RESEARCH ARTICLE

Analyzing Consumption Behavior-Through Habits and Precautionary Motives

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Abstract

This paper purposes to first compare and amalgamate existing literatures (both theoretical and empirical) on consumption patterns with respect to habit formation, precautionary motive, inter-temporal substitution motive and life cycle motive) and immigrant assimilation. Then, I use (combinations of) the best of these models to analyze the similarity (or the lack of) between the consumption patterns of immigrants and native born individuals while taking into consideration their similar/ dissimilar habit formation, precautionary motive, lifecycle motive and inter-temporal substitution motive. The paper is constructed as follows: it first provides applicable theories on immigrants and their impact on economies, habit formation (and its use in various topics), precautionary motive, and consumption (incorporating habits and prudence). This section culminates with the presentation of three testable models. The next section presents the econometric issues at hand: choice of functional form, choice of variables, construction of a quasi-panel, and method of estimation. This is then followed by a discussion of the regression results and concluding remarks.

Introduction

Today's economic realities necessitate conscious consideration for tomorrow and for the day after, be it in the form of wealth accumulation or (the perhaps less politically polarized notion of) consumption smoothing behavior.

Immigrants, however, may initially have rather dissimilar consumption smoothing behavior to that of native-born individuals, which, I argue, may predominantly be explained through the concepts of precautionary savings and habit formation. Over time, due to assimilation, this dissimilarity should diminish and in fact be non-existent. These immigrant specific behaviors may be attributed to factors such as poor integration into the credit/financial systems in the host country due to reluctance in reliance on such institutions because of preset notions carried forth from the home country, especially in the case of developing countries where financial/credit institutions are infested with fraud or are inaccessible at large.

Nevertheless, due to global technological, banking, and other advances, immigrants are progressively better able to maintain cultural and economic ties with families in their respective home countries. And as Galvez [1] points out, this ease of maintaining commerce and communication both within an immigrant group and with families abroad may contribute towards the formation of strengthened and insular networks that are separate from the host country's mainstream economy. This in turn may be reflected in the loosening up of stringent constraints placed on immigrants' consumption, such as poor integration into the credit/financial systems. Thus, one may take the previous hypothesis a step further and postulate that since dependence on financial/credit systems have become more common-place over the years and since improved technologies have enhanced financial security and made support from family and associates in home countries more accessible, the consumption smoothing behavior of recent cohorts should be more in synchrony with that of native-born individuals.

Theoretical Framework

Immigration and Impact on Host Economy

Disregarding political agendas associated with immigration laws, the foremost foci of immigration policy can be attributed to self-interest, i.e. the maximization of "national welfare", which encompasses the "welfare of the existing stock of [the host nation's] residents" and that of "potential immigrants" [2], and to

altruism, i.e. humanitarian concerns. Thus, the actions adopted by policymakers are governed by their slant on the labor market impact of immigration.

One important impact of immigration can be considered to be that on overall savings. If the inflow of immigrants into a host country is of a rather significant volume, then immigrants' saving behavior may have an adverse impact on the national saving rate, which may either bolster or restrict capital deepening in the economy. Therefore, through this perspective, the inflow of 'prudent' immigrants increases the welfare of the state.

Habit Formation

Habit formation has been scrutinized by various authors in a range of topics, and has been used to "improve the prediction of time-separable models ... where savings behavior under uncertainty and the income-fluctuation problem are the chief ingredients" [3]. The notion is simply that formed habits have a significant impact on consumption (or other) behaviors.

Precautionary Savings

Uncertainty ... causes some agents to behave as though they discount expected future earnings at a higher rate than the market rate of interest [4].

If this holds, then the presence of uncertainty creates welfare loss,[i] which is supportive of the argument for a precautionary motive. An individual with a relatively strong precautionary motive would tend to smooth consumption, perhaps excessively so. However, as Browning and Lusardi have cautioned in their paper, the presence of uncertainty not only induces precautionary savings but also presents the case for insurance. Therefore, a model that does not incorporate insurance, may not sufficiently identify the presence of a precautionary motive, for an individual with a precautionary motive may adopt a variety of actions to insure against a catastrophic income outcome.

