Credit Spending And Its
Implications for Recent U.S. Economic Growth

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Since the early 1990's, the United States has experienced the longest economic expansion in recorded history. From 1991 to 1999, real GDP has cumulatively increased 32.9 percent, averaging an annual growth rate of 3.6 percent (2000 *ERP*). The driving force behind the present expansion is consumption. Consumption, which is responsible for 75 percent of GDP, has increased 34.5 percent since 1991, with an average growth rate of 3.8 percent. More recently, from 1997 to 1998, consumption increased 5.3 percent (2000 *ERP*). What is fueling this increase in consumption? The answer is credit spending. Since 1991, disposable personal income (DPI) has increased at a slower rate than consumption has (Table 1). Therefore, people are spending money that is not readily available to them; in other words, they are spending on credit. In 1999, consumer credit outstanding[1] (CCO) was at $1325 billion, which is 22 percent of consumption expenditures and 20 percent of DPI. This is a cumulative increase in CCO of 68.5 percent since the last recession.

Table 1

	Percent Change from 1991-1999	Average Growth Rate from 1991-1999
Real GDP	32.9%	3.6%
Real Consumption	34.5%	3.8%
Real DPI	26.7%	3.0%
Real CCO	68.5%	7.6%

Source: 2000 *ERP*

What has caused this increase in credit spending? Because of the expansion, lenders and consumers have become too optimistic of the future. Put simply, consumers

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[1] Total revolving and nonrevolving consumer credit outstanding.

are spending money they don't yet have because lenders are lending it to them. It seems that credit spending is the newest fad, but it can only be sustained through a continuance of economic expansion.

The purpose of this paper is to examine how consumer spending and debt, particularly credit spending and debt, affect the economy. To illustrate the importance of this study, consider the scenario of a negative shock to the economy. If such a shock were to occur, such as a sudden, sharp decrease in the stock market, we could be headed for a recession. In the event of a shock, lenders would be unprepared for the losses and could not make good on their loans (an important point to consider, since loans today are becoming increasingly riskier as the economy progresses), consumers would not be able to obtain credit, which would lead to a dramatic decrease in consumption, and consumers would also not be able to pay off their outstanding debts. In short, a shock to the economy could result in a severe recession.

To examine the question of how consumption and credit spending affect the economy, I will conduct a study modeled after Ando and Modigliani's (1963) study on the Life-Cycle hypothesis of savings. Ando and Modigliani hypothesize that consumption is a function of present income, future income, and wealth. They found that marginal propensity to consume (MPC) out of income is 0.68 to 0.71, and the MPC out of wealth is about 0.07 to 0.08. I propose that although a correlation between wealth and consumption exists today, the relationship is indirect. I hypothesize that people consume on credit, but they obtain credit based on wealth and confidence in the economy. My study will compare my results to Ando and Modigliani's. I will also create a revised model to account for consumer confidence and credit spending in the economy, and I will

examine the future implications of these results.

II. Theory

The consumption function in this study is based on Modigliani's; however, there are several important changes I will make to the original model. As previously mentioned, Modigliani states that consumption is a function of DPI, wealth, and expected future income. In measuring expected future income, Modigliani used current DPI as a proxy. I, however, considered one of two assumptions for measuring expected future income:

1. Consumer credit outstanding as a proxy for expected future income

2. Current net worth as a proxy for expected future income.

People borrow based on their income, wealth, and expected future income; the credit obtained is used for consumption. I hypothesize that people spend on credit because they believe they can pay off the debt with future earnings. Therefore, I will use CCO as a proxy for expected future income. Although the second assumption is a viable option, the first better suits the purpose of this paper.

Because of data availability problems, Modigliani constructed data for net worth (NW). In my study, I will use quarterly NW data from the Federal Reserve.

Theoretical Model:

(1) $C = a_0 + a_1 DPI + a_2 DPI_{future} + a_3 NW$

(2) $CCO = b_0 + b_1 DPI + b_2 NW + b_3 i + b_4 consumer\ confidence$

Like Modigliani, I assert in my consumption model that people spend based on

how much income they earn, how much income they expect to earn, and their accumulated wealth. But recent studies have shown that the MPC out of wealth has decreased since Modigliani's 1963 study. Poterba (2000) found in his research that there may no longer even be a MPC out of wealth. I hypothesize that the MPC out of wealth is smaller today because there is a transitive relationship between consumption, net worth, and credit spending. There is still explicit consumption out of NW, but consumption overlaps credit spending. In other words, credit spending is a form of consumption, and people directly spend on credit based on their wealth. The higher a person's net worth, the more credit they can obtain and therefore, the more they can spend on credit. I hypothesize that the NW coefficient out of credit spending will be higher than that out of consumption.

