Canadian home sale price would have been preferable, but this data was only available back to 1980. Residential structures are at least correlated with housing prices, so it was used as a proxy. Income was also included to decrease the probability of an omitted variable bias in the regression.

Therefore the first regression being tested is of the following form:

$$1) \ D_t = \Omega_0 + \Sigma\alpha_k S_{t-k} + \Sigma\beta_k H_{t-k} + \Sigma\pi_k Y_{t-k}$$

All of the following tables display the coefficient in the first row, p-value in the second, and the significance level in the third if the explanatory variable rejects the null hypothesis.

Table 3: Dependent Variable: Personal Loans

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00932305		
	0.00043		
	***		
Personal Loans	0.518171	-0.053595	0.11643
	<0.00001	0.51714	0.11868
	***		
Res Structures	-0.00437455	0.0212202	0.0281125
	0.89247	0.52228	0.36696
Stocks	-0.00733406	0.0118313	-0.0339447
	0.67356	0.50143	0.04745
			**
Income	0.362773	-0.155619	-0.114507
	0.02143	0.29675	0.45339
	**		
R-squared	0.384037	Number of Obs	196

Significance level: *** 1%, ** 5%, * 10%

The model does not hold much explanatory power and makes it difficult to suggest that changes in wealth cause changes in personal loans. Residential structures across all lags are poor predictors of personal debt levels in the future, which suggest that liquidity constraints on housing wealth in Canada are insignificant and households can access this rising equity through mortgage debt. The first and second lags for stock wealth are weak predictors of personal debt. However, a 1 percent increase in stocks 3 quarters prior leads to a 0.03 percent decline in loans, which suggests that some amount of capital gains from

stocks are being liquidated to pay down debt. The importance of a 3 quarter lag indicates that the sell off might not occur until the next taxation year, to postpone the payment of capital gains tax. A rise in income last quarter of 1 percent leads to a 0.36 percent rise in personal loans, meaning that households borrow against positive changes in income. Conversely, as income falls, banks decrease their risk exposure by decreasing the amount of loans they will originate. Lags of personal loans were included as a necessary component of Granger causality tests to see if the addition of extra explanatory variables actually increases the predictive strength of the model. An F-Test with zero restrictions on the coefficients of all three explanatory variables does not reject the null hypothesis, which means that I cannot conclude that Granger causality exists. Results for F-tests with zero restrictions for all of the subsequent regressions have been included in the appendix.

It is not clear that the wealth effect has a strong impact on personal debt and does not explain why household debt has risen so rapidly over the last 20 years. Stock wealth and housing wealth have shown strong growth for the last 20 years with the exception of the most recent financial crisis of 2008. Although the permanent life-cycle income hypothesis suggests that households will borrow against this wealth to smooth consumption, the mode by which they borrow in Canada is not through vehicles like credit cards, lines of credit or term loans. This implies that the rise in Canadian debt is concentrated most heavily in mortgages, such that as housing wealth increases, households do not borrow against their credit card and then subsequently refinance their mortgage to pay off their card, but rather bypass the intermediary step of personal loans.

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Following on my analysis of personal debt, I test the effect of loans, income and stocks on consumption.

$$C_t = \Omega_0 + \Sigma\alpha_k S_{t-k} + \Sigma\beta_k H_{t-k} + \Sigma\varphi_k D_{t-k}$$

Table 4: Dependent Variable: Consumption

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00294575		
	0.03361		
	**		
Consumption	-0.0517348	0.257262	0.30433
	0.48821	0.00066	0.00012
		***	***
Stocks	0.0312922	0.00629579	-0.00828446
	0.00013	0.44111	0.28835
	***		
Income	0.157408	0.00340353	0.109473
	0.04965	0.96448	0.14954
	**		
Loans	0.108907	-0.0603338	-0.0304719
	0.00353	0.12805	0.39556
	***		
R-squared	0.523669	Number of Obs	196

Significance level: *** 1%, ** 5%, * 10%

Unlike the model of personal loans, Granger causality tests confirm that the null hypothesis that the three extra independent variables do not provide any explanatory power should be rejected. These results support the hypothesis that personal debt is used

to finance consumption. Personal debt has a strong positive effect on consumption in the current period after 1 lag. For every dollar increase in personal loans, expenditure on consumption increases by almost eleven cents. Increases in stock wealth are also significant but with a more muted effect than loans. A one percent rise in the value of the Toronto Stock Exchange leads to a 0.03 percent rise in the consumption of goods and services. Since stock wealth is concentrated among the richer households who have a lower marginal propensity to consume, the fact that stocks are a weaker predictor of consumption than personal loans should be expected. Income is also a significant predictor of future consumption at the first lag, with a one percent increase in income leading to a 0.157 percent rise in consumption. However, for each variable, every lag beyond the first holds little explanatory power.

