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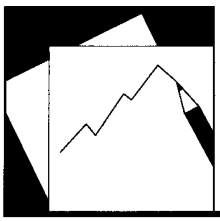

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After the Crisis: Lower Consumption Growth but Narrower Global Imbalances?

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After the Crisis: Lower Consumption Growth but Narrower Global Imbalances?

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Abstract

We estimate consumption dynamics in the G-7 economies, paying particular attention to the possibility of precautionary behavior in the face of uncertainty. We find that in the short run, continued income uncertainty will significantly dampen consumption growth. As such, consumption in the G-7 economies is unlikely to be the engine that revives global growth. Differences in the pace and timing of consumption moderation have implications for the evolution of global imbalances. With the U.S. experiencing a sharper rise in unemployment and, perhaps, more widespread loss of financial wealth than elsewhere in the G-7, the relative rise of the U.S. savings rate is helping narrow global imbalances. But with a likely earlier recovery in the U.S., this narrowing could be short-lived. Moreover, long-term differences—in economic and financial volatility and in demographic structures—have been an important source of the imbalances and could soon reassert their prominence.

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I. INTRODUCTION

In the recovery from this crisis, the evolution of private consumption is a matter of keen interest. This is not surprising. Private consumption constitutes the largest share of GDP. In the United States, private consumption has, in recent years, been 70 percent of GDP. Even in Germany, where savings rates are high, private consumption constitutes almost 60 percent of GDP. Moreover, consumption growth has implications for global trade and investment. As such, the pace at which consumption growth will revive is critical to the speed of GDP growth.

But there is a further, more subtle, interest. Prior to the onset of the crisis, there was considerable concern about widening global imbalances. The U.S. current account deficit had reached historically-high levels and this deficit was being financed by large German, Japanese, and Chinese surpluses. The risk that these balances would ultimately unwind in a disorderly manner was a source of considerable policy apprehension. In particular, if the sizeable required depreciation of the U.S. dollar were disorderly, the fear was that the global economy could be severely destabilized. Events took a different course and the crisis had other sources—in the U.S. housing bubble, subprime mortgage lending, the opacity of financial markets, and the inability of global banks to withstand the rapid discounting of their assets. While some would argue that the housing bubble reflected the tendency towards over-consumption that was mirrored in the U.S. current account deficit, the immediate response to the crisis was an appreciation, not depreciation, of the U.S. dollar. Nevertheless, although the crisis was not directly set off by the correction of global imbalances, the concern with such imbalances remains (see Feldstein, 2008).[2]

In this paper, we use an econometric specification of consumption growth in the so-called G-7 economies (Canada, France, Germany, Italy, Japan, the U.K, and the U.S.) to provide some quantitative sense of the likely effects. In particular, we project likely rates of consumption growth and we ask if these growth rates will differ in a manner that could help narrow global imbalances.

The empirical model of consumption growth used in this paper is guided by two observations regarding the behavior of savings, the complement of consumption. First, savings rates do vary within a country over time. This implies that the empirical model be capable of tracking the changes. But, second, despite the short-term changes, large differences persist across countries. Thus, while there has been much angst in the U.S. on account of its falling savings rates (for an early expression of this concern, see Summers and Carroll, 1987), the fact is that U.S. savings rates have been lower than those of Germany for nearly each of the last 40 years

[2] Writing after the rescue of Bear Stearns, a pivotal moment of this recent crisis, Feldstein (2008) highlighted the role of mortgage refinancing with equity withdrawal as central to an unsustainable run-up in consumption. He predicted an inevitable rise in U.S. household savings as access to and incentives for such refinancing were reversed along with a sharp decline in household wealth.

(Figure 1). Similarly, although recently falling, Japanese savings rates have also been traditionally high. Thus, any analysis must also incorporate the possibility that long-standing country factors are a source of continuing differences. While more difficult to isolate in a small sample of countries than variations over time, the differences across countries are, nevertheless, important to consider since they reflect deeper roots that reassert themselves regularly to influence the dynamics of consumption.

An innovation of this paper is to assess the influence of a country's economic volatility on consumption growth. While the role of uncertainty is widely recognized, its empirical significance is rarely examined. At this time, when uncertainty is particularly acute, that role can be quantitatively important. Carroll (1992) finds that the expectation of a rise in unemployment is a useful measure of uncertainty because it proxies the risk of a catastrophic fall in income. While we also use a similar measure, we add a more direct metric of volatility, the standard deviation of the forecast error of GDP growth. The premise is that when such variance is high, the future will be more uncertain and consumption growth will be dampened.[3]

The starting point of the analysis is, in principle, 1984 but due to missing data, the starting dates differ by country. The analysis ends in 2007. Because we use a panel structure for the analysis, the assumption is that all variables influence growth in the same way in all the countries. Differences in growth rates of consumption across countries are, therefore, a consequence of the differences in the variables that explain consumption growth. Robustness tests show that this is a good approximation for posing and answering the questions of policy interest.

Four main conclusions emerge. First, within a country, over time, two variables show a consistently clear influence on consumption growth. An increase in unemployment over the previous year is associated with significantly lower consumption growth, appearing to proxy not just for risk but also for expected future income. Higher GDP volatility is similarly associated with a sizeable reduction in consumption growth. These results are consistent with Carroll's (2001, p. 2) interpretation of Friedman's (1963) permanent income hypothesis.[4]

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[3] In principle, a rise in labor-income uncertainty reduces the *level* of consumption but raises its growth rate. However, where the uncertainty is revealed over time and consumption responds gradually, uncertainty will be associated with lower consumption growth. A fuller discussion is in footnote 4.

[4] The theory predicts that the precautionary motive induces the consumer to keep the level of consumption low out of the fear of an unfavorable income shock, particularly when her financial wealth is low (Carroll, 2001). The greater the uncertainty, the greater is the expected reduction in the level of consumption. The consumer's high precautionary saving in period t will result in a larger future wealth, adding to more rapid growth in consumption in period t+1 as the higher level of resources allows for a relaxation of the precautionary saving motive (see, for example, Carroll, 2001, p. 17). However, with partial-adjustment (habits) a rise in income uncertainty is associated with slower consumption growth, because it takes time for consumers to build up the buffer stock (see Carroll, 1992, in his discussion of his Table 7).

Households place a large emphasis on precautionary savings and the "permanent income" that guides their current spending is the expected level of income in the "very near-term."

Second, precautionary behavior is also implied by the finding that households tend to set target levels of wealth to act as buffers in bad times. Typically, however, the size of the annual consumption variation on this account is limited since wealth changes from one year to another are small. When, as now, the loss of financial wealth is substantial, the effects are evidently larger. Moreover, our results show that the cumulative differences in household wealth over time are a source of significant cross-country differences in consumption growth. As such, the current drop in wealth will likely have persistent effects.

Third, while short-term variations in financial markets' instability do not appear to influence the growth of consumption, countries with a greater long-term tendency for financial instability increase their consumption at a slower rate. Recently, Barro and Ursúa (2008) have emphasized the link between a greater likelihood of catastrophic risk and a higher level and variance of the equity premium. Weitzman (2008) also argues that where structural parameter uncertainty about bad events is high, a "fear factor" will generate a high and more volatile equity premium. Thus, we find that along with short-term economic risks reflected in rising unemployment and a more volatile GDP dynamic, a more volatile equity premium is, in the long run, associated with lower average consumption growth.

Finally, the demographic structure matters. Where the working-age population supports more dependents, both young and old, consumption growth is lower. Thus, differences in dependency rates are another source of long-term differences in consumption growth across countries.