"If moral hazard and adverse selection problems can be overcome or if someone (family, friends, or the government [through unemployment insurance], for example) provides a floor to consumption even in the event of bankruptcy then agents may borrow in the first period"[4].

Thus, though immigrants, since they face initial labor market uncertainties, may have a greater precautionary motive than the average comparable native-born, they may not necessarily hold higher precautionary savings if other alternatives are available. It would be of interest to decipher the various factors that induce the precautionary motive, and the relative impact these have on the magnitude of precautionary savings.

Consumption

Consumption choices made by households undoubtedly have growth consequences for the macro-economy. Browning and Lusardi have extensively proven how the CEQ (certainty equivalence) PIH (permanent income hypothesis) model may be misleading in the presence of any uncertainty and if individuals are prudent. Thus, in the next section, the standard additive model is described for it does not assume uncertainty and provides insight on the roles of other motives, besides the life-cycle and intertemporal substitution motives, in determining consumption smoothing behavior.

Standard Additive Model

This model relaxes the assumption of perfect certainty, however, the assumption of perfect capital market still holds.
The Euler equation under this model is given by:

$$vc(C_t, Z_t) = E_t\{\beta(1 + \tilde{r}_t)vc(C_{t+1}, Z_{t+1})\}$$

For ease of econometric analysis, and computability, this equation is rewritten in the following log-linear form:

$$\Delta ln C_t = \phi[ln(1 + r_t) + ln(\beta)] + \phi ln Z - \phi \ln(1 + \varepsilon_t)$$

Where $\phi = \frac{1}{\rho}$

The above model can be slightly varied to reflect habit formation, and precautionary motives along with the life cycle and inter-temporal substitution motives.

Adapted Model: Including Habit Formation

Due to data restrictions, since we only have observations across four time periods, in this paper habit formation is modeled such that current consumption is sensitive to consumption at time t-1, a habit reference level, instead of being sensitive to a weighted average of past consumption levels at times t-1, t-2, t-k. The Euler equation can be re-expressed, after accounting for habit formation, as:

$$\Delta \ln(C_t - \theta C_{t-1}) = \phi[\ln(1 + r_t) + \ln(\beta)] + \phi \ln \Delta Z_t - \phi \ln(1 + \varepsilon_t)$$

approximating $\Delta \ln(C_t - \theta C_{t-1})$ with $\Delta \ln C_t - \theta \Delta \ln C_{t-1}$
Now, if r is assumed to be constant and if T is considered to be large enough, then:

Model I

$$\Delta \ln(C_t) = \gamma_0 + \theta \Delta \ln(C_{t-1}) + \gamma_1 \Delta Z_t + e_t$$
Where:
$$\gamma_0 = \phi[\ln(1 + r_t) + \ln(\beta)]$$

Model II

$$\Delta \ln(C_t) = \phi[\ln(1 + r_t) + \ln(\beta)] + \theta \Delta \ln(C_{t-1}) + \phi \Delta Z_t - \phi \ln(1 + \varepsilon_t)$$

Adapted Model: Including Precautionary Motive

It is of interest to also use a model that incorporates precautionary motives for it can be reasoned that individuals, who exhibit disparate

$$\frac{1}{M} \sum_{i=1}^{M} GC_{it} + \mu_i = \frac{1}{\zeta}\left(\frac{r_i - \delta}{1 - r_i}\right) + \frac{\rho}{2}\left(\frac{1}{M} \sum_{i=1}^{M} GC_{it}^2\right) + \nu_i + \eta_i$$

where:
GC_{it}: growth in consumption of individual i at time t
M: number of periods in the sample
μ_i, ν_i: error terms associated with replacing expected values with their sample means
η_i: "taste shifter", i.e. shocks to marginal utility that change consumption growth

For econometric ease, the above can be written as:

Model III

$$avg(GC)_i = \frac{1}{\zeta}\left(\frac{r_i - \delta}{1 - r_i}\right) + \frac{\rho}{2} avg(GC^2)_i + \varepsilon_i$$

Methodology

This paper uses FAMEX (Survey of Family Expenditures, Statistics Canada). Since the models require panel data, a quasi-panel is created by grouping individuals by age (3 year bands), and therefore observing changes in the mean consumption of each cohort across time.[ii]

Method of Estimation

The Generalized Method of Moments (GMM) Estimator is a "broad class of estimators" that enables econometricians to formulate a model without presuming the presence of (or the lack thereof) correlation, and/or hetero scedasticity. Greene provides the following illustrative example of GMM for linear models:

For the class of linear models: $y_i = x_i'\beta + \varepsilon_i$, GMM estimation can be based on the orthogonality

$$\gamma_1 = \phi$$
$$e_t = -\phi \ln(1 + \varepsilon_t)$$

If the rate of return to savings (r) is allowed to vary across households and across time, then, we can obtain a model that observes all the same motives as MODEL I, and also incorporates the inter-temporal substitution motive.

levels of "prudence", will have disparate consumption smoothing behavior.
The strength of precautionary motive can be estimated from:

conditions: $E[z_i(y_i - x_i'\beta)] = 0$.

Since the models (of both habit formation and precautionary motive) are of the general form: $y_1 = Y_1 + X_1\gamma_1 + u_1$ where y_1 and Y_1, are both endogenous variables, of the order (Txl) and T x (G-1) respectively, a 2SLS is used to estimate the over-identified equation.

The matrix Y_i can be partitioned to give: $Y_1 = [y_2 \quad y_3 \quad \cdots \quad y_G]$, where each of the y's is a vector of order T x 1 such that:
$$y_2 = X\pi_2 + \upsilon_2,$$
$$y_3 = X\pi_3 + \upsilon_3,$$
.
$$\{V_1 = [\upsilon_2 \quad \upsilon_3 \quad \cdots \quad \upsilon_G]\}$$
.
$$y_G = X\pi_G + \upsilon_G.$$

where X is a (T x K) matrix, each of the π's represents a (K x l) vector of corresponding coefficients, and each of the υ's is a (T x 1) vector of the corresponding disturbances. In order to obtain consistent estimates of β_1 and γ_1, two successive applications of the ordinary least squares is conducted. In the first stage I estimate the reduced form equations for $y_2, y_3 \cdots y_G$ and calculate the fitted values of these variables:

$$\hat{Y}_1 = [X\hat{\pi}_2 \quad X\hat{\pi}_3 \quad \cdots \quad X\hat{\pi}_G] + \bar{V}_1$$

In the second stage I apply the least squares method to:

$$y_1 = \hat{V}_1 \beta_1 + X_1 \gamma_1 + u_1^*.$$
$$u_1^* = u_1 + \hat{V}_1 \beta_1$$

Results

Habit Formation

Immigrants

The second stage results of the different categories of country-of-origin enable some interesting conclusions. The coefficient of the habit formation instrument is -0.064 when the entire population is taken into consideration. It is -0.0780 for individuals born in Britain, US, NW Europe; -0.0684 for individuals born in Canada; -0.0815 for individuals not born in Canada, Britain, US or NW Europe, -0.0094[iii] for individuals not born in Canada, Britain, US, NW Europe or SE Europe; -0.0447 for individuals born in SE Europe. According to these estimates, all individuals, regardless of their origin, smooth their consumption based on previous consumption habits; however, for individuals from non-European and non-North American origins, prior consumption habits are insignificant to the current growth in consumption. This is contrary to my hypothesis; nevertheless, it makes another more viable point, especially when viewed in combination with other results (for example: coefficients of chfams and chinct). The magnitude of the impact of a change in family size is largest for the individuals from non-European and non-North American origins, and then for those from SE Europe and then for the British/American/NW European origins. Native-born Canadians experience the smallest impact of a change in family size on consumption growth. With regards to the impact of a change in income after tax, the pattern is quite the same: Canadians respond the least to a change in income while non-NW European and non-American respond with the largest change in consumption growth. Thus, from these results it can be said that it is not the continuance of a set pattern of consumption that is of importance to the immigrant population, instead, the consumption growth of immigrants is more sensitive to external factors.