Consumption is a broad measure containing many components. For this reason it is appropriate to separate the various components, such as durable, semi-durable and non-durable goods, as well as services. The consumption model will be run four additional times using each component of personal expenditure on goods and services as a dependent variable. The goal of this part of my analysis is to establish how and why different elements of consumption respond to varying income, debt and wealth changes differently from one another. What I expect to see is the effect of stocks and personal loans to be more significant for durable and semi-durable goods, while income should be the only significant determinant of non-durable goods. Theoretically, the interest payments being made to finance the durable or semi-durable goods are being made over the expected lifespan of the good, making financing the good instead of saving in

advance reasonable and rational. Conversely, debt based finance of non-durable goods that have a short economic life span of less than 1 quarter (one lag in the data set) would be an unreasonable decision for consumers as the debt is continuing to be paid past the economic life span of the product. It is difficult to make a prediction for services, especially as sophisticated yet expensive software and its requisite technical support might be a reasonable debt financed purchase, while debt used to pay for cleaning services would not.

Table 5: Dependent Variable: Durable Goods

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.0084273		
	0.1018		
Stocks	0.0818364	0.0477313	-0.0116116
	0.01383	0.15237	0.72259
	**		
Income	0.260621	-0.0760309	0.0127087
	0.3974	0.79351	0.96543
Loans	0.357542	-0.070025	-0.173883
	0.01989	0.67266	0.23905
	**		
Durable	-0.273213	0.0961915	0.241487
	0.00046	0.23598	0.00178
	***		***
R-squared	0.198829	Number of Obs	196

Significance level: *** 1%, ** 5%, * 10%

Granger causality tests indicate that the null hypothesis should be rejected, which indicates the model has explanatory value. As I expected, personal loans and stocks are good predictors of durable consumption since products like cars, a category which dominates retail trade figures, typically require major financing. A one percent rise in stocks and loans cause a 0.082 and 0.357 percent rise in durable goods consumption respectively. However, none of the lags on income are significant, indicating that changes in income are not being saved to pay for durable goods.

Table 6: Dependent Variable: Semi-Durable Goods

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.000520697		
	0.82102		
Stocks	0.0552172	0.0101042	0.00450682
	0.00025	0.50379	0.75684
	***		
Income	0.356926	0.0149582	0.238055
	0.01413	0.91291	0.08049
	**		*
Loans	0.156591	-0.0319112	-0.0329477
	0.0216	0.66453	0.61891
	**		
Semi Dur	-0.174178	0.068543	0.0962888
	0.02472	0.38682	0.21674
	**		
R-squared	0.306323	Number of Obs	196

Significance level: *** 1%, ** 5%, * 10%

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F-tests of zero restrictions (p-values in brackets):
All lags of Stocks $F(3, 183) =$ 5.27 [0.0016]

All lags of Income $F(3, 183) =$ 5.1168 [0.0020]

All lags of Loans $F(3, 183) =$ 1.979 [0.1187]

All lags of Semi_Dur $F(3, 183) =$ 2.6446 [0.0506]

All vars, lag 3 $F(4, 183) =$ 1.5286 [0.1957]

From the above figures we can see that the model that includes stocks or income would cause us to reject the null hypothesis, but the inclusion of loans would not for a Granger causality test. So loans are a poor predictor of semi-durable goods consumption, but stocks and income do provide more explanatory value. Changes in income have a strong effect on semi-durable goods consumption at both the first and third lag, leading to growth of 0.356 and 0.238 percent respectively. This indicates that Canadians save a portion of their changes in income to spend on future consumption within the same year. A one percent rise in stocks leads to a 0.055 percent increase in semi-durable consumption.

Table 7: Dependent Variable: Non-Durable Goods

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00178906		
	0.35145		
Stocks	0.029594	-0.00336641	0.00905557
	0.0154	0.78133	0.43442
	**		
Income	0.273154	0.288732	0.0885434
	0.01557	0.0096	0.43427
	**	***	
Loans	0.105284	-0.0662833	-0.0458611
	0.05686	0.26617	0.39486
	*		
Non Durables	-0.0898836	0.0438246	0.172548
	0.22198	0.54386	0.01766
			**
R-squared	0.358094	Number of Obs	196

Significance level: *** 1%, ** 5%, * 10%

The F tests for Granger causality indicate that the null hypothesis should only be rejected at the ten percent confidence level. The only version of the model that is a better predictor than lagged values of non-durables is a model that also includes income as an explanatory variable. From the above table we can see that a one percent rise in income at the first and second lag lead to a 0.273 and 0.288 percent rise in non-durable goods consumption respectively.