With these empirical findings, we are in a position to return to the issues of policy interest posed at the outset. In the short-run, the high level of economic uncertainty will act as a significant dampener on growth. Since this is likely to happen everywhere, consumption in the G-7 economies is unlikely to be the engine that revives global growth. The differing pace and timing of consumption moderation has implications for the evolution of global imbalances. With the U.S. experiencing a sharper rise in unemployment and, perhaps, more widespread loss of financial wealth than elsewhere in the G-7, the relative rise of the U.S. savings rate is helping narrow global imbalances. But the findings of this paper also caution that with a likely earlier recovery in the U.S., this impact could be short-lived. Moreover, long-term differences—in economic and financial volatility and in demographic structures—have been an important source of the imbalances and could soon reassert their prominence.

II. PRECAUTIONARY BEHAVIOR

We estimate the following basic equation to evaluate the scope of precautionary behavior:

$$\Delta \ln c_t = \alpha_0 + \alpha_1 c_{t-1} + \alpha_2 \Delta \ln y_t + \alpha_3 \Delta UER_t + \alpha_4 V_t + \varepsilon_t .$$

The dependent variable, $\Delta ln c_t$, is the log change in real consumption. As in Gruber and Kamin (2008), we include c_{t-1}, lagged consumption as a share of disposable income. They see this as an "error correction" term, to allow for mean reversion. $\Delta \ln y_t$ is the log change in real disposable income. The two variables that are intended to assess precautionary behavior are ΔUER_t and V_t. ΔUER_t, the change in unemployment rate from the previous year, was used by Carroll (1992). He interpreted the variable primarily as reflecting the risks faced by households. Thus, when unemployment rises, the risk of being out of a job and, with it, the risk of a large decline in income increases. In the discussion following his paper, it was noted that when unemployment increases, expected future incomes also decrease, so that both the first and the second moment are affected. For our purpose, both interpretations are relevant.[5]

We include a more direct measure of macroeconomic volatility, V_t. This volatility in the macroeconomic outlook is measured by the standard deviation of the forecast error of real GDP growth as in Stock and Watson (2005). A "factor-structural" VAR (FSVAR) model is used to predict detrended GDP growth using own lags and lags of GDP growth in other countries. The standard deviation of the forecast error is the measure of volatility. Stock and Watson (2005) end their analysis in 2002. Using their methods, Carare and Mody (forthcoming) have extended the estimates to 2007. Figure 2 reports the trends in volatility so measured. The decline in volatility associated with the "Great Moderation" started in the 1960s, well before our sample period but, for some countries, notably the U.S., continued beyond 1984, when our sample begins. In other countries, Germany, for example, volatility had already reached relatively low levels by 1984. As is well-known, among G-7 economies, Japan did not experience the "Great Moderation," and its volatility remained relatively high. Importantly, however, Carare and Mody (forthcoming) find a tendency for volatility to rise again after the mid-1990s. The U.S. and Germany are examples where this rise is noticeable. Following the Stock and Watson (2005) methodology, Carare and Mody (forthcoming) conclude that even by 2007 (well before the current crisis emerged) countries' sensitivity to international spillovers was the source of the rise in volatility. This, we shall see, has had—and can be expected to continue to have—an important bearing on consumption growth.

Before presenting the results, a few more preliminaries are necessary. In the following sections, we follow Gruber and Kamin (2008) in the focus on G-7 economies. As they note, data for household wealth for other OECD countries is limited. However, for this section, where we do not yet introduce the effects of household wealth, we were able to pull together data for 9 other OECD countries (Australia, Austria, Belgium, Finland, Ireland, the Netherlands, Norway, Spain, and Sweden). The Data Appendix reports the sample periods for each country in our dataset. The additional countries help gain reassurance that the

[5] For the U.S., the University of Michigan's index of unemployment expectations provides an alternative measure of unemployment prospects. See Carroll and Slacalek (2009) estimate a consumption growth equation using as an explanatory variable the fraction of consumers who expect the unemployment rate to decline over the next year minus the fraction who expect it to increase.

finding of precautionary behavior is not just an artifact of our sample. Also, as is conventional, we test for robustness by dropping one country at a time to assess if a single country is driving the results.

Gruber and Kamin (2008) make an effort to use quarterly data, allowing them to run regressions for each country. For our purposes, we were not persuaded of the quality of quarterly data, especially of disposable income and household wealth. As such, we use annual data, which requires us to use panel data techniques. In doing so, we make the assumption the consumption growth function is the same for all countries, the differences arising entirely from the differences in the variables explaining consumption growth. The robustness tests of our specification, examination of the in-sample actual and predicted outcomes, and comparisons of our predictions with those of the IMF's *World Economic Outlook* (WEO), lead us to conclude that our results are a sensible approximation of the individual country dynamics.

Where a mean reversion term is used as an explanatory variable (c_{t-1}, lagged consumption as a share of disposable income) the concern is that it may be correlated with the error term. This concern arises in fixed effects models where the variables are measured as deviations from their means. To the extent that a shock in a particular year influences the mean, this may induce a correlation with the lagged dependent variable. However, econometric practice shows that where there are more than about 8 time-series values for each country, each shock makes a small contribution to the mean, reducing this concern. In our case, we have between 16 and 24 observations per country. There is also a concern about reverse causality from consumption to disposable income and unemployment. The only real instruments available to deal with this issue are the lagged values of the right-hand side variables. We experimented with these and obtained qualitatively similar results. But without strong evidence that these are valid instruments, in particular that they are uncorrelated with consumption growth, we have preferred to present the results without attempting to correct for the possibility of reverse causality. The implication is that the results should be interpreted as descriptive rather than as causal. In our writing, we have made an effort to keep this distinction in mind.

Table 1 presents the results for all the 16 countries: the G-7 and the additional 9 OECD countries. All regressions in this table have country and year fixed effects. The error correction term has a negative and significant sign, as is expected. This is not always the case in the more elaborate specifications reported below, especially those that incorporate the cross-sectional variation. But even there the sign is typically negative. A rise in the real disposable income is associated with increased consumption. The coefficient, in the range of 0.2, suggests a marginal propensity to consume of 20 percent, a number that Carroll (2001) considers consistent with the literature. However, the size of the coefficient and its significance does vary across specifications. We see that variation immediately when we introduce ΔUER, the change in the unemployment rate. This variable is always solidly statistically significant. A rise in unemployment is associated with a clear reduction in consumption growth. Because it reduces the size of the coefficient on the real disposable

income, it appears as if the rise in unemployment reduces income earning potential and, hence, lowers consumption growth. Also, as Carroll (1992) has emphasized, the tail risk of a substantial drop in earnings through unemployment increases with increasing unemployment, inducing increased savings.

Finally, we include V, GDP volatility, as an explanatory variable. A rise in volatility is associated with a decline in consumption growth and, as with ΔUER, this variable proves robust through the many specifications that we explore below. Together, then, the salience of ΔUER and V constitutes in our view the evidence in favor of precautionary behavior in our sample of countries. A rise in the unemployment rate by one percentage point reduces consumption growth by ¾ of a percentage point and a one percentage point increase in the standard deviation of the forecast error is associated with about 0.9 percentage point decrease in consumption growth. Of course, the forecast error does not typically increase by such a large magnitude in one year and there may also be some tendency for short-term overreaction to volatility. But following the onset of the crisis in 2008, both unemployment and volatility have increased, contributing significantly to reduce consumption, as we discuss below.

Table 2 presents the results for the G-7 and the non-G-7 economies separately. Also, while our main findings are based on annual data, we report the results based on 3-year averages to reduce the influence of short-term annual changes and capture longer-term influences. The short-term error correction effect is weaker in the non-G-7 economies and, as is reasonable, is weaker when 3-year averages are used (during which period, presumably, the short-term deviations have a greater chance of being ironed out). The income effect is also somewhat weaker in the non-G-7 economies and, in both cases, in the 3-year averages, suggesting that some of the annual income variations are viewed as temporary. In contrast, the effect of the change in unemployment actually rises in the 3-year averages. This could, of course, simply reflect reverse causality: over a three-year period, a decline in consumption is more likely to raise unemployment. However, it is not clear why a similar effect does not operate also for real disposable income, where we just noted that the relationship actually weakens. As such, the data at least raise the possibility that changes in unemployment are viewed as more permanent and hence have more persistent effect on consumption growth. Finally, the influence of V, is somewhat smaller in the non-G-7 economies but the effect is about the same in the annual and in the 3-year-averaged data.