In the consumer credit model, I assert that credit spending is a function of DPI, interest rates (i), NW, and consumer confidence. People obtain and spend on credit based on their incomes and, as mentioned before, their net worth. Credit spending is also a function of interest rates since they reflect the cost of borrowing. Finally, people spend on credit based on their confidence in the economy. Poterba (2000) contends that the recent rise in consumption may be attributed to pure confidence in the economy. If, for example, the stock market is going up, people assume the economy is doing well and will continue to do well in the near future. Today, the stock market accounts for "roughly one-quarter of household net worth" (Poterba 2000). When consumers feel optimistic about the economy, they borrow more on credit because they depend implicitly on their increasing wealth from stock returns. This is not to say that people spend in direct accordance with their returns on stocks, but the stock market is a good measure of

consumer confidence. In this model, I will use the DJIA as a proxy for consumer
confidence.

Table 2: Past Results/Future Expectations for Model Coefficients

	DPI	CCO	NW	i	DJIA
Modigliani (M)	a1 = 68% - 71%	N/A	a3 = 5% - 7%	N/A	N/A
C Hypothesis	a1 > M	a2 > 0	a3 < M	N/A	N/A
CCO Hypothesis	0 < M < b1	N/A	0 < a3 < b2	b3 > 0	b4 > 0

Table 2 reports Modigliani's results, as well as my expectations for the
coefficients of my model. In the equation C = f (DPI, NW, CCO), I hypothesize that all
the coefficients of the independent variables to be positive, although the coefficient for
NW will be smaller than the one in Modigliani's study. In the equation CCO = f (DPI,
NW, i, DJIA), I hypothesize that i will be the only independent variable with a negative
relationship to the dependent variable. I also hypothesize that the coefficient for NW in
the consumer credit function will be higher than the coefficient for NW in the
consumption function.

III. Empirical Analysis

To examine my hypothesis, I collected quarterly data from 1973.1 to 1999.2 for
nominal consumption expenditures and nominal disposable personal income (DPI) from
the St. Louis Federal Reserve (http://www.stls.frb.org). I also collected unpublished
quarterly nominal data for net worth (NW) from the Federal Reserve Board of Governors,
and I collected quarterly data for the Dow Jones Industrial Average (DJIA) and interest
rates (i) using the Bank Prime Loan Rates (www.economagic.com).

To show how the coefficients of DPI and NW have changed since Modigliani's studies, I ran an OLS regression of Modigliani's specification on the following equation:

(3) $C = f(DPI, NW)$

To determine what variables influence consumption and credit spending, I ran a two-stage-least-squares (2SLS) regression on the following equations:

(4) $C = f(DPI, NW, CCO)$

(5) $CCO = f(DPI, NW, i, DJIA)$

The purpose for running a 2SLS regression is to account for the simultaneity of NW and DPI, which are both determined by equations not specified in the model.

IV. Results

In this section, the results of the regressions are reported and discussed. These results are reported with two focal questions in mind: how my results compare to Modigliani's, and what my results imply with respect to my hypothesis.

Before running the regressions, I first checked for mulitcollinearity in the models. To do this, I ran a correlation matrix on the independent variables:

Table 3: Correlation Matrix

	CCO	DPI	NW	i	DJIA
CCO	1	0.98799	0.99177	-0.3099	0.92139
DPI	0.98799	1	0.99106	-0.3071	0.88542
NW	0.99177	0.99106	1	-0.316	0.93624
I	-0.3092	-0.3071	-0.316	1	-0.3416
DJIA	0.92139	0.88542	0.93624	-0.3416	1

The matrix shows that DPI and CCO, DPI and NW, DPI and DJIA, DJIA and CCO, DJIA and NW, and NW and CCO are all highly correlated. Mulitcollinearity is a very common problem with macroeconomic time series data. Modigliani's original consumption function also suffered from both mulitcollinearity and autocorrelation. A common solution to mulitcollinearity is to remove one of the correlated variables. But in order to examine the hypothesis of this paper, it is not possible to omit any of the variables. Therefore, the models are kept as they are.

This table reports the results of the consumption function of Modigliani's specification:

Table 4: C = f (DPI, NW)

	Coefficient	t Stat
Intercept	-27.15912	-2.581625
DPI	0.729664	45.78518
NW	0.037661	12.86899

Because this equation has a Durbin-Watson statistic of 0.31, it suffers from first degree serial correlation. To correct for this problem, I reran this equation using an AR(1) term.

Table 5: C = f (DPI, NW)

	Coefficient	t Stat
Intercept	133924.5	0.040568
DPI	0.328143	5.483024
NW	0.043141	4.266748
AR(1)	0.999851	245.7612

This regression has an R-squared of 99.98 and an F-statistic 298494.8. All the independent variables have the correct signs and are significant at the 0.05 level. These results show that the MPC out of DPI is 0.32, and the MPC out of NW is 0.043. Both the

coefficient for DPI and the coefficient for NW are significantly lower than when

Modigliani tested this model. This implies that while DPI and NW are still important

determinants of consumption, they are becoming increasingly less important. This is

consistent with recent studies, e.g. Poterba (2000).

Now that I have attempted to replicate Modigliani's specification, I will now

examine the revised consumption function. This regression was run using 2SLS, and the

instruments for this equation were DPI, NW, i, and DJIA.

Table 6: C = f (DPI, NW, CCO)

	Coefficient	t Stat
Intercept	-34.81635	-2.780998
DPI	0.664921	25.83640
NW	0.008179	0.934406
CCO	1.109246	3.661311

This regression had a Durbin-Watson statistic of 0.23, which means that this

equation also suffers from first degree serial correlation. To account for this problem, I

reran the regression using an AR(1) term. The results were as follows:

Table 7: C = f(DPI, NW, CCO)

	Coefficient	t Stat
Intercept	-38.15115	-2.2827
DPI	0.644947	17.9347
NW	-0.001453	-0.1128
CCO	1.466491	3.23415
AR(1)	0.086679	0.8724

This regression had an R-squared of 99.99, with an F-statistic of 24726.91. DPI

and CCO are significant variables at the 0.05 level and have the hypothesized signs, but

NW is not a statistically significant variable. The results show that the MPC out of DPI

is 0.64. This regression shows that, since Modigliani's study in 1963, NW is no longer an important determinant of consumption, as hypothesized. Because NW was not a statistically significant variable, this implies that Poterba's assertion that there is no longer an MPC out of wealth could be accurate. Finally, the coefficient of CCO is 1.47. This means that for every one dollar of credit obtained, consumption goes up $1.47! This is particularly relevant because this implies that credit spending is more important to consumption than DPI. This result is consistent with my hypothesis that, although income is still a determinant of consumption, credit spending is more important. Therefore, if credit spending dropped, it would have a significant impact on consumption.

Table 8: CCO = f (DPI, NW, i, DJIA)

	Coefficient	t Stat
Intercept	-3.836137	-0.303043
DPI	0.166048	4.015727
NW	-0.000509	-0.050648
I	-0.410185	-1.971955
DJIA	0.031661	2.778421

This regression has a Durbin-Watson statistic of 0.11, which means that this equation also suffers from first degree serial correlation. Again, to account for this, I reran the equation using an AR(1) variable.

Table 9: CCO = f (DPI, NW, i, DJIA)

	Coefficient	t Stat
Intercept	64525.88	0.007535
DPI	0.034098	0.983037
NW	0.015047	2.011614
I	0.574576	0.708569
DJIA	-0.006229	-1.308329
AR(1)	0.999923	97.21779

This regression has an R-squared of 99.93, with an F-statistic of 26501.63. Here, NW is the only variable that is significant at the 0.05 level. The coefficient for NW is 0.015. This implies that the MPC on credit out of wealth is 0.02. Thus, for every one dollar increase in NW, credit spending increases by $0.02. Although I hypothesized that the other variables would have some impact on CCO, the fact that NW is the only significant variable reinforces my hypothesis that people implicitly spend on credit when the stock market increases. When the stock market increases, consumers know their NW is increasing, and so they spend more on credit, although not necessarily proportionally.

V. Conclusion

The results of the regression show that although DPI continues to be a significant determinant of consumption, credit spending has taken the lead, at least for the years covered by this study. NW is less important, if important at all, to direct consumption today than at the time of Modigliani's study. Modigliani's study reported a seven to eight percent MPC out of NW; my study reports that where C = f (DPI, NW), the MPC out of NW today is about four percent. In the revised consumption function, which includes CCO, NW is not a significant variable. In the credit spending function, however, the

MPC on credit out of NW is about two percent. It appears that NW has the most impact on credit spending, but credit spending has the most impact on consumption.

I hypothesized that if a shock, such as a stock market crash, were to occur, credit availability and credit spending would decrease. My results prove that the presence of NW is a determinant of credit spending. Therefore, since people spent implicitly based on their increasing NW in the stock market, a crash would result in lowered net worth and less credit spending. Since NW fosters credit availability and spending, consumption would fall dramatically because NW would not increase and thus, there would be less desire to spend on credit. In this way, the economy could fall into severe recession. Perhaps a solution to this problem is a voluntary gradual decrease in credit spending. If consumers were to start cutting back gradually from credit spending now, the recession will be less severe than if the decrease in credit spending was a result of an economic shock.

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