Table 8: Dependent Variable: Services

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00364989		
	0.01139		
	**		
Stocks	0.013095	0.0041108	-0.0124381
	0.09251	0.59265	0.09275
	*		*
Income	0.210862	-0.0282338	0.206301
	0.00332	0.69594	0.00513
	***		***
Loans	0.0273278	-0.0475329	0.0224342
	0.43742	0.21101	0.51353
Services	0.11184	0.163432	0.170556
	0.11895	0.02251	0.01587
		**	**
R-squared	0.53637	Number of Obs	196

Significance level: *** 1%, ** 5%, * 10%

F test with zero restrictions indicate that the model for services has one of the best fits for Granger causality, rejecting the null hypothesis at the one percent confidence level. Changes in income are the strongest predictor of future service consumption while changes in loans have no predictive value. Changes in stocks have a weak effect on services, with the rise in stocks at the third lag of one percent actually leading to a decline in service consumption of 0.012 percent.

When comparing the results across the different types of goods and services what we can generally see is that as the durability of the good declines, the significance of personal loans declines as well, while the importance of changes in income rises. Stocks on the other hand maintain a similar effect across all categories of consumption.

Pre vs. Post 1986 comparison

Since the data contains an even number of observations they can be split in two equal halves of 96 observations apiece. Coincidentally this split closely corresponds to a number of very interesting developments in the Canadian economy that significantly changed the banking landscape in the country. For these reasons I chose the fourth quarter of 1985 and the first quarter of 1986 as the time period to separate my data in to two periods.

Looking back at figure 3 in Chapter 3 we can see that despite a drop in the late 1990s and in 2008, loans have grown steadily over time. Conversely the make-up of these loans has changed considerably. Business loans peaked in the early 1980s before beginning to give up ground to personal loans and particularly mortgages. It is clear from the graph that in 1986 residential mortgages began to shoot up quickly as a share of total bank loans.

The previous year in 1985 tremors ran through the Canadian banking industry with a number of large bank failures, resulting in mergers and acquisitions within the sector. By 1986 the remaining banks were fewer in number with a larger amount of loan assets on their books (The Bank of Canada, 2010). As mentioned by Steijvers and Voordeckers in

chapter 2, larger more regionally widespread banks typically enforce more consistent and objective measures for determining credit approval, resulting in an increased need for collateral in a number of its transactions. At a local level, established character collateral due to strong relationships with the bank branch manager may have resulted in a larger number of collateral free loans be originated. However, a larger more centralized banking operation which removes decision making power from local managers enforces the need for traditional collateral. This helps explain why mortgages grew so rapidly since a house represents a uniform consistent form of collateral across the country. Business loans on the other hand tend towards less consistent forms of collateral, such as industrial factories, commercial manufacturing equipment, specialized vehicles etc. As such, acquiring a business loan became more onerous in the period after 1986 than before 1986.

More important than changing collateral requirements is the introduction of mortgage backed securities (MBS) in Canada. MBS in Canada are mortgage loans guaranteed against default by the Canadian Mortgage and Housing Corporation, a federal crown corporation, that are packaged in to a security with a number of other similar mortgages originated by Canadian lenders. This financial innovation helped improve access to lower cost financing and put downward pressure on extremely high interest rates present during the early to mid-1980s. The government's guarantee protected investors, which helped to increase liquidity for mortgage loans, giving banks a new opportunity for generating profits. Instead of relying on an originate and hold model of lending, gaining income from interest payments, banks could now sell the mortgages for a fee after origination.

This new form of liquidity also helps to diminish the banks reliance on deposits as a financing source for new loans. Coupled with a convenient and simple form of collateral, it is clear to see why banks shifted a larger proportion of their lending to mortgages from business loans.