Appendix Tables A and B report the basic regression when we drop one country at a time. Table A works with the full sample of 16 countries; table B is based on dropping one country at a time from the G-7 economies. The size of the coefficients changes somewhat, but the results are robust.[6]

[6] Similarly, when we drop one year at a time, we confirm that the results are not driven by any particular year.

III. WEALTH EFFECTS

Note first, that the real interest rate does not appear to matter. This is consistent with Campbell and Mankiw (1989) and, more recently, Carroll and Slacalek (2009).[7] Also when we introduce wealth in its different specifications, the results reported thus far retain their strength and significance.

For wealth, w_{t-1}, we follow Gruber and Kamin (2008) in using the lagged stock of households' net financial wealth relative to disposable income.[8] When this variable is introduced in the fixed-effects regression, it has the expected positive sign but it is not statistically significant. This is not surprising. Wealth does not typically change significantly from one year to another and consumers presumably respond with some lag to changes in wealth. Moreover, wealth may have non-linear effects.

One such non-linearity is implied by Carroll's (1992) buffer-stock model of savings. He posits that consumers set a target level of wealth that they can use in periods of adversity. Below that target, they forego consumption to build up their buffer; above the target, they feel more free to spend. Thus, in column 2 of Table 3, we introduce the square of wealth to examine this non-linearity. And, indeed, there is some indication that non-linear effects are present. The wealth term has a negative coefficient and the square term has a positive and significant coefficient. Figure 3a helps in analyzing the marginal effect of wealth from the fixed-effects regression. Above a ratio of wealth-to-disposable income of about 2½, close to the median of the ratios in the sample, a rise in wealth is associated with a rise in consumption growth; below that cut-off point, the marginal effect of wealth, by construction is negative, although it becomes less negative as wealth increases towards the threshold level. Thus, while supportive of the notion that consumption growth takes off only above a wealth threshold—and hence supportive of the buffer stock concept of precautionary saving—the sense of the picture is that the marginal effects are relatively flat and not statistically significant in much of the wealth range observed. Thus, short-term variations in wealth within a country do not appear to have a large effect.

When we repeat this exercise to allow for cross-sectional variations, using a random effects model, the wealth effect is much clearer and stronger. Here, the non-linear specification shows a much lower threshold, encompassing virtually the entire sample (Figure 3b). As such, a simple linear term suffices to capture the wealth effect: countries with larger household wealth experience more rapid consumption growth. Note one important change,

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[7] Keynes (1937, p. 219), with less refined econometric techniques at hand, came to a similar conclusion: "People's propensity to spend (as I call it) is influenced by many factors such as the distribution of income, their normal attitude to the future and—tho probably in a minor degree—by the rate of interest."

[8] Ideally, we would like to also have included household housing wealth. Data, however, is sparse. Slacalek (2006) or European Central Bank (2003), for example, provide data for a subsample for 1995 and 2000 only.

though, when we move from the fixed to the random effects specification. The coefficient on *V*, falls in half but remains highly significant. This is consistent with the suggestion made above that there may be some short-term overshooting in the response to volatility.[9]

IV. DOES FINANCIAL VOLATILITY MATTER?

With financial markets unusually volatile at times during 2008 and 2009, a question of particular interest is whether market volatility affects consumption behavior. If such an association exists, of further interest is whether it is complementary to the relationship between consumption growth and GDP volatility, or whether it subsumes that relationship. The relationship between stock market volatility and real economic activity has been highlighted recently by Bloom (2009), who also points out that stock market volatility is correlated with other measures of economic uncertainty. Bloom (2009) focuses on output and the demand for labor and capital. While recognizing the importance of the level of volatility, he identifies an important further role for the changes in (or "shocks" to) volatility. In our assessment of the relationship between consumption growth and stock market volatility, the level effect is captured in our regressions by the cross-sectional differences across countries, while the within-country dimension allows an assessment of the changes over time.

Column 1 in Table 4 adds as an explanatory variable the volatility of the domestic stock market, measured as the standard deviation of daily changes in the stock market index over a year for each year from 1984 to 2007. Market volatility appears to have no influence on consumption growth in this fixed effects regression. We tried a variety of different specifications, for example, excluding *V* and excluding the square of wealth, but stock market volatility never rises even close to significance in a fixed effects set up. It could be that, as Akerlof and Shiller (2009) have recently reminded us, financial markets are so volatile that their short-term variations within a country carry little information. Or, it could be, as Bloom (2009) finds that the effects of a change in market volatility are short-lived, and as such difficult to capture in annual data. Interestingly, stock market volatility does show more action in a random effects regression: thus even though much of the variation in market volatility is within-country over time, the long-term differences in the level of volatility averaged over a number of years tend to differentiate countries, with the more volatile exhibiting lower consumption growth.

These findings are consistent with Sandri's (2009) simulations of the consumption response to uncertainty shocks using a life-cycle model with portfolio choice. While an increase in labor income uncertainty leads to an immediate fall in consumption, higher stock market volatility needs to persist for a few years in order to have a substantial impact on

[9] In this section and in the rest of the paper, we do not report the results with the three-year averages. With 54 observations, the addition of extra variables eats into the already limited degrees of freedom. However, the results do remain very similar.

consumption. This is because higher volatility in stock returns reduces consumption only by depressing the portfolio interest rate (as consumers move their savings from high-return risky stocks into lower-return safer assets) and thus needs to be persistent before having a sizeable effect.

Weitzman (2008) suggests an intriguing possibility for the source of persistently high stock market volatility. He argues that consumer behavior reflects long-run perceptions of tail risks. Specifically, where consumers are more uncertain about structural parameters of the economic and financial systems, they are more likely to exhibit "fear" of tail risks. In turn, the greater such a fear, the higher will be the equity premium and stock market volatility, and lower will be the risk-free interest rate. Barro and Ursúa (2008) present a similar notion in terms of probabilities of "catastrophic events" experienced by the population. Presumably, the experience of catastrophic events induces greater parameter uncertainty. For 15 OECD countries, Barro and Ursúa (2008) estimates total average annual returns on stocks and their standard deviation for long time series, often starting in the late 19th century. They also estimate real returns on short-term treasury bills over the same long time horizon and construct the equity premium as a differential between real total stock returns and real treasury bill yields. There are gaps in the series: for Germany, for example, their sample starts in 1870 and excludes the seven years leading up to the hyperinflation of 1923, for which reliable data cannot be constructed; for France, the two years at the start of the Second World War are excluded. On the other hand, the U.S. and U.K. data cover the whole period from 1870.

Despite some of the limitations of this data, it shows interesting patterns, consistent with Weitzman's (2008) hypothesis (Figure 4). Over a long horizon, stock market volatility has been high in Germany and the equity premium correspondingly large. Risk free assets, on the other hand, such as treasury bills, have yielded low returns. Japan falls at the same end of the scale as Germany in these respects. The opposite has been true for the U.S.: historically low stock market volatility and a moderate equity premium have coincided with relatively high real returns on treasury bills. These data are consistent with the notion that facing greater parameter uncertainty or an impending sense of catastrophic risk, German and Japanese consumers are willing to accept relatively low risk-free returns; they are more skittish in their equity investments, which raises both the equity premium and the volatility of equity prices (and of the equity premium).

When we introduce the Barro and Ursúa (2008) measure of the long-run volatility of the equity premium in column 3 of Table 4, it soaks up the influence of our measure of the contemporary stock market volatility. In turn, long-run volatility is statistically significant in differentiating countries: greater volatility is associated with lower consumption growth. The implication is that the long run volatility of stock markets is a symptom of deep-rooted consumption behavior. Note also that with the introduction of this Barro and Ursúa (2008) index, the marginal influence of V is reduced, although it remains highly significant. It would

appear, therefore, that there are different sources of uncertainty and though they overlap somewhat, their independent effects are also noticeable.

V. Working-Age Population

The influences of demographic factors on savings are well understood. We ask if those influences are evident in our data. Moreover, we also ask if the demographic factors are so strong that they overwhelm the relationships reported above. To this end, we introduce two new variables: the share of the young population (those between the ages 0 and 14) and the share of the old population (those 65 or above). The presumption is that as either young or old dependents increase as a share of the population, a smaller proportion of the population has to work to support the dependents: this lowers standards of living and hence consumption growth rates. Table 5 reports the results.

Columns 1 and 2 report the fixed effects or within country results. As before, the interpretation is that these represent the short-term effects of the annual variations in the explanatory variables. An increase in both the young and the old population reduces consumption growth in the short run, with the young acting as more of a short-term break on consumption growth (possibly reflecting withdrawal of mothers from the workforce). However, the longer-term effects of a younger population—captured in the random effects model of columns 3 and 4—are more benign, although a larger share of the young continues to restrict consumption growth. The share of the older population also has less of an effect in the longer run but that longer-run effect is greater than the dampening of growth by the younger population.

We also explored the possibility that while an older population has a direct effect of lowering consumption growth, there may be indirect benefits. For example, where an older population benefits from social security arrangements, as it does to varying degrees in the G-7 countries, the buffeting due to higher GDP volatility is somewhat muted. And, indeed, the evidence in column 5 of Table 5 does point in that direction. However, while suggestive, we do not think that this is the place to form a definitive view on this matter. That would require a more careful differentiation by country in terms of the nature of old age security.

The lesson from this final exploration, then, is that demographic factors are clearly important but they do not negate the prior conclusions of this paper.

VI. Interpreting the Results

With this preparation, we are ready to reflect on the implications for the pace of recovery and the evolution of global imbalances. To do so, we use, first, column 4 of Table 5 as our summary regression to identify the key associates of consumption growth in Germany and Japan on the one hand and the U.S. on the other. Next we use the projections of the WEO on the right-hand side variables that it does project and assumptions about the evolution of V to

project consumption growth in the G-7 countries. The differential evolution of consumption growth helps gain a perspective on the likely trend in global imbalances.[10]

The left-hand panel of Figure 5 shows the actual consumption growth rates and those predicted by our model for Germany, Japan, and the U.S. The model does particularly well for Germany and the U.S., tracking consumption growth quite closely. In 2007, there was a significant deviation for Germany, since consumption had been spiked in 2006, anticipating the 2007 VAT hike: hence actual growth was much lower than predicted growth. For Japan, the model predicts generally anemic consumption growth, although in recent years actual growth, while still anemic, has been somewhat higher than that predicted. It is possible that as Japanese households accumulated financial wealth during this period, they responded with somewhat greater enthusiasm than the model predicts; also, possibly, the aging Japanese population has learnt to, over time, somewhat disregard its traditional high volatility—as discussed, the regressions suggest that this may well be more broadly true.

The right-hand side of Figure 5 decomposes consumption growth differentials relative to the G-7 average. Thus, in the construction of the right-hand panel, country differences in the explanatory variables from the G-7 averages were multiplied by the coefficients in column 4 of Table 5. The messages from this panel are clear. For Germany and Japan, consumption growth has been weighed down by relatively high (in Germany's case, recently rising) GDP volatility, by the factors that induce a greater "fear" of financial tail risks than in other countries (as reflected in the high long-term volatility of the equity premium), and by the aging population. Thus, while both Germany and Japan benefit in the demographic dimension because of a small share of the young, the large share of the old leads to a net negative demographic disadvantage. In Germany, low net financial wealth has also been a factor that has pulled growth down. The U.S. has benefited on all these counts. Thus, while U.S. consumption growth has stayed between 2½ and 3¼ percent a year since 1992, German and Japanese consumption growth rates have been mainly in the 0 to 2 percent range. The U.S. has had relatively low GDP volatility, although with its rise towards the end of the sample, that advantage has been eroded. The U.S. has also had low volatility of its equity premium and it has benefited in the net from its population structure since the share of its old is particularly low. Finally, U.S. households have also consumed at a higher rate because of the financial wealth they have accumulated.

In sum, then, there are quite powerful long-term forces that have differentiated the long-term differences in consumption growth, which are then mirrored in different savings rate and which then get reflected in global imbalances. It does appear, however, that in 2009 global imbalances will narrow as U.S. households increase their savings rates at a higher pace than

[10] This is admittedly a partial perspective on a larger question. It leaves out considerations of private investment and public savings and expenditures. We also do not consider China and the Middle East. The main claim of the paper is that consumption trends in the G-7 economies have significant short-term and long-term implications for the global imbalances.

elsewhere. What underlies these short-term developments and how do our results speak to the further dynamics of global imbalances?

Figure 6 helps with answering these questions. It projects consumption growth from 2008-2010 using our results and compares them to the WEO projection.[11] While we use the WEO estimates of the right-hand side variables where available, for V we assume that it is twice its 2007 value in 2008, 2¼ times its 2007 value in 2009, and 1¾ times its 2007 value in 2010. With that, once again, we find a reasonable correspondence between our projections of consumption growth and those of the WEO. In other words, the WEO's projections of the right-hand side variables and of consumption growth are broadly consistent with our empirical results.[12] The fit for the U.S. and Italy is particularly good. Elsewhere the match is less tight but the levels are within a reasonable range and the directional changes are almost always consistent. For Germany and Japan, the WEO projects generally weak consumption growth in 2009 and 2010 but our model predicts even lower growth.

The implications for consumption growth and its role in the global recovery are clear. U.S. consumption growth, which as noted has been in the 2½ to 4 percent range for almost two decades, will remain weak. After a shrinking of consumption in 2009, consumption growth is projected at 1¾ percent in 2010. Elsewhere also, consumption growth will remain below pre-crisis levels through 2010. In terms of our model, this immediate weakness is being generated by the rise in unemployment, our assessment that GDP volatility (though reduced from its 2009 levels) will remain high in 2010, and by the destruction of financial wealth.[13]

Writing in the context of the Great Depression, Keynes (1937) was quite clear that consumption was unlikely to lead a recovery. As long as, he argued, consumption bears some relatively stable relationship to income—and particularly if the share of consumption is falling—production for consumption that is not accompanied by investment will result in aggregate incomes that produce insufficient effective demand for consumption goods. But

[11] This as an illustrative exploration rather than an effort to forecast annual consumption growth or offer a comparison with the *World Economic Outlook* forecasts. We would not expect our model to be particularly good at forecasting annual consumption growth in the sense of capturing conjunctural effects and, hence, producing the best fit in out-of-sample forecast. Instead, our empirical results help explore how long-term forces might play out over the next few years.

[12] Given that the underlying change in change in log income in our model projections is the same as in the WEO, differences in projected savings rates mirror those in consumption growth projections.

[13] Carroll and Slacalek (2009) also project a similar consumption growth trajectory for the U.S. They highlight the role of unemployment uncertainty but emphasize also the consequences of the decline in housing wealth. They note, therefore, that their projections for consumption growth are lower than the consensus forecasts. Glick and Lansing (2009) point to the deleveraging of household balance sheets and the consequent need for a higher savings rate. To the extent that these authors highlight additional considerations, consumption growth may be even weaker than we project. However, Carroll and Slacalek (2009) suggest that there may be significant comovement in the drivers of consumption and a refined decomposition may not be feasible.

investment, he went on to note, was highly sensitive to a deep form of uncertainty. The factors that influence the rate of investment, he concluded, were "most unreliable" since they were "influenced by our views of the future about which we know so little" (p. 221). Thus, at a time when consumers are restrained by the uncertainties and fears that we have discussed in this paper, investors are likely to be all the more reluctant to step forward. Our claim that these processes may be working at the same time in all G-7 countries, though to varying degrees, implies that the synchronization puts a further dampener on the strength of the recovery.

Finally, global imbalances are narrower in 2009 because the U.S. has taken an earlier big hit on unemployment and possibly because more U.S. households held risky financial assets that have caused a more widely spread loss of financial wealth. In the countries on the other side of the global imbalances, the rise in unemployment has been slower due to the domestic structure of employer-employee relationships and public support to maintain employment. While U.S. unemployment is projected to rise further, that rise is expected to be relatively modest compared with the projected unemployment increase, especially in Germany. The German forecasts for consumption growth reflect that anticipated increase in unemployment. As such, if events were to develop in line with the projections, the implication is that the unwinding of the global imbalances could reverse quite quickly in 2010.

Beyond that, the longer-term forces will kick in again. The differences in the so-called "fear" factor and demographics are not easy to reverse. Note also, the same fear factor that increases the savings rate also causes households to invest their savings in low-risk, low-return assets. Thus, the irony is that while German and Japanese households have saved at high rates, they have not necessarily benefited from the process by accumulating large amounts of wealth. That, in turn, has further kept consumption growth low. At the same time, low domestic consumption growth rates have implied that growth had necessarily to emanate from exports to the global economy. But exports tend to be significantly more volatile than domestic consumption. So, in the search for growth, Japan has traditionally faced high volatility and German volatility increased as it tried to break out of its low-growth phase of the early 2000s. Once again, low consumption growth induces volatility in GDP growth, which reinforces the tendency for low consumption growth.

Thus altogether, having averted a financial meltdown, the global economy is faced with the prospect of a halting recovery in large part because consumption growth in the richest nations is likely to remain well below the rates experienced before the crisis. Moreover, this slower growth is not likely to produce a welcome dividend in the form of smaller global imbalances and hence the prospect of greater global financial stability. Even the short-term dynamics of global imbalances suggest that any narrowing could be quickly reversed. And, the longer-term forces remain potent drivers of these imbalances. The task of addressing global imbalances lies ahead: the results of this paper caution that it may be unrealistic to place the full burden of the adjustment on savings and consumption, and changes in investment behavior will also be required.

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DATA APPENDIX

Country	Time Period
G-7 Countries	
Canada	1984-2007
France	1984-2007
Germany	1992-2007
Italy	1984-2007
Japan	1984-2007
U.K.	1984-2007
U.S.	1984-2007
Non-G-7 Countries	
Austria	1996-2006
Belgium	1996-2006
Netherlands	1984-2006
Norway	1993-2007
Sweden	1994-2006
Finland	1984-2006
Ireland	2003-2006
Spain	2001-2006
Australia	1984-2007

DATA DEFINITIONS AND SOURCES

Real consumption growth	Annual log change in volume index for private final consumption. OECD's *Detailed Tables for Annual National Accounts*.
Real disposable income growth	Annual log change in net disposable income of households and nonprofit institutions. OECD's *Simplified Non-Financial National Accounts*. Earlier data for 1985-1995 for Japan and for 1985-1987 for the U.K. from Kamin and Gruber (2007). Deflated by consumer price index from the IMF's *International Finance Statistics*.
Household wealth	Financial net worth of households and nonprofit institutions. OECD's *Financial Annual Accounts*. Earlier data for France and Italy from 1985-1995 and for the U.K. from 1985-1987 from Kamin and Gruber (2007).
Real interest rates	Long-term interest rates as reported in the OECD's *Monthly Economic Indicators*.
Unemployment rate	OECD's *Monthly Economic Indicators*.
Share of working age population (15-64 years), young (0-14 years) and old (65+ years), in percent of total population.	World Bank's *World Development Indicators*.
Gross private national savings (percent of GDP)	Gross national savings excluding gross public savings. IMF's *World Economic Outlook*.
GDP Volatility	Standard Deviation of forecast error of a cross-country VAR regression of real GDP growth, as in Stock and Watson (2005), as extended by Carare and Mody (forthcoming).
Stock market volatility	Standard deviation of daily changes in Morgan Stanley stock market index over the period of one year. *Global Insight database*.
Equity premium volatility	Standard deviation of equity premium over T-bill returns. Table 5, Barro and Ursúa (2008).

Table 1. Precautionary Behavior

	Dependent Variable: Consumption Growth			
VARIABLES	(1)	(2)	(3)	(4)
Lagged consumption (share of disposable income)	-48.19***	-97.64***	-93.19***	-70.29***
	[-2.85]	[-5.71]	[-5.64]	[-4.24]
Real disposable income growth		0.29***	0.17***	0.12***
		[5.78]	[4.49]	[3.28]
Change in unemployment rate			-0.82***	-0.75***
			[-7.61]	[-7.20]
GDP volatility				-0.88***
				[-4.59]
Constant	6.56***	10.38***	9.96***	10.11***
	[4.66]	[7.28]	[7.19]	[7.42]
Observations	330	321	321	290
R-squared	0.361	0.473	0.593	0.610
Number of countries	18	18	18	16

Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Table 2. Consumption Growth in G-7 and Non-G-7 Countries:
1-Year and 3-Year Horizons

VARIABLES	1-Year Horizon		3-Year Horizon	
	G-7	Non-G-7	G-7	Non-G-7
	(1)	(2)	(3)	(4)
Lagged consumption (share of disposable income)	-70.02***	-34.81	-55.97**	0.59
	[-3.78]	[-0.87]	[-2.71]	[0.0084]
Real disposable income growth	0.15**	0.07	0.11	0.12
	[2.58]	[1.48]	[0.99]	[0.96]
Change in unemployment rate	-0.77***	-0.74***	-1.08***	-0.83**
	[-4.76]	[-4.51]	[-3.68]	[-2.38]
GDP volatility	-0.98***	-0.79*	-1.05***	-0.77
	[-4.59]	[-1.87]	[-3.99]	[-1.13]
Constant	10.08***	6.84*	8.82***	3.86
	[6.76]	[1.69]	[4.68]	[0.55]
Observations	160	130	55	47
R-squared	0.664	0.635	0.757	0.684
Number of countries	7	9	7	9

Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Table 3. Wealth Effects

VARIABLES	(1) Fixed Effects	(2) Fixed Effects	(3) Fixed Effects	(4) Random Effects	(5) Random Effects
Lagged consumption (share of disposable income)	-58.19**	-49.28*	-55.48**	-15.22	-14.35
	[-2.27]	[-1.98]	[-2.23]	[-0.72]	[-0.68]
Real disposable income growth	0.13*	0.17**	0.16**	0.21***	0.20***
	[1.82]	[2.30]	[2.24]	[2.98]	[2.90]
Change in unemployment rate	-0.73***	-0.83***	-0.82***	-0.66***	-0.62***
	[-4.36]	[-4.97]	[-4.91]	[-3.67]	[-3.39]
GDP volatility	-1.09***	-1.01***	-0.99***	-0.49***	-0.51***
	[-4.67]	[-4.40]	[-4.25]	[-3.74]	[-3.99]
Long-term real interest rate	0.06	0.09			
	[0.68]	[1.12]			
Lagged household wealth (share of disposable income)	0.17	-2.81***	-2.60**	-0.56	0.63***
	[0.54]	[-2.67]	[-2.56]	[-0.79]	[4.52]
Lagged household wealth squared		0.49***	0.47***	0.24*	
		[3.25]	[3.24]	[1.78]	
Constant	9.03***	11.43***	12.14***	5.30***	3.97***
	[4.43]	[5.36]	[5.93]	[3.03]	[2.61]
Observations	154	154	154	154	154
R-squared	0.669	0.691	0.688	0.605	0.596
Number of countries	7	7	7	7	7

Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Table 4. Does Financial Volatility Matter?—G-7 Economies

VARIABLES	(1) Fixed Effects	(2) Random Effects	(3) Random Effects
Lagged consumption (share of disposable income)	-56.62**	-21.99	-48.24**
	[-2.33]	[-1.02]	[-2.18]
Real disposable income growth	0.17**	0.19***	0.13*
	[2.28]	[2.82]	[1.89]
Change in unemployment rate	-0.86***	-0.60***	-0.64***
	[-5.27]	[-3.26]	[-3.65]
GDP volatility	-0.96***	-0.54***	-0.40***
	[-4.23]	[-4.28]	[-3.39]
Lagged household wealth (share of disposable income)	-2.92***	0.61***	0.59***
	[-2.89]	[4.40]	[3.94]
Lagged household wealth squared	0.52***		
	[3.63]		
Standard deviation of daily MS Stock Market Index growth	0.57	-0.66*	-0.10
	[1.46]	[-1.65]	[-0.21]
Equity premium volatility			-7.94***
			[-3.45]
Constant	12.06***	5.25***	8.47***
	[6.10]	[3.18]	[4.89]
Observations	154	154	154
R-squared	0.695	0.593	0.622
Number of countries	7	7	7

Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Table 5. Working Age Population

VARIABLES	(1) Fixed Effects	(2) Fixed Effects	(3) Random Effects	(4) Random Effects	(5) Random Effects
Lagged consumption (share of disposable income)	-91.81***	-93.83***	2.05	-16.22	-36.00*
	[-3.75]	[-3.62]	[0.10]	[-0.78]	[-1.86]
Real disposable income growth	0.18**	0.12*	0.09	0.10	0.15**
	[2.37]	[1.73]	[1.31]	[1.41]	[2.22]
Change in unemployment rate	-0.87***	-0.74***	-0.80***	-0.75***	-0.73***
	[-5.82]	[-4.84]	[-5.15]	[-4.66]	[-4.60]
GDP volatility	-1.00***	-1.08***	-0.69***	-0.69***	-3.12***
	[-3.72]	[-3.50]	[-4.75]	[-4.74]	[-4.32]
Lagged household wealth (share of disposable income)	-3.31***	0.45	0.48***	0.51***	0.39**
	[-3.17]	[1.25]	[3.62]	[3.60]	[2.55]
Lagged household wealth squared	0.63***				
	[4.19]				
Population 65+ years (in percent of total population)	-0.42***	-0.35**	-0.32***	-0.34***	-0.68***
	[-3.83]	[-2.60]	[-5.14]	[-5.38]	[-6.46]
Population 0-14 years (in percent of total population)	-0.70***	-0.58***	-0.09	-0.20**	-0.36***
	[-5.23]	[-3.84]	[-1.43]	[-2.22]	[-4.29]
Equity premium volatility				-5.77**	-12.44***
				[-2.05]	[-4.01]
Volatility * population 65+					1.60***
					[3.32]
Constant	35.38***	28.11***	9.18***	14.28***	26.60***
	[7.97]	[5.76]	[3.87]	[4.01]	[6.65]
Observations	154	154	154	154	154
R-squared	0.742	0.707	0.721	0.730	0.746
Number of countries	7	7	7	7	7

Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Appendix Tables

Appendix Table A. Robustness to Full Country Sample

VARIABLES	(1) All Included	(2) Excl. Australia	(3) Excl. Austria	(4) Excl. Belgium	(5) Excl. Canada	(6) Excl. Finland	(7) Excl. France	(8) Excl. Germany	(9) Excl. Ireland
Lagged consumption (share of disposable income)	-70.29***	-77.20***	-69.07***	-70.04***	-73.25***	-90.62***	-69.22***	-74.37***	-70.11***
	[-4.24]	[-4.74]	[-4.14]	[-4.19]	[-4.33]	[-5.22]	[-3.35]	[-4.49]	[-4.24]
Real disposable income growth	0.12***	0.13***	0.12***	0.12***	0.11***	0.14***	0.12***	0.11***	0.12***
	[3.28]	[3.47]	[3.16]	[3.13]	[2.87]	[3.63]	[3.13]	[3.10]	[3.23]
Change in unemployment rate	-0.75***	-0.78***	-0.75***	-0.76***	-0.77***	-0.71***	-0.74***	-0.76***	-0.76***
	[-7.20]	[-7.33]	[-7.14]	[-7.19]	[-7.27]	[-5.80]	[-6.54]	[-7.29]	[-7.35]
GDP volatility	-0.88***	-0.75***	-0.88***	-0.88***	-0.83***	-0.96***	-0.89***	-0.78***	-0.86***
	[-4.59]	[-3.71]	[-4.60]	[-4.55]	[-3.85]	[-4.86]	[-4.23]	[-3.93]	[-4.49]
Constant	10.11***	10.54***	10.10***	10.15***	10.07***	11.66***	10.23***	10.29***	9.98***
	[7.42]	[8.11]	[7.34]	[7.41]	[7.39]	[8.63]	[6.50]	[7.59]	[7.33]
Observations	290	266	279	279	266	267	266	274	286
R-squared	0.610	0.629	0.614	0.610	0.603	0.563	0.603	0.618	0.619
Number of countries	16	15	15	15	15	15	15	15	15

Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Appendix Table A. Robustness to Full Country Sample (concluded)

VARIABLES	(10) Excl. Italy	(11) Excl. Japan	(12) Excl. Netherlands	(13) Excl. Norway	(14) Excl. Spain	(15) Excl. Sweden	(16) Excl. U.K.	(17) Excl. U.S.
Lagged consumption (share of disposable income)	-48.80**	-72.84***	-48.88***	-71.28***	-70.40***	-70.13***	-73.53***	-70.31***
	[-2.49]	[-4.21]	[-3.00]	[-4.23]	[-4.25]	[-4.13]	[-4.09]	[-4.16]
Real disposable income growth	0.13***	0.13***	0.11***	0.13***	0.12***	0.13***	0.14***	0.10***
	[3.20]	[3.25]	[2.80]	[2.94]	[3.28]	[3.40]	[3.46]	[2.76]
Change in unemployment rate	-0.81***	-0.70***	-0.73***	-0.73***	-0.75***	-0.76***	-0.70***	-0.75***
	[-7.54]	[-6.25]	[-7.10]	[-6.57]	[-7.17]	[-7.26]	[-6.37]	[-7.02]
GDP volatility	-0.87***	-0.92***	-1.01***	-0.88***	-0.88***	-0.88***	-0.88***	-0.97***
	[-4.58]	[-3.92]	[-5.58]	[-4.56]	[-4.59]	[-4.56]	[-4.50]	[-4.63]
Constant	8.26***	10.55***	8.72***	10.11***	10.12***	10.08***	10.41***	10.15***
	[4.90]	[6.73]	[6.34]	[7.23]	[7.42]	[7.21]	[6.96]	[7.47]
Observations	266	266	267	275	284	277	266	266
R-squared	0.627	0.604	0.644	0.622	0.610	0.616	0.610	0.619
Number of countries	15	15	15	15	15	15	15	15

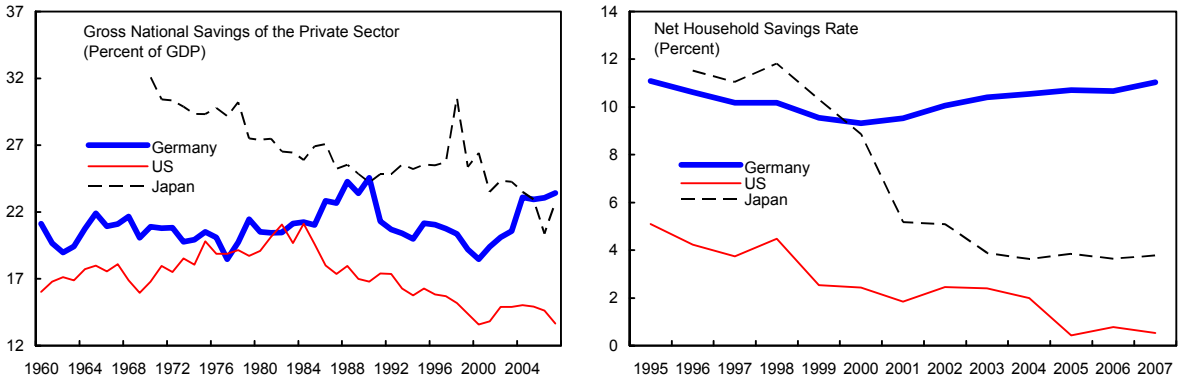
Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Appendix Table B. Robustness to G-7 Country Sample

VARIABLES	(1) All Included	(2) Excl. Canada	(3) Excl. France	(4) Excl. Germany	(5) Excl. Italy	(6) Excl. Japan	(7) Excl. U.K.	(8) Excl. U.S.
Lagged consumption (share of disposable income)	-70.02***	-74.08***	-52.14	-75.28***	-34.37	-83.49***	-89.19***	-70.13***
	[-3.78]	[-4.00]	[-1.54]	[-4.06]	[-1.53]	[-3.62]	[-5.02]	[-3.82]
Real disposable income growth	0.15**	0.11*	0.13**	0.13**	0.18***	0.21***	0.24***	0.10
	[2.58]	[1.69]	[2.03]	[2.23]	[2.92]	[2.95]	[4.02]	[1.56]
Change in unemployment rate	-0.77***	-0.84***	-0.74***	-0.81***	-0.95***	-0.66***	-0.56***	-0.79***
	[-4.76]	[-4.51]	[-3.95]	[-4.61]	[-5.76]	[-3.85]	[-3.63]	[-4.33]
GDP volatility	-0.98***	-0.82***	-1.08***	-0.85***	-1.07***	-1.28***	-0.90***	-1.11***
	[-4.59]	[-2.97]	[-4.16]	[-4.02]	[-5.43]	[-4.21]	[-4.18]	[-4.74]
Constant	10.08***	9.70***	9.29***	10.31***	7.35***	11.92***	11.34***	9.96***
	[6.76]	[6.72]	[3.98]	[6.98]	[3.98]	[5.84]	[7.83]	[6.73]
Observations	160	136	136	144	136	136	136	136
R-squared	0.664	0.656	0.656	0.678	0.732	0.678	0.674	0.687
Number of countries	7	6	6	6	6	6	6	6

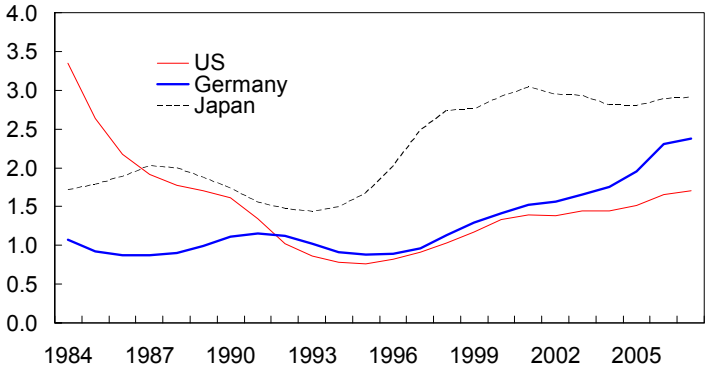
Robust t-statistics in brackets.
*** p<0.01, ** p<0.05, * p<0.1
Coefficients for country and year dummies not reported.

Figure 1: Long-Term Differences in Savings Rates



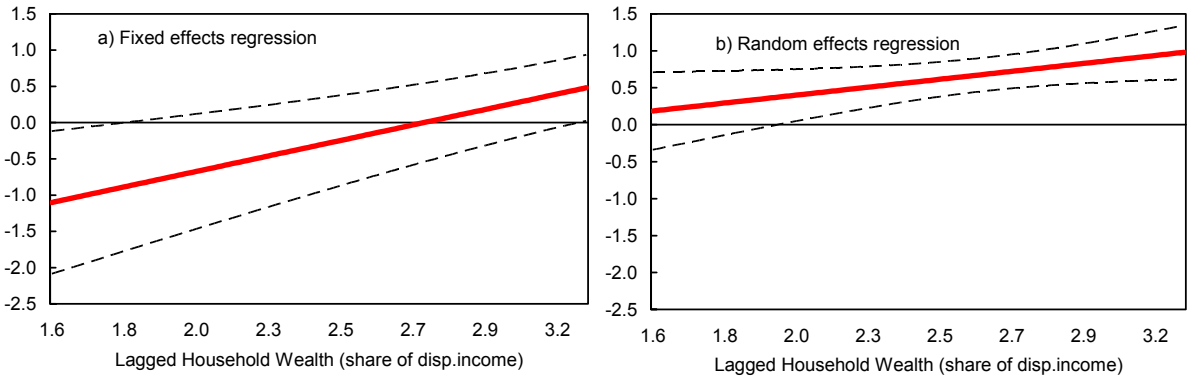
Source: OECD, World Economic Outlook.
Note: Data on household savings rates only available from 1995.

Figure 2. Volatility: Standard Deviation of GDP Growth
(Standard deviation of forecast error of GDP growth)



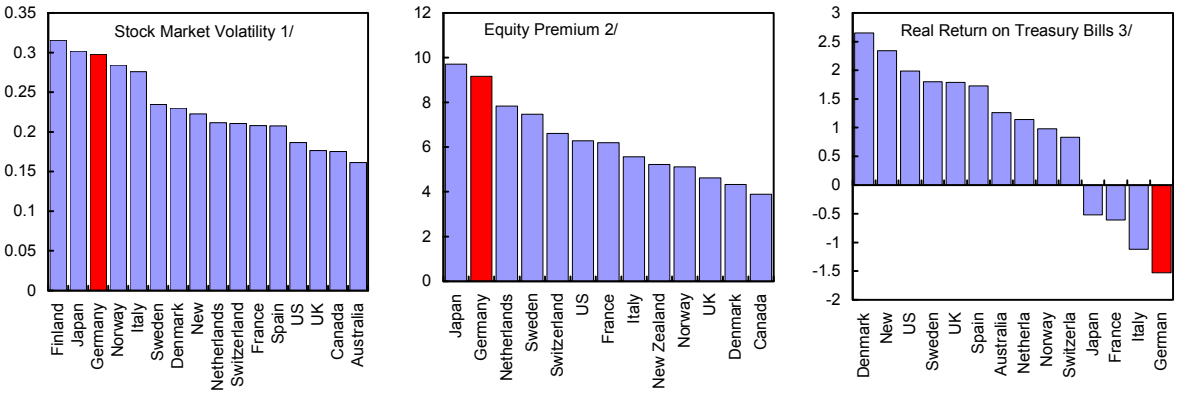
Source: Carare and Mody (forthcoming).

Figure 3. Effective Coefficient on Volatility in Panel Regression on Log Change in Real Consumption



Source: Authors' estimates.
Note: Dashed lines show 95 percent confidence interval of effective coefficient estimate.

Figure 4. Long-Run Equity Premium, Real Treasury Bill Yields, and Stock Market Volatility
(Percent)



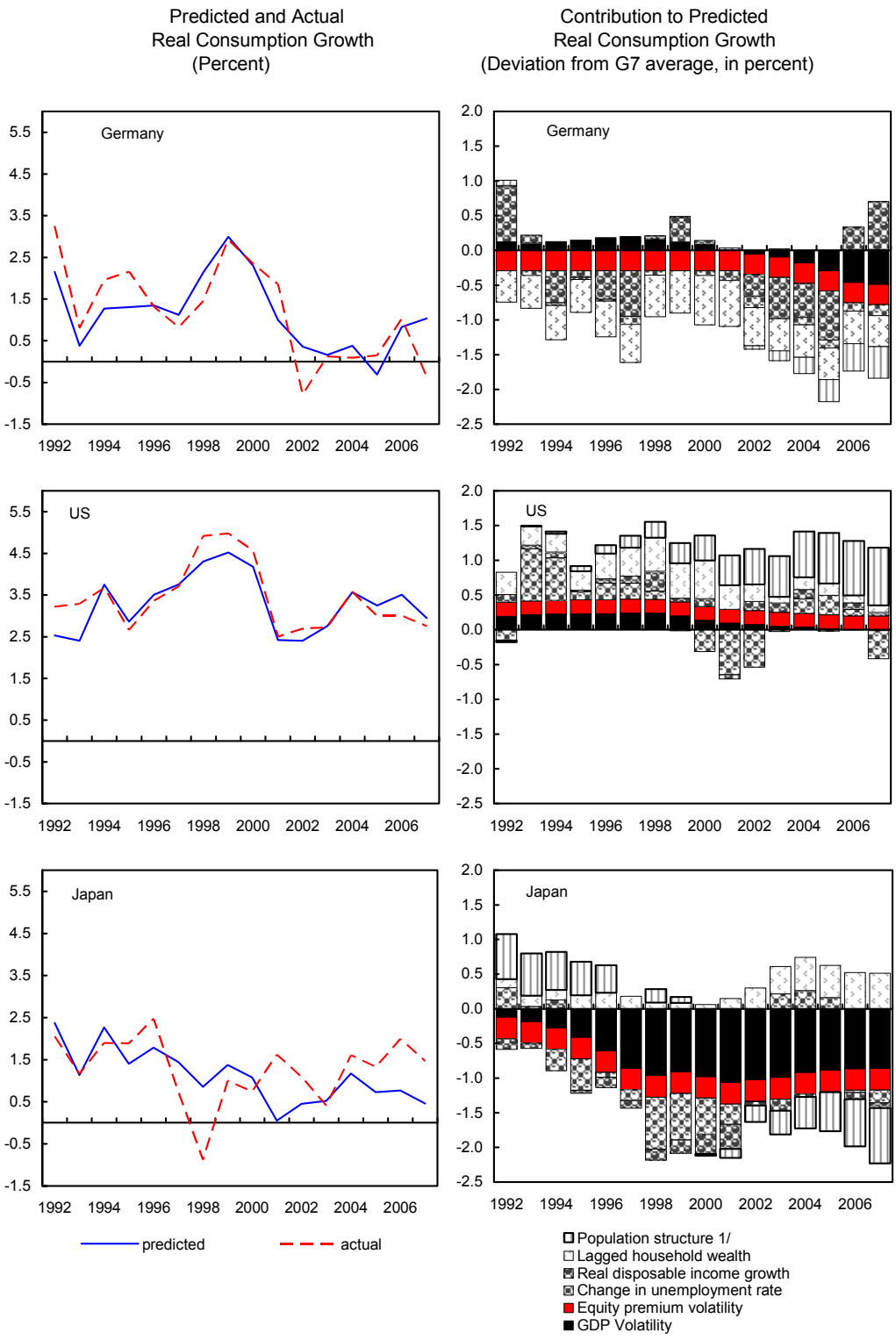
Source: Barro (2008); and authors' calculations.

1/ Defined as standard deviation of stock market rate of return, starting in 1870-1927 depending on the country and ending in 2006 (Table 5 of Barro and Ursúa, 2008).

2/ Defined as difference between average rate of return on stock market index and treasury bills (Table 5 of Barro and Ursúa, 2008).

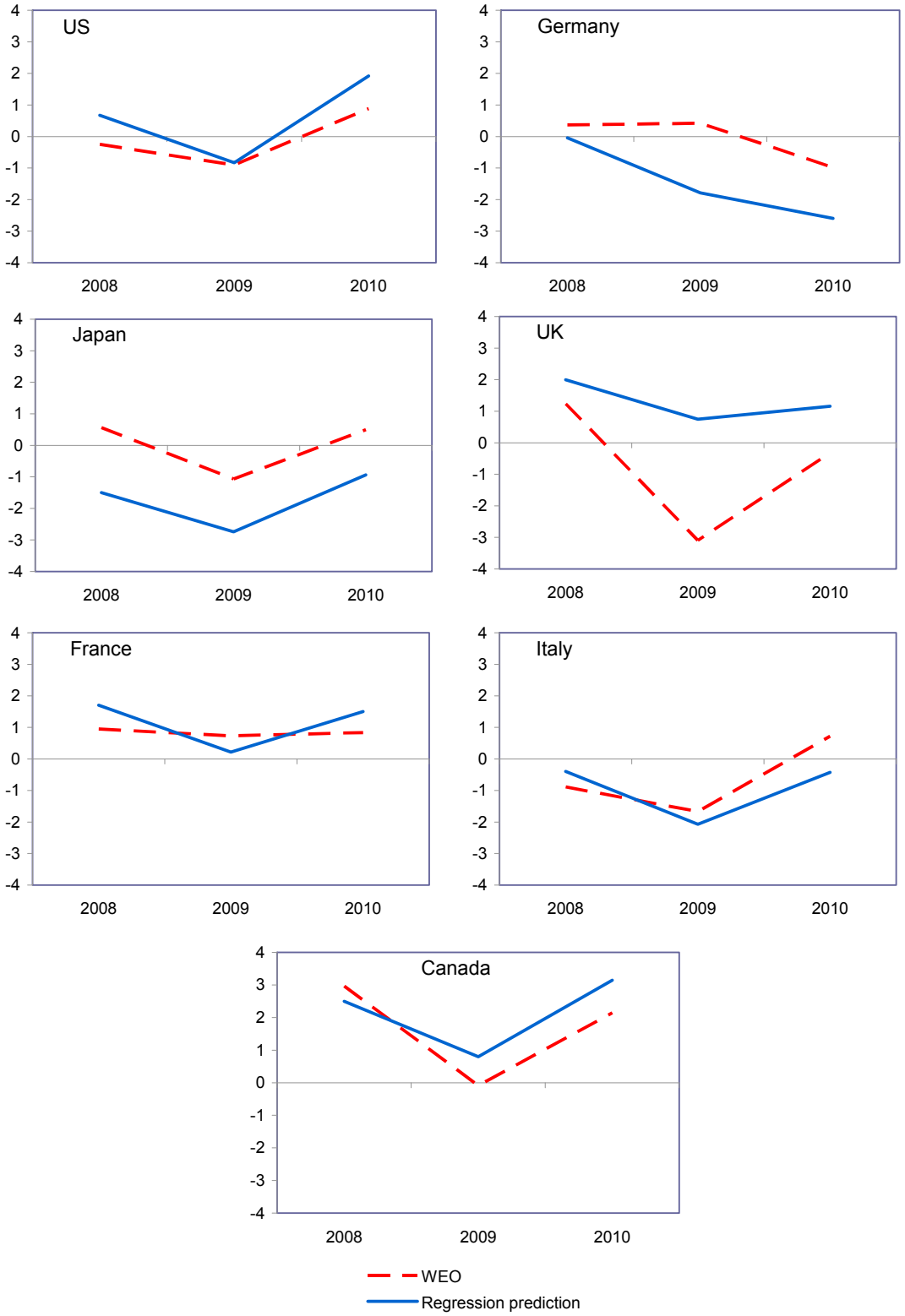
3/ Defined as average bond rate of return, starting in 1870 depending on the country and ending in 2006 (Table 5 of Barro and Ursúa, 2008).

Figure 5. Random Effects Regression: Real Consumption Growth
(Percent)



Source: Authors' estimates.
1/ Combined contribution of population 65+ years and population 0-14 years.

Figure 6. Projections of Real Consumption Growth
(Percent)



Sources: World Economic Outlook October 2009 (WEO); and authors' estimates.