Another interesting result is that within the group of non-American, non-British, non-Canadian, non-NW European individuals, SE Europeans have significantly lower growth in consumption relative to others within the group; Chinese and SE Asians have higher growth in consumption (though not significantly so) than others within the group. Among the non-European and non- North American individuals, SE Asians have significantly higher growth in consumption, and non-Asians have significantly lower growth in consumption than others within

this group. This may be attributed to a range of factors including the relatively large recent inflow of individuals from Asia that enables them to function in cultural based communities, thereby boosting their consumption over time, especially of goods and services provided by the specific community.

Women, Marital Status and Education

The second stage results of the non-specific (with respect to country of origin) also suggest that women and married individuals have lower consumption growth than their counterparts. Women from Canada, US, and NW Europe have greater consumption growth than their counterparts, while women from the other regions have lower consumption growth than men. This is reflective of the social structures among individuals/households from these countries, as women may be seen to take a sub-ordinate position to men among Canadians born in Asia, SE Europe, Africa and other non-American and non-NW European countries.

With regards to marital status, married individuals from Britain, US, Canada, NW Europe have higher growth in consumption, but those from other regions have lower growth in consumption compared to unmarried individuals from the same country-of-origin.

The consumption growth impacts of education are similar across the different regions of origin, with the exception of the impact of university degree being positive (though not very significant) for non-American, non-NW European, and non-British individuals.

Intertemporal Substitution Motive

None of the models reflect a significant impact of intertemporal substitution motive on consumption growth. This could easily be because of the unavailability of marginal (individual) tax rate, which I had substituted with the average tax rate.

Precautionary Motive

The prudence variables are insignificant for all the groups. This, however, may be due to a variety of econometric reasons rather than the true insignificance of prudence in consumption behavior. Squared consumption growth may not be a good indicator of risk especially since the panel is only for four years. Also, due to unavailability of appropriate indicators for

"industry" and assets, these variables have been

left out of the model. Furthermore, insurance and other means to avoiding catastrophic income outcomes need to be accounted for to obtain a sound model of prudence.

Conclusion

Through this paper, I have presented and analyzed the models and theories surrounding consumption-smoothing behavior of immigrants and native-born Canadians. I had commenced with the intention to prove the presence of stronger habits amongst immigrants under the assumption that they retain their consumption behavior that was influenced by the economic, cultural, and other factors of their home countries. However, the findings of this paper suggest that the consumption behavior of immigrants is mostly reactionary in nature, for it responds (relatively more than that of native-born Canadians) to economic, and other external factors that may infringe upon the regular consumption pattern assumed by these

individuals. This finding puts immigrants in a neither good nor bad light, for it reflects the relative flexibility in their behavior, thereby showing their willingness to adapt to a new socio-economic situation, but the higher volatility of their consumption is not entirely favorable to the host economy. This volatility in consumption can partly be explained through their reluctance in dependency on credit systems. For this reason it would have truly benefited this paper if a sound model of prudence were developed, as it would explicitly show how prudent individuals, depending on their country of origin, may use savings to accommodate for calamities. If immigrants exhibit greater levels of prudence, then one may conclude that it is not merely a fear of credit systems that create the excess sensitivity in immigrant consumption behavior. On the whole, my results suggest that habits allow for bettering the understanding of factors affecting the consumption-smoothing behavior of all individuals.

References

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[i] The argument of uncertainty creating welfare loss is based on the assumption of univariate risk aversion, constructed by Milton Friedman, which implies that when facing choices with comparable returns, agents tend to choose the less-risky alternatives.

[ii] Note that the time lag is 4 years.

[iii] NOTE: This coefficient is insignificant.