Why is this important? I argue that liquidity constraints for households fell after the changes made in 1986, as mortgage credit became more affordable and abundant. Therefore, what we should see in the data is that rising housing wealth in the pre-1986 period would have a significant positive effect on personal debt, while this effect should be fairly insignificant in the post 1986 period. In the meantime, due to rising collateral requirements on businesses, the need to find alternative sources of financing would cause many of these firms to turn to equity markets. Therefore stock wealth should begin rising more quickly in the post 1986 period than previously. With the expected return on stocks exceeding average interest rates especially with the run up of the stock market through the 1990s, rising stock wealth during the post 1986 period should have a positive effect on personal debt, while in the pre-1986 period it is likely that rising stock wealth may actually have a negative effect on personal debt. With interest rates being much higher, selling the stock to pay off a personal debt is a rational choice. With these features of the data in mind, a comparison of the data should be enlightening.

Table 9: Dependent Variable: Personal Loans Pre-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00792492		
	0.1885		
Personal Loans	0.50684	-0.0964721	0.0601466
	<0.00001	0.42278	0.58172
	***		
Stocks	0.0460977	-0.0159868	0.0532337
	0.13422	0.61071	0.08186
			*
Income	0.324024	0.140338	-0.130165
	0.12502	0.47676	0.53202
Res Struct	0.0166913	0.00369731	-0.0252
	0.71696	0.93306	0.57459
R-squared	0.422758	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Table 10: Dependent Variable: Personal Loans Post-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00722689		
	0.04405		
	**		
Personal Loans	0.00443729	-0.0121994	0.0918109
	0.93745	0.85837	0.10709
Stocks	0.392711	0.0259837	0.156205
	0.0004	0.81774	0.13181
	***		
Income	0.0358156	-0.0129993	-0.0324223
	0.10293	0.5421	0.11129
Res Struct	0.13379	0.303277	-0.335913
	0.65255	0.34936	0.24202
R-squared	0.376985	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Neither time period rejects the null hypothesis for Granger causality, so just like the model for the entire time series, the split does not improve its explanatory power. The post 1986 model nearly rejects the null hypothesis at the ten percent confidence level however. In either time period, only stocks hold any kind of explanatory value, where a one percent rise in stocks after 1986 leads to a 0.39 percent rise in personal loans in the next quarter. One implication of this result is that as stocks rise in value, households, investors or speculators can borrow against their rising securities as collateral for a margin account. The other implication is that rising stock wealth encourages households to increase their use of personal loans for consumption purposes. The following regressions for consumption will uncover which scenario is more likely.

Table 11: Dependent Variable: Consumption Pre-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00721275		
	0.03843		
	**		
Personal Loans	0.0120426	-0.0697149	0.0355763
	0.82716	0.26808	0.52908
Stocks	0.0339498	0.0217726	-0.000385537
	0.02804	0.15785	0.97859
	**		
Income	0.10178	-0.00241187	0.162062
	0.37348	0.98238	0.14751
Consumption	-0.0318614	0.233114	0.225105
	0.76893	0.03509	0.05037
		**	*
R-squared	0.313048	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Table 12: Dependent Variable: Consumption Post-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00683456		
	0.00072		
	***		
Personal Loans	-0.0145626	0.0179577	-0.0382481
	0.74751	0.70835	0.37857
Stocks	0.0318664	-0.00150938	-0.0106338
	0.00032	0.86627	0.2347
	***		
Income	0.353743	0.0638719	-0.129109
	0.00981	0.651	0.30117
	***		
Consumption	-0.185339	0.0939507	0.285965
	0.12448	0.44768	0.01613
			**
R-squared	0.390408	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

The model is a good fit at the ten percent level for Granger causality in the pre 1986

period but fails to reject the null hypothesis after 1986, though just barely. This makes it

difficult to make a strong conclusion regarding the effect of rising stock wealth on

personal loans and on consumption. If rising stock wealth is pushing up personal loans

for consumption purposes, we would expect personal loans to have a positive significant

effect on consumption which fails to be the case in both time periods. However, stocks do

have a positive effect on future consumption in both time periods, which implies from the

previous model for personal loans that as stocks rise, the subsequent increase in personal

lending is more likely being used to invest than to consume. A breakdown of the

components of consumption may make this clearer, with the expectation that stocks will

have a stronger effect on durable goods than non-durables if the rise in stocks is being

used for investment. Surprisingly, changes in income have an insignificant effect on

consumption before 1986, but have a strongly positive impact after 1986. This implies

that post 1986 consumption is more sensitive to shocks to income than previously.

Table 13: Dependent Variable: Durable Goods Pre-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.0352429		
	0.00696		
	***		
Personal Loans	0.340996	-0.208589	-0.0976895
	0.14673	0.42298	0.67175
Stocks	0.091876	0.115538	0.0162865
	0.14309	0.06928	0.79056
		*	
Income	0.0868067	-0.165466	-0.242481
	0.84401	0.68708	0.57621
Durable	-0.340996	-0.0121645	0.155974
	0.00363	0.92102	0.17469
	***		
R-squared	0.219928	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Table 14: Dependent Variable: Durable Goods Post-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00540581		
	0.1273		
Personal Loans	0.404544	0.0445049	0.13712
	0.0003	0.69603	0.18443
	***		
Stocks	0.0373527	-0.0296599	-0.0203467
	0.06342	0.13936	0.32225
	*		
Income	0.0805816	0.449512	-0.247505
	0.7878	0.15992	0.38545
Durable	0.0665455	0.0515748	-0.051329
	0.30478	0.44355	0.42498
R-squared	0.368075	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Before 1986 the model is a very poor fit for Granger causality, but the null hypothesis is rejected after 1986. The results for the post 1986 period shows that durable goods are heavily influenced by changes in personal loans and stocks, which implies that a large percentage of the change in personal loans is spent on durable goods. A one percent rise in loans leads to a 0.40 percent rise in durable goods. The poor fit for the pre 1986 period suggests that households are more dependent on personal loans to finance durable goods consumption than they have been in the past.

Table 15: Dependent Variable: Semi-Durable Goods Pre-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00765334		
	0.18245		
Personal Loans	0.166124	-0.113281	0.0413459
	0.10197	0.32505	0.69056
Stocks	0.08592	0.00587048	0.00813601
	0.00249	0.83806	0.76281
	***		
Income	0.284887	-0.087811	0.246109
	0.16913	0.64857	0.2172
Semi Dur	-0.183733	0.053802	0.0567445
	0.1151	0.64803	0.62091
R-squared	0.216672	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Table 16: Dependent Variable: Semi-Durable Goods Post-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.0053745		
	0.05513		
	*		
Personal Loans	-0.106489	0.0219137	-0.0378608
	0.20565	0.80841	0.6382
Stocks	0.0332373	0.013871	0.0101378
	0.03462	0.36822	0.51777
	**		
Income	0.462337	0.442507	-0.145645
	0.04666	0.08328	0.51761
	**	*	
Semi Dur	-0.315617	-0.1243	-0.00932792
	0.00636	0.2998	0.93374
	***		
R-squared	0.260155	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

The model for semi-durable goods cannot reject the null hypothesis for both time periods. As such it is difficult to infer causation from either set of result, although we can see that personal loans are no longer a relevant determinant of semi-durable goods consumption, but stocks continues to remain a significant predictor.

Table 17: Dependent Variable: Non-Durable Goods Pre-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.0106763		
	0.078		
	*		
Personal Loans	0.501942	-0.109534	0.0355867
	<0.00001	0.34855	0.73635
	***		
Stocks	0.0474042	-0.0148554	0.0440386
	0.09851	0.60732	0.10428
	*		
Income	0.414111	0.233468	-0.0850974
	0.04519	0.24556	0.68304
	**		
Non Dur	-0.0190625	-0.109833	-0.196213
	0.8983	0.45481	0.19191
R-squared	0.434014	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Table 18: Dependent Variable: Non-Durable Goods Post-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00589546		
	0.10455		
Personal Loans	0.408834	0.0222661	0.134882
	0.00032	0.84834	0.2018
	***		
Stocks	0.0347854	-0.0203074	-0.0228629
	0.09412	0.31288	0.2583
	*		
Income	0.184053	0.448007	-0.352688
	0.52804	0.17173	0.23756
Non Dur	0.00860321	0.0117067	0.0365786
	0.95181	0.93669	0.79963
R-squared	0.350786	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Non-durable goods on the other hand do display Granger causality in the pre 1986 period, but cannot reject the null hypothesis after 1986. Contrary to my expectations after analyzing the results of durable goods, personal loans actually have an even stronger effect on non-durable goods consumption than durable goods. It would be easy to jump to the conclusion that this is the result of increasing use of rewards based credit cards but their widespread use through the market was far greater after 1986 than before. Yet the coefficient for personal loans after 1 lag is larger before 1986. Furthermore, changes in income are only significant before 1986, which implies that non-durable goods consumption is less sensitive to shocks to income and debt than in the past.

Table 19: Dependent Variable: Services Pre-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00603077		
	0.07716		
	*		
Personal Loans	-0.0770431	0.0618176	-0.0393206
	0.13949	0.30025	0.4633
Stocks	0.00246511	0.0268702	-0.0195422
	0.86567	0.06465	0.15017
		*	
Income	0.224479	-0.0290728	0.269778
	0.02523	0.77614	0.01325
	**		**
Services	0.202732	0.0821584	0.0813996
	0.05908	0.44177	0.42691
	*		
R-squared	0.383655	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

Table 20: Dependent Variable: Services Post-1986

Regressor	Lag (1)	Lag (2)	Lag (3)
const	0.00505099		
	0.00967		
	***		
Personal Loans	0.00662204	0.0316233	-0.0440188
	0.87624	0.48286	0.27539
Stocks	0.0250392	-0.00652908	-0.00858993
	0.002	0.4134	0.28521
	***		
Income	0.11587	-0.0395045	0.088102
	0.33562	0.75845	0.43892
Services	-0.0606819	0.272033	0.277802
	0.57197	0.01095	0.01062
		**	**
R-squared	0.368199	Number of Obs	96

Significance level: *** 1%, ** 5%, * 10%

The model of services is a good fit for Granger causality at the five percent confidence level prior to 1986 and at the ten percent level after 1986. In both time periods personal loans at every lag do not cause a change in future service consumption. The coefficient for second lag of stocks of 0.026 before 1986, moved forward to the first lag after 1986, implying that service consumption is more sensitive to rises in stocks after three months rather than six. Put differently, short term changes in stocks are more likely to influence services after 1986 than before. Changes in income have little explanatory value after 1986, but were good predictors of future service consumption before 1986. The significant third lag shows a stronger savings behaviour before 1986, which is consistent with a falling Canadian savings rate since the late 1980s.

CHAPTER 6 - CONCLUSION

The results of my analysis make it difficult to conclude that liquidity constraints in Canada have played a significant role in the populations' ability to smooth consumption over time. Despite an environment of large liquidity constraints in the housing market before 1986 compared to what the average homeowner is accustomed to today, rising wealth does not play a significant role in the accumulation of personal debt as a tool to smooth consumption. However, this does not imply that personal loans are being under utilized by the Canadian population. In fact, particularly in durable goods consumption, personal loans play an increasingly important role in the domestic economy.

One feature of the results that rings true across almost all regressions is the importance of changes in stocks on the future of the dependent variables. Movements in the stock index are highly publicized by the media, often to exaggerated levels that may actually have a feedback effect that can make changes in the stock index more volatile than it would be in the absence of media attention. With the introduction of the internet, even more news on stocks is available in the post 1986 period than prior, and we can see the effect of changes in stocks having a generally stronger effect. So although the portfolio of most households is not fully exposed to changes in the stock index, it is generally seen as a leading indicator. If stocks are rising, households spend more, and if they are falling, households spend less, as they generally look at the stock market as an indicator of the future direction of the economy and their financial security. Corporations also report earnings quarterly, so it makes sense for there to be a significant one period lag on stocks,

as households cannot react to this news until the next quarter to change their purchasing or borrowing behaviour.

As liquidity constraints on extracting home equity have fallen, the average Canadian household has improved its ability to smooth consumption over time. By the same token, the Canadian economy is more sensitive to changes in the housing market than it was in the past. Financial authorities have identified this problem and have tightened down payment requirements and lowered the maximum loan to value ratio on home refinancing in an attempt to curb a surging housing market. Ultimately, the downward trend in interest rates since 1986 has led to a new expectation of the stable rate of interest. This could be an artefact of the Canadian government standing behind all mortgages included in mortgage backed securities portfolios. Without this guarantee, investor interest in Canadian mortgages would surely weaken and interest rates would be driven sharply higher. We can see this phenomenon playing out in the United States as the government continues to stand behind Fannie Mae and Freddie Mac despite being insolvent and their business model unviable.

Absent from my data analysis are the effects of age on the household wealth, debt and consumption decision. According to Statistics Canada's 2006 census, a baby boomer age bubble exists in Canada. The collective buying behaviour of this age cohort as they reached an appropriate age to purchase a home has helped to push the Canadian real-estate market higher over time. These households have been borrowing against this rising wealth mainly due to the expectation that house prices will continue their rise. What will

happen when these households retire on mass and need to liquidate their homes for cash to finance their consumption during retirement? If an insufficient number of younger households will exist to absorb this amount of housing stock on the market (which means prices will decline) much of the wealth these households expected will not exist anymore. So although the permanent income life-cycle hypothesis suggests that borrowing against rising wealth is a rational feature of consumption smoothing, when the wealth that was supposed to exist in the future disappears, Canadians will be forced to cut consumption, leading to a potential economic downturn.

APPENDIX A - AUGMENTED DICKEY FULLER TEST RESULTS

Includes one lag, constant and trend

Variable	Test Statistic: tau_ct(1)	P-value
Loans	-2.19873	0.4897
Residential Structures	-1.75614	0.726
Stocks (Lag 1)	-4.01586	0.00827
Stocks (Lag 4)	-3.62044	0.02806
Income	-0.102177	0.9949
Consumption	1.01796	0.9999
Durables	-0.311825	0.9904
Semi-Durables	0.603133	0.9995
Non-Durables	0.343831	0.9988
Services	1.13659	0.9999

Stocks at the 1st lag are stationary and will not be included in the cointegrating regression.

Stock data is not seasonally adjusted, so testing for a unit root at the 4th lag shows that stocks, like the other explanatory variables is also non-stationary at the 1% level.

Unit root test after first differences applied to variables

Variable	Test Statistic: tau_ct(1)	P-value
Loans	-6.71531	1.591e-008
Residential Structures	-8.48256	4.431e-014
Stocks (Lag 1)	-9.23704	8.009e-017
Income	-4.96584	0.0001
Consumption	-5.74276	4.737e-006
Durables	-9.92785	1.657e-019
Semi-Durables	-8.51045	3.539e-014
Non-Durables	-7.33484	2.526e-010
Services	-5.39753	2.785e-005

The above results confirm that all variables are now stationary.

APPENDIX B - GRANGER CAUSALITY ZERO RESTRICTION F-TESTS

All lags of d_l_Loans   F(3, 183) =   20.413 [0.0000]
All lags of d_l_Res_StrucF(3, 183) = 0.61053 [0.6090]
All lags of d_l_Stocks   F(3, 183) =   1.3696 [0.2535]
All lags of d_l_Income   F(3, 183) =   1.8246 [0.1442]
All vars, lag 3   F(4, 183) =   1.5562 [0.1879]

All lags of d_l_ConsumptiF(3, 183) =   8.3658 [0.0000]
All lags of d_l_Stocks   F(3, 183) =   6.2056 [0.0005]
All lags of d_l_Income   F(3, 183) =   2.4994 [0.0610]
All lags of d_l_Loans   F(3, 183) =   3.3415 [0.0205]
All vars, lag 3   F(4, 183) =   5.8925 [0.0002]

All lags of d_l_Stocks   F(3, 183) =   3.2668 [0.0226]
All lags of d_l_Income   F(3, 183) = 0.30963 [0.8184]
All lags of d_l_Loans   F(3, 183) =   2.353 [0.0737]
All lags of d_l_Durable F(3, 183) =   8.6486 [0.0000]
All vars, lag 3   F(4, 183) =   2.7031 [0.0320]

All lags of d_l_Stocks   F(3, 183) =   5.27 [0.0016]
All lags of d_l_Income   F(3, 183) =   5.1168 [0.0020]
All lags of d_l_Loans   F(3, 183) =   1.979 [0.1187]
All lags of d_l_Semi_Dur F(3, 183) =   2.6446 [0.0506]
All vars, lag 3   F(4, 183) =   1.5286 [0.1957]

All lags of d_l_Stocks   F(3, 183) =   2.1348 [0.0974]
All lags of d_l_Income   F(3, 183) =   7.7373 [0.0001]
All lags of d_l_Loans   F(3, 183) =   1.7081 [0.1669]
All lags of d_l_Non_Dur F(3, 183) =   2.4941 [0.0615]
All vars, lag 3   F(4, 183) =   2.1314 [0.0787]

All lags of d_l_Stocks   F(3, 183) =   2.1602 [0.0943]
All lags of d_l_Income   F(3, 183) =   8.0261 [0.0000]
All lags of d_l_Loans   F(3, 183) =   0.5575 [0.6437]
All lags of d_l_Services F(3, 183) =   6.8848 [0.0002]
All vars, lag 3   F(4, 183) =   5.1633 [0.0006]

All lags of ld_Personal_LF(3, 83) =   8.1995 [0.0001]
All lags of ld_Stocks_lg F(3, 83) =   1.6675 [0.1803]
All lags of ld_Income_lg F(3, 83) =   1.2096 [0.3114]
All lags of ld_Res_StructF(3, 83) = 0.20057 [0.8957]
All vars, lag 3   F(4, 83) = 0.90944 [0.4624]

All lags of ld_Res_StructF(3, 83) =   1.1869 [0.3198]
All lags of ld_Personal_LF(3, 83) =   8.3025 [0.0001]
All lags of ld_Stocks_lg F(3, 83) =   2.0979 [0.1067]
All lags of ld_Income_lg F(3, 83) = 0.63424 [0.5950]
All vars, lag 3   F(4, 83) =   1.8171 [0.1333]

All lags of ld_Personal_LF(3, 83) = 0.45491 [0.7145]
All lags of ld_Stocks_lg F(3, 83) =   2.9145 [0.0391]
All lags of ld_Income_lg F(3, 83) =   1.1188 [0.3463]
All lags of ld_ConsumptioF(3, 83) =   2.6501 [0.0541]
All vars, lag 3   F(4, 83) =   2.1462 [0.0823]

All lags of ld_Personal_LF(3, 83) = 0.31818 [0.8122]
All lags of ld_Stocks_lg F(3, 83) =   5.3591 [0.0020]
All lags of ld_Income_lg F(3, 83) =   2.8758 [0.0410]
All lags of ld_ConsumptioF(3, 83) =   3.0269 [0.0340]
All vars, lag 3   F(4, 83) =   1.8275 [0.1313]

All lags of ld_Personal_LF(3, 83) = 0.92747 [0.4313]
All lags of ld_Stocks_lg F(3, 83) =   2.4533 [0.0690]
All lags of ld_Income_lg F(3, 83) = 0.19389 [0.9003]
All lags of ld_Durable_lgF(3, 83) =   4.1437 [0.0087]
All vars, lag 3   F(4, 83) = 0.73315 [0.5719]

All lags of ld_Personal_LF(3, 83) =   0.6882 [0.5618]
All lags of ld_Stocks_lg F(3, 83) =   2.0624 [0.1115]
All lags of ld_Income_lg F(3, 83) = 0.63497 [0.5946]
All lags of ld_Durable_lgF(3, 83) =   4.7819 [0.0040]
All vars, lag 3   F(4, 83) =   2.9674 [0.0241]

All lags of ld_Personal_LF(3, 83) = 0.94728 [0.4217]
All lags of ld_Stocks_lg F(3, 83) =   3.5718 [0.0174]
All lags of ld_Income_lg F(3, 83) =   1.5069 [0.2188]
All lags of ld_Semi_Dur_lF(3, 83) =   1.1248 [0.3439]
All vars, lag 3   F(4, 83) = 0.62268 [0.6476]

All lags of ld_Personal_LF(3, 83) = 0.72977 [0.5371]
All lags of ld_Stocks_lg F(3, 83) =   2.0396 [0.1146]
All lags of ld_Income_lg F(3, 83) =   3.8836 [0.0119]
All lags of ld_Semi_Dur_lF(3, 83) =   2.6411 [0.0547]
All vars, lag 3   F(4, 83) = 0.28528 [0.8868]

All lags of ld_Personal_LF(3, 83) =   1.3747 [0.2562]
All lags of ld_Stocks_lg F(3, 83) =   3.1484 [0.0293]
All lags of ld_Income_lg F(3, 83) =   1.9919 [0.1215]
All lags of ld_Non_Dur_lgF(3, 83) =   2.2843 [0.0849]
All vars, lag 3   F(4, 83) =   3.3281 [0.0140]

All lags of ld_Personal_LF(3, 83) = 0.21081 [0.8886]
All lags of ld_Stocks_lg F(3, 83) = 0.38211 [0.7661]
All lags of ld_Income_lg F(3, 83) =   6.0829 [0.0009]
All lags of ld_Non_Dur_lgF(3, 83) =   1.1945 [0.3170]
All vars, lag 3   F(4, 83) =   1.4671 [0.2196]

F-tests of zero restrictions:
All lags of ld_Personal_LF(3, 83) = 0.85755 [0.4665]
All lags of ld_Stocks_lg F(3, 83) =   1.5815 [0.2000]
All lags of ld_Income_lg F(3, 83) =   4.8739 [0.0036]
All lags of ld_Services_IF(3, 83) =   2.3842 [0.0751]
All vars, lag 3   F(4, 83) =   2.5729 [0.0436]

F-tests of zero restrictions:
All lags of ld_Personal_LF(3, 83) = 0.46012 [0.7109]
All lags of ld_Stocks_lg F(3, 83) =   4.3031 [0.0071]
All lags of ld_Income_lg F(3, 83) = 0.64466 [0.5885]
All lags of ld_Services_IF(3, 83) =   4.5571 [0.0053]
All vars, lag 3   F(4, 83) =   2.4017 [0.0563]

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