Changes in the Income Distribution and Aggregate Consumption*

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April 30, 2012

1 Introduction

Since the late 1970s there has been a remarkable and persistent increase in wage inequality in the US and other industrialized countries. Researchers have also documented an increase in the dispersion of individual earnings, household (pooled) earnings, household disposable income, and (less consistently) consumption. Some of the changes in inequality are exogenous and reflect transformations in labor markets and institutions, while others are endogenous and reflect individual and household behavioral responses to such changes in terms of labor supply, asset accumulation, and participation in government insurance programs. The first goal of this paper is to discuss what we know about the effect of shifts in the distribution of income on aggregate consumption. We focus in particular on changes in inequality, volatility, and expectations, and highlight the pervasive role of heterogeneity. Our second goal is to assess the role of changes in the income distribution in explaining the joint evolution of aggregate consumption and income over the Great Recession.

2 Income Inequality and Aggregate Consumption

To set the stage for the discussion, we start with some well-known facts. The left panel of Figure 1, taken from Heathcote, Perri and Violante (2010), uses CPS data and shows that the variance of log hourly wages of males increased by about 16 points between 1980 and 2005. The variance of log hourly wages of females experienced similar trends. The right panel of Figure 1 shows that the variance of (logged) household disposable income (CPS data from Heathcote, Perri and Violante, 2010) increased by about 10 points between 1980 and 2005 (after peaking in the mid-1990s). In the same panel we also plot two different measures of inequality in nondurable consumption, one based on CEX data on disposable income and reported savings (Aguiar and Bils, 2011), and one based on CEX spending data (Heathcote, Perri and Violante, 2010). While both series suggest an increase in consumption inequality, they differ substantially.

*This paper has been prepared for the “Federal Reserve Academic Consultants Meeting on Household Heterogeneity and Aggregate Consumer Spending”, to be held on May 14, 2012, in Washington, D.C. The authors are affiliated with Stanford University, EIEF, NBER and CEPR; and Stanford University, respectively.

1 The most frequent explanations for the rise in wage inequality is skill biased technical changes coupled with the demand for high skills outpacing supply (due to educational slowdowns, Goldin and Katz, 2008). Other explanations include the adverse effect of international trade, low-skill immigration, the declining value of the minimum wage, changing norms regarding pay setting, and the decline of unions.

2 Was the rise in inequality coming from the rich getting richer or the poor losing ground? During the 1980s inequality increased due to wages (and income) at the top growing faster than in the middle, which in turn grew faster than at the bottom of the distribution. Since the early 1990s, however, most of the increase in inequality has stemmed primarily from the top quantiles growing very fast, while the distance between the middle and the bottom has, if anything, declined.
in terms of growth rates, highlighting important measurement issues on which the literature is currently debating. We will touch on this debate in the conclusions.

![Figure 1: Inequality in Hourly Wages, Disposable Income, and Consumption.](image)

Does the rise in inequality matter for aggregate consumption? This question has fascinated economists for a long time. It has also important policy implications: Do redistributive policies stimulate the economy, mitigate market imperfections, and increase social equity? The obvious case in which distributional issues don’t matter for aggregate consumption is when consumption responses are homogenous across consumers.\(^3\) To see this with a trivial example, suppose that there is a 1% mean-preserving (transitory) redistribution of resources from poor to rich consumers, which generates an increase in inequality in disposable income. If poor and rich have the same propensities to consume, however, such redistribution has no effect on aggregate consumption. The poor will reduce their consumption by MPC% (where MPC is the marginal propensity to consume) and the rich will increase it by the same amount, leaving aggregate consumption unchanged.

It follows that for inequality to have some non-trivial effects on aggregate consumption, we need propensities to consume to be heterogeneous across consumers (or, equivalently, non-linear response of consumption to income and/or wealth).\(^4\) There are of course many theoretical reasons to expect heterogeneous propensities to consume. First, borrowing constraints. Consumers who are subject to liquidity constraints would like to consume more (for example because they expect positive growth in their future income) but they have no access to credit and hence set consumption equal to their disposable income. It follows that an extra dollar given to them has a larger measured propensity to consume than an extra dollar given to the unconstrained. Second, precautionary savings. Carroll and Kimball (1996) argue that when prudent

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\(^3\)The focus on heterogeneity was present in the early studies looking at this question. Kaldor (1957) assumed that workers consume everything they have while profit makers save some of their profits for future capital accumulation. Pasinetti (1962) translated this idea into marginal propensities to consume declining with the level of income. In Friedman (1957) and Modigliani-Ando (1963), saving is instead a constant fraction of permanent (or lifetime) income, hence effectively eliminating any importance of distributional effects.

\(^4\)This is a result that goes back to Gorman (1953) who gave the conditions under which a representative agent could exist – i.e., linear Engel curves. Complete markets, i.e., full insurance of resource shocks, deliver identical implications, regardless of functional forms.
consumers are faced with uncertainty (and hence have a precautionary motive for saving), the consumption function is strictly concave, so that the poor’s marginal propensity to consume is greater than the rich’s. Intuitively, the concavity of the consumption function induced by precautionary saving resembles the effect of liquidity constraints. An individual who is consuming hand-to-mouth will increase spending one-for-one if given additional income (i.e., a propensity to consume of 1), unless the income increase were so large as to make the liquidity constraint no longer binding (i.e., a propensity to consume less than one). An individual who sacrifices his current consumption for precautionary reasons will respond to an additional unit of wealth in a way that depends on how rich he is to start with. Poor consumers live on the edge of (precautionary) fear and hence an extra unit of wealth exerts a stronger effect, while rich consumers have plenty of resources to smooth consumption and hence have smaller consumption responses. Third, bequest motives for saving. Bequest are typically modeled as being a concave function of permanent income ("luxury" goods). Hence, when permanent income increases by $1, the poor mostly consume it, while the rich mostly save it for bequests.\footnote{Besides these more traditional explanations, there are other theories implying a link between inequality and aggregate consumption. Consider "social interaction effects". The rise in income inequality of the last three decades allowed households in the top quintiles of the income distribution to increase their consumption strongly. Due to keeping-up-with-the-Joneses (or status-maintaining) effects, a rise in the level of consumption of rich households may have led to more spending also by the non-rich (despite their stagnating incomes and thanks to easier access to debt induced by lower interest rates, increased financial markets sophistication, etc.). See Bertrand and Morse (2011) for this “trickle-down consumption” theory. De Giorgi, Frederiksen and Pistaferri (2012) use Danish data to estimate a model with consumption network effects. They use their estimates (and network formation structure) and consider the aggregate implications of an exogenous 1% increase in consumption for each household in the top decile of the consumption distribution. They find that social interactions increase the effect on aggregate consumption of such particular policy from 0.20% to 0.21%, i.e., a (small) 7% increase relative to the case of no network effects.} Note that these theories all predict that low-income and low-wealth households are, in general, more responsive to changes in their resources than high-income and high-wealth households. Hence, these theories predict that redistributive policies could be expansionary (unless incentive distortions are severe).

What does the empirical evidence say about the link between inequality and aggregate consumption? Some studies use macro data to look directly at the link, and regress aggregate consumption on measures of income inequality using cross-country data. Most of these studies fail to find a statistically significant and economically convincing effect. For example, Schmidt-Hebbel and Servén (2000) find little evidence that inequality affects saving or consumption, while Cook (1995) finds a positive but small effect. Blinder (1975) uses time series data for the US and also finds little evidence in support of the link. However, for a single country there is very little variability in inequality statistics (distributions shift very slowly). In general, it is hard to learn much from aggregate studies due to reverse causality issues, small sample sizes, collinearity problems, etc.

At the micro-level, two types of studies are of interest for our purposes. As said earlier, a necessary condition for income distribution to matter in explaining movements in aggregate consumption is that the response of consumption to changes in resources differ across consumers. Some studies use non-experimental data and assess whether propensities to consume are indeed heterogeneous, and in what direction the heterogeneity goes. Dynan, Skinner and Zeldes (2004) show that the rich have higher propensities to save (hence, lower propensities to consume) relative to current income. This is predicted, however, by a simple saving-for-a-rainy day model (Campbell, 1987). If income is temporarily high, it means that consumers expect it to revert to the mean (i.e., to go down in the future) and hence save in anticipation of that event. The intriguing finding of their study is that the MPS of the rich is higher than the poor’s also with respect to lifetime income measures (for which they use various proxies). In particular, they regress the $(S/Y)$ ratio against quintiles of the income distribution (instrumented with permanent income indicators such as edu-
tion), and find that the saving ratio increases with the position in the income distribution. Using a different empirical approach, Banks, Blundell and Lewbel (1997) find important non-linearities in Engel curves for various consumption goods. Finally, Blundell, Pistaferri and Preston (2008) find that consumers with low education and low initial wealth (two standard markers for low socio-economic status) have larger responses to both transitory and permanent disposable income shocks.

Other papers use quasi-experimental changes in income induced by tax rebates and related policies to study how household consumption responds to exogenous (mostly temporary) income changes. These policies sometimes reduce inequality (in the absence of severe moral hazard responses) by targeting low-income consumers. They may affect aggregate consumption if there are large consumption responses among transfer recipients. These are more likely to occur if the transfers are perceived as permanent (independently of credit market imperfections), or if consumers face liquidity constraints (independently of the persistence of the income change). In the latter case, even a temporary tax rebate policy may be highly effective if appropriately targeted.\footnote{Traditional consumption theory states that consumers do not respond to transitory shocks such as one-shot stimulus package interventions, but only to changes in their permanent income. See Taylor (2011) for a recent discussion. Oh and Reis (2011) argue that targeted transfers may affect aggregate consumption both because of a neoclassical wealth effect and because of heterogeneity in MPCs.} One issue to consider, however, is that heterogeneity in consumption responses to a certain tax policy needs not be a “fixed effect”. That is, it is not obvious that a certain type of heterogeneity found in response to a given stimulus will be replicated by a different type of stimulus (if conditions, such as the nature of the recession, change). Hence, it is not clear that one should “target” stimulus to the groups where large responses were found in certain occasions, because they may be little responsive in different occasions (or vice versa). To give an example, consider that during recessions induced by financial crises the mass of liquidity constrained individuals increases to include households who (in “normal” recessions) would have relatively easy access to credit. Hence, the same type of individuals may be highly responsive to a tax rebate offered during a liquidity-driven recession but little responsive during, say, a technology-driven recession. Similarly, in the recent Great Recession a debt overhang may have led many consumers to use tax rebates to pay off debts rather than spend. The same consumers could have been more responsive to tax rebates in previous recessions.

Table 1 summarizes qualitatively findings from a number of research papers documenting heterogeneity in marginal propensities to consume/income elasticities in the US (the full list of papers and findings from these papers can be found in the Appendix). There are a number of observations that emerge from the table. First, at least some of the papers document a U-shaped response of consumption to transitory changes both in income and assets. Hence, both the very poor (in terms of income and assets) and the very rich seem to have large consumption responses. While the result for the poor is somewhat expected, for the rich is more surprising. Explanations for the large response among the rich vary, including: mental accounting; the fact that some people keep their assets in very illiquid form (such as housing), an explanation put forward by Kaplan and Violante (2011); and inattention (Reis, 2006), namely the fact that the cost of processing information may make it optimal to revise consumption plans only if the unanticipated amount is large enough relative to income and wealth (and tax rebates are typically small in size). One caveat is that it is not clear that this effect would survive when looking at other, larger changes to resources – including negative changes (where one could study whether asymmetric effects are important). Finally, there are very large standard errors suggesting heterogeneity within groups. A second important finding from many studies is that MPCs are increasing monotonically with age, a result predicted by a simple life-cycle model without...
a bequest motives. Third, there seems to be a monotonically decreasing MPC and elasticity in income and wealth with respect to permanent changes in household resources (such as fundamental tax reforms of the type induced by the 1986 TRA, for example). Finally, there is a state dependence issue. First, the amount of debt households hold at the moment of receiving a tax rebate plays a crucial role in affecting what they do with the rebate money. To get rid of high interest payments, households with a high level of debt may decide to de-leverage instead of going on a spending binge. This is seen both in the cross-section (with low income households more likely to de-leverage than high income households, and more likely to do so for mortgage debt) and when comparing the 2001 tax rebate to the tax stimulus of 2008 (when the average level of household debt was considerably higher). Second, expectations about the aggregate state of the economy also play an important role—expectations of good economic conditions are associated with higher spending (see Section 4).

Considering the importance of heterogeneity of consumer responses to stabilization policies may alter our views about their effectiveness. An example is Misra and Surico (2011), who study the 2001 temporary tax rebate allowing for heterogeneity of consumer responses. They estimate that a model in which homogenous responses are imposed would predict a 5% increase in aggregate non-durable consumption expenditure due to the rebate. However, the estimate is smaller (3%) once heterogeneous responses are allowed for.

Table 1: Heterogeneity in MPCs over Income, Wealth and Age Groups

<table>
<thead>
<tr>
<th>Transitory changes in household resources</th>
<th>Permanent changes in household resources</th>
</tr>
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<tbody>
<tr>
<td>By Income</td>
<td>U-shaped consumption response*</td>
</tr>
<tr>
<td>By Wealth</td>
<td>U-shaped consumption response*</td>
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<tr>
<td>By Age</td>
<td>Increasing consumption response</td>
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*: In response to small, positive income or wealth change.

In conclusion, do changes in the distribution of income matter for aggregate consumption? The response is most likely yes (there is ample evidence of heterogenous responses of consumption to income or wealth changes), but the direction is hard to qualify and even harder to quantify. For example, the fact that the MPC in response to temporary tax stimulus changes is non-monotonic in income suggests almost neutral (or even perverse) effects of small-sized redistributive policies on aggregate consumption, while effects are more likely to be as expected in theory when considering persistent policies such as fundamental tax reform.

Krueger (2012) provides a simple back-of-the-envelope calculation of the possible effect of a permanent redistributive policy. He starts from the fact that the share of income going to the top 1% of the distribution increased by 13.5 percentage points between 1979 and 2007. This is equivalent to $1.1 trillion a year in 2007 income. He then uses the estimates of the marginal propensities to save from Dynan, Skinner and Zeldes (2004) (which mostly refer to permanent income, rather than transitory income) and calculates that “if another $1.1 trillion had been earned by the bottom 99% instead of the top 1%, annual consumption would be about $440 billion higher. This would be a 5% boost to aggregate consumption”. While this calculation has a number of caveats and ignores all sort of behavioral responses, it provides some useful (albeit large) benchmark. Behavioral responses may be important. For example, a transfer of wealth of the type considered by Krueger (2012) may induce wealth effects, reduce labor supply, and potentially eliminate the positive effect on aggregate consumption induced by response heterogeneity.


3 Income Volatility and Aggregate Consumption

A number of papers in the labor economics literature (see for example Dynan, Elmendorf and Sichel, 2007) present evidence showing that during the period in which the distributions of wages in the US was becoming more dispersed, wage volatility was also increasing. The increase in wage volatility may hide two types of changes: increase in the variance of transitory income changes ("wage instability" in the language of Gottschalk and Moffitt, 1994), and volatility associated with changes in the permanent component of income. According to Gottschalk and Moffitt (1994), one-third to one-half of the increase in wage volatility is due to an increase in wage instability. As we will discuss, the distinction between the two types of income changes is important from a welfare point of view. Several papers have also found evidence for increasing volatility in earnings, household disposable income (see Jensen and Shore, 2009, and Shin and Solon, 2011 for recent contributions), and consumption (Gorbachev, 2011).

Our reading of the literature leads us to two conclusions. First, the evidence of increased volatility is not uncontroversial. A number of recent papers (almost all of them using administrative data), have cast some doubts on the earlier findings and argued that there is little evidence of rising volatility (see for example Sabelhaus and Song, 2009, and CBO, 2007). Second, there is much more agreement that volatility is counter-cyclical (it goes up during recessions).

Inequality and volatility are two different concepts and, indeed, it is possible to have increased wage volatility even with a completely stagnant wage distribution. Inequality has to do with "between people" heterogeneity of wages (a static concept), while volatility has to do with "within people" heterogeneity of wages (a dynamic concept). The concept of wage volatility is closely related to that of wage mobility (Gottschalk and Moffitt, 1994). While wage mobility is usually interpreted as a positive force (a "Horatio Alger" effect), it also has undesirable features, as risk-averse individuals dislike the uncertainty that comes with not knowing whether income will go up or down.

Does wage volatility matter for explaining movements in aggregate consumption? The traditional channel linking increased wage volatility to aggregate consumption is as follows. An increase in wage volatility implies an increase in the risk (or uncertainty) that households face. Prudent households would respond to this increase in uncertainty by engaging in precautionary saving, i.e., by depressing their current consumption. Increased uncertainty is also known to affect the purchase of durable goods (especially those that are difficult to undo due to high transaction costs), as consumers enter a "wait-and-see" mode. If increased uncertainty spreads throughout the distribution, aggregate consumption will fall. However, this logical chain can be broken at each step.

First, increased volatility does not necessarily imply increased uncertainty – which is what prompts precautionary behavior. Part of the volatility that people experience may reflect "heterogeneity" rather than risk – for example, some individual may sort into occupations in which wages are more volatile because they have a greater tolerance for risk (and presumably are compensated with a higher mean). It

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7 The increase in wage volatility at the micro level is in contrast with the decline in aggregate volatility (the so-called Great Moderation, see Davis and Khan, 2008).

8 Dynan, Elmendorf and Sichel (2007) provide an excellent survey of the literature on wage, earnings and household income volatility.

9 We will use the terms "risk" and "uncertainty" interchangeably. In reality, there is a technical difference between the two, dating back to Knight (1921). A risky event has an unknown outcome, but the underlying outcome distribution is known (a "known unknown"). An uncertain event also involves an unknown outcome, but the underlying distribution is unknown as well (an "unknown unknown"). We also focus exclusively on income risk, although consumers face other types of risk, which may be even more important than income risk depending on the stage of the life cycle (i.e., health risk, mortality risk, etc.).
is notoriously hard to disentangle risk from heterogeneity, although there are a few papers that have tried to address this issue. Recent work by Cunha, Heckman and Navarro (2005) estimate which components of measured lifetime income volatility are due to uncertainty realized after college decision time, and which components are due to heterogeneity (known at the time the college decision is made, and reflecting things like ability). The authors find that about half of the variance of unobservable components in the returns to schooling are known and acted on by the agents when making schooling choices. Primiceri and van Rens (2009) assume that consumers are unable to smooth permanent shocks, and that any attenuated response of consumption to permanent shocks measures the amount of advance information that they have about developments in their (permanent) income. Using CEX data, they find that almost all of the increase in income inequality over the 1980-2000 period can be attributed to an increase in the variance of permanent shocks but that most of the permanent income shocks are anticipated by individuals; hence consumption inequality remains flat even though income inequality increases (another way to explain the evidence in Krueger and Perri, 2006, see below). Low, Meghir and Pistaferri (2010) show that one source of volatility faced by individuals is the possibility of receiving outside offers from other firms. If changing employer is a choice, however, then firm-specific volatility has no downside – people can always turn down bad offers and only accept the ones that allow them to go up on the economic ladder, an option value concept. This is one example in which volatility is not risk but opportunity, and indeed in Low, Meghir and Pistaferri’s welfare analysis people are willing to pay to face that particular type of volatility (but, predictably, they want to be compensated for an increased variance of shocks to their “general human capital”).

Second, even if risk increases, precautionary saving may not necessarily increase if there are improved opportunities for insurance, if the household can adjust along other margins (such as labor supply or portfolio choice), and if risk increases are of transitory nature. Krueger and Perri (2006) show that during the last three decades non-secured debt has increased in parallel with the increase in income inequality. Their argument is that when income volatility increases “the value households place on access to formal and informal credit and insurance mechanisms rises, and the scope of these mechanisms may endogenously broaden. Individual consumption may then be better insulated against (higher) income risk, and cross-sectional consumption inequality may increase only mildly.” Besides markets (formal insurance), there are other mechanisms that could keep consumption smooth despite the increase in risk (and hence not generate much effect on aggregate consumption). Consider labor supply and assume that individuals face increased volatility in wages. The latter does not map one-for-one in disposable income (or consumption) volatility due to labor supply responses, among other things. In particular, hours can be changed as to attenuate the rise in wage volatility (households can cut the consumption of leisure rather than the consumption of goods). To consider a simple example, suppose that wages can be 1 or 10 with equal probability. The variance (volatility) of log wages is 1.32 – this is wage risk. Now suppose that hours are chosen so that $H=10$ when $W=1$ and $H=1$ when $W=10$. The variance (volatility) of log earnings is going to be zero (earnings are 10 regardless of the wage realization). For this implicit “insurance” mechanism to work we require the labor supply function to be backward bending (i.e., the wealth effect to dominate the substitution effect). Note that this says...
nothing about welfare. Sacrificing leisure instead of goods may keep consumption stable but it is not costless because going to work requires effort and people value leisure. Above, we mentioned that distinguishing between increasing volatility due to permanent shocks and increasing volatility due to transitory shocks is important for welfare reasons. In general, precautionary saving effects should (theoretically) come from changes in the variance of the marginal utility of wealth (or permanent income). In a standard model with no liquidity constraints, the variance of permanent shocks should play an important role while the variance of the transitory shock not so much. However, with liquidity constraints, the variance of the transitory shock might matter a lot. This could indeed be very relevant for explaining the link between volatility and aggregate consumption during the last recession.

Third, heterogeneity can attenuate the aggregate effects of an increase in risk. Suppose that volatility increases only among individuals who would not typically engage in precautionary savings, either because (a) they are wealthy, (b) have high risk tolerance, or (c) have easy access to formal (or informal) insurance mechanisms where they can diversify their (increased) risk. Point (a) is well understood. As showed by Carroll and Kimball (1996), the “precautionary savings effect”, which depresses current consumption, decreases as wealth increases (and it vanishes altogether when wealth becomes infinitely large). As for (b), precautionary saving effects only exist under specific restrictions on preferences (“prudence”). As is well known, this means that it is not enough to be risk averse (i.e., to dislike risk). We also require the consumer to take specific actions (i.e., save more) to offset the effects of the risk. These actions will not be undertaken if the consumer is not prudent (in the sense of Kimball, 1990). Finally, point (c) means that even prudent consumers will find it more efficient to buy an insurance (which smooths consumption across states), if available, rather than saving (which smooths consumption across periods). Indeed, saving may be very costly from a welfare point of view – savings are carried forward to the next period even if in that period there is a chance of becoming a billionaire.

What does empirical evidence have to say about income volatility and its effects on aggregate consumption? The first thing to stress is that, unlike the evidence on increasing income inequality, where it is rare to find dissenting voices, the evidence on the increase in wage, earnings and disposable income volatility is much less solid-rock. While the early literature has found consisting evidence of increasing volatility, a number of recent papers, mostly using administrative data, have found much weaker evidence (if not a declining pattern). For example, Guvenen, Ozkan and Song (2012) write: “the variance of income growth display a clear downward trend [...] this conclusion is in contrast to the conventional wisdom since 1990s that income shock variances have generally risen since the 1980s.” Some differences across studies can certainly be ascribed to differences in the sample used, whether data come from survey or administrative records, the way volatility is defined, the income component on which the analysis is based, and so on. For example, the CBO study exclude self-employment income, which has become more volatile. Comparing the different income measures as in Dynan, Elmendorf and Sichel (2007), reveals that family earnings volatility increased more than individual earnings volatility, which suggests an increase in the covariance of spouses’ earnings. Finally, administrative data could be less subject to measurement error than survey data.\footnote{\textsuperscript{13}Other measurement issues may also be important. Dynan, Elmendorf and Sichel (2007), for example, mention that treatment of zeros is different between studies, although this should not necessarily affect trends. Finally, the actual measures of volatility also differ across studies, ranging from simple measures such as wage growth dispersion to measures that try to supply” under certain preference restrictions). One is “background risk behavior” – consumers may shy away from holding risky assets and increase holding of safer assets. Other actions may include “holding on semi-durables” longer than optimal (Browning and Crossley, 2009); try to strike implicit contracts with employers that promise to keep wages constant in the face of variable labor productivity; or even making occupational or educational choices that are associated with less volatile earnings profiles.}
Second, even assuming that volatility has increased, has risk increased? A few papers look at increased frequency of “involuntary” events. For example, Dynan, Elmendorf and Sichel (2007) note that volatility in hourly wages (which is presumably less under the control of workers) has risen much more than volatility in hours (which instead may reflect choice). An indirect way to answer this question would be to look at consumption volatility (or the variance of consumption changes) – if uncertainty has not risen, consumption changes should have a small variance. This is the approach taken by Davis and Khan (2008). They note that various indicators of risk have declined for most of the 1980s and 1990s (aggregate volatility or "Great Moderation", a reduction in firm-level volatility, and a reduced risk of job loss). If these were the most important components of the risk faced by households, permanent-income logic should imply a decline also in household-level consumption adjustments. But in fact, they find no evidence that this has been the case (consumption volatility has increased). Taken at face value, this seems to suggest that the Great Moderation “failed to deliver more economic tranquility in the form of less consumption risk for the average household.” More likely, productivity uncertainty may have risen. Because of its large persistence, productivity risk is the most important component of risk that households face. In contrast, job loss (given the nature of the US economy, with its very short duration of unemployment and its dynamic labor market) is mostly a transitory shock, and transitory shocks are relatively easier to "insure" against. Hence, reduction of job loss risk had little welfare impact as measured by consumption volatility. Davis and Khan (2008) suggest that the evidence can be explained by flexible pay arrangements increasing in their frequency and coverage, and allowing firms to respond to shocks by cutting wages rather than reducing employment.

Third, what do we know about diversification channels other than consumption? Krueger and Perri (2006) report an increase in the use of non-secured debt over the same period in which income inequality was rising. However, the increase in debt accumulation came to an abrupt end recently and it is not clear whether the increase was episodic or part of a more persistent trend. On the alternative adjustment margins, Davis and Willen (2000) show that people do not seem to use asset portfolio choice to hedge optimally against their labor market risks. Assortative mating also appears not to be a good insurance channel because the evidence is that spouses tend to work in the same sector, firm, etc., so they do not diversify risk very efficiently. In contrast, there is large evidence from the labor literature of the importance and relevance of "added worker effects", i.e., secondary earners increasing their labor supply (both at the intensive and extensive margin) when the primary earner faces (idiosyncratic) wage or unemployment shocks. Finally, precautionary labor supply seems to be second-order. In terms of mean labor supply effects, however, Blundell, Pistaferri and Saporta-Eksten (2012) report that Marshallian elasticities increase over the life cycle, implying that people are more likely to use their own labor supply in response to a wage shock when they are young (and presumably when they do not have much assets to smooth consumption).

Fourth, what about heterogeneity in volatility/risk? Has risk increased the same for everyone, or differently for different individuals? Jensen and Shore (2009) argue that risk has increased primarily for people who already faced most of the risk: the self-employed. A number of other papers look at volatility heterogeneity by points in the income distribution, and show that there has been an increase in the frequency of large (upward and downward) swings in income. Dynan, Elmendorf and Sichel (2007) for example, conclude that most of the increase in wage volatility can be explained by an increase in the frequency of very large income changes. Parker and Vissing-Jorgensen (2009) highlight the fact that high income households (top 1 percent) are far more exposed to aggregate fluctuations than lower-income households, and as a results separate transitory from permanent income changes.
their consumption is much more volatile (which is also consistent with the fall in consumption inequality during the Great Recession). During booms their incomes grow more than average and during recessions their incomes go down more than the average. Note that this again says nothing about welfare – as high income individuals may be the ones best equipped to face this increased volatility, and that this finding only refers to the very top 1%. Indeed, Parker and Vissing-Jorgensen report that, expectedly, low educated are more cyclical than high educated, and people in the bottom 40% are more cyclical than those is the 41-99th percentile – so there is evidence of a U-shape in the cyclicality across the income distribution – with the right branch of the U-shape only becoming apparent around the top 1% of the distribution. Guvenen, Ozkan and Song (2012) finds somewhat similar results. They start by ranking prime-age (35–54) males according to 2002–2006 average income. Those in the bottom 10% of this distribution experience a fall in their income during the Great Recession (2007–2010) that was much higher than those in the top 10%. In fact, the fall in income declines in intensity with the average income percentile, with one exception: those in the top 1% experienced much larger average losses than workers in the 90th percentile (or below). This finding confirms that during recessions volatility/risk is higher at the bottom of the distribution than at the top (with the exception of the very top). Guvenen, Ozkan and Song (2012) also find that income uncertainty is countercyclical, but the counter-cyclicality comes almost entirely from the left-skewness of the distribution increasing during recessions. That is, during recessions, "the upper end of the income shock distribution collapses—large upward income movements become less likely—whereas the bottom end expands—large drops in incomes become more likely." These are new facts that researchers will want to understand for their effect on consumption and saving behavior (see Caballero, 1990, for some stylized distributional examples).

How important are changes in uncertainty for explaining movements in aggregate consumption? As stressed by Kennickell and Lusardi (2006) there is wide variability in the literature regarding the quantitative importance of the precautionary motive for saving, with estimates ranging from zero to 50% of total asset accumulation. For this reason, providing quantitative assessments is not easy. Some qualitative conclusions about what we have learned about volatility, risk, and household behavior are possible, however. First, from a long run ("trend") point of view, the jury is still out regarding whether volatility has increased or remained stable at the micro level, although on net our reading of the evidence is that there has been an increase (judging from the increase in consumption volatility documented by Davis and Khan, 2008, and others). Second, from a short run ("cycle") point of view (i.e., during recessions) there is instead more interesting evidence coming to the fore – especially the mounting evidence on increasing left-skewness and the increasing frequency of large income drops in income at the bottom of the distribution, suggesting increasing uncertainty during recessions – not just volatility. We lack solid theoretical understanding of how these moments work for explaining consumption decisions. Third, from a volatility heterogeneity point of view, there is some evidence that volatility/risk has increased precisely for those more able to shoulder it or more able to bear it, so this is somewhat less worrying from a welfare point of view. This conclusion, however, does not apply to increased uncertainty during recessions, when people at the bottom of the income distribution suffer more than those at the top (with the exception of the very top). Finally, there is evidence that people do try to use alternative adjustment margins (rather than having consumption take the brunt of it), but family labor supply appears as the only channel used with some success (in the form of added worker effects), but then only in response to idiosyncratic shocks. In fact, during recessions the labor

14 Similarly, Meyer and Sullivan (2011) find that during the 1960-2008 period low percentiles of both income and consumption are sensitive to macroeconomic conditions, and in most cases low percentiles of income appear to be more responsive than low percentiles of consumption.
supply insurance channel becomes increasingly unavailable due to restrictions in hours, loss of work, or lack of employment opportunities for secondary earners. An evaluation of the consequences of a more uncertain environment will have to account for the changes in leisure (not just consumption) that the increase in uncertainty induces.

4 Income Expectations, Income Shocks, and Aggregate Consumption

One way of interpreting income (and wealth) shocks faced by consumers is that they represent revisions in consumers’ expectations about their future resources. According to the standard permanent income hypothesis, revisions in expectations about current and future income are the main determinants of changes in consumption. In particular, if consumers’ expectations about the future become more pessimistic (i.e., income is expected to go down in the future or to grow less rapidly than initially thought), they will need to save more (the traditional “saving for a rainy day” mechanism), which will depress current consumption. If the diminished expectation effect is synchronized across the entire consumption distribution (as it typically happens during recessions or at the start of one), a negative effect on aggregate consumption follows.\(^\text{15}\)

How much do consumers respond to revisions in income expectations, i.e., income shocks? A state-of-the-art study by Blundell, Pistaferri and Preston (2008) find that consumers respond very little to transitory shocks (a result predicted by the theory with perfect credit markets), while the response to permanent shocks is larger on average (around 2/3), but still less than one because of precautionary asset accumulation. Consumers who are likely to be liquidity constrained or have low wealth have larger responses to both types of shocks. Kaplan and Violante (2010) show that theory also predicts strong age heterogeneity, with the response of transitory shocks increasing with age (because of a horizon effect) and the response of permanent shocks declining with age (because of assets growing over the life cycle). Blundell, Pistaferri and Saporta-Eksten (2012) show that another important determinant of consumption smoothing of permanent shocks is family labor supply allowing for non-separable preferences (complementarity between consumption and leisure).

How synchronized are consumer expectations (and revisions thereof) over the business cycle? We use income expectations data from the Michigan Survey of Consumers (MSC) to address this issue. The MSC elicits expected household income growth rates for the following 12 months. Not surprisingly, income expectations are strongly pro-cyclical. In the Great Recession, income growth expectations fell from about 4% in the last quarter before the recession (2007:3) to about 1% in the first quarter of 2009. Similar patterns (somewhat attenuated) were observed in all previous recessions since 1980. While expectations are fairly synchronized due to the common aggregate component, there is also substantial heterogeneity. In particular, income growth expectations of high-income (and high-education) households are more sensitive to the aggregate state of the economy than income growth expectations of low-income households. To formalize this, we use the panel aspect of the MSC (we have two observations per household) and look at how expectations change for different demographic groups. For each observation, we also eliminate the

\(^{15}\)Recent research (Reis, 2006, Carroll, 2003) has emphasized that consumers may not update their expectations as fast or accurately as predicted by standard model, due to transaction costs or other types of frictions (“inattention”). Exceptions are easily predictable events or extraordinary events which capture people’s attention at little cost. In these cases, it is more likely that expectations are formed rationally. The recent Great Recession, with all the media attention it received, may have indeed been perceived as an extraordinary event and hence made consumers update their expectations more carefully and/or attentively.
common aggregate effect by subtracting the median of the income growth expectation for that month (we use medians instead of means due to the presence of some large outliers). This allows us to focus on excess sensitivity of expectation revisions for particular groups (i.e., after eliminating fixed pessimism/optimism effect, and the natural tendency to be more pessimistic when the aggregate state of the economy is bad).

Our main findings are summarized in Figure 2 (and explained fully in the Appendix). The left panel shows that during the most recent recession, households from the upper quintile of the income distribution revised their expectations downward much more than the aggregate change in expectations (a value of 0 means that the household did not revise expectations relative to the median household). The opposite is the case for the lower quintile of the income distribution. It turns out that this increase in the sensitivity of expectations to aggregate conditions by income quintiles is not restricted to the Great Recession. The right panel of Figure 2 plots, for each quintile of the income distribution, the coefficient of a regression of our excess sensitivity measure on a recession dummy, using data from 1981 to 2011 comprising four recessions. The dashed lines represent the 95% confidence band. The plot shows that there is a negative and almost monotone relationship between the sensitivity of expectations to aggregate conditions and the rank in the income distribution. We repeat this analysis with three education groups (High School or less, Some College, and College degree) and find qualitatively similar results. As education is a good proxy for permanent income, the findings for the different education group suggest that this is not just reversion to the mean of expectations happening in recession for high-income households.

![Figure 2: Excess sensitivity of households’ expectations.](image)

How are these findings related to aggregate consumption? First, the fact that expectations fall in recession, and remain low for quite some time, suggest that household revise down expectations of their permanent income, which would translate in downward adjustment in consumption.\(^\text{16}\) It is more difficult to determine how the excess sensitivity of high-income households’ expectation would affect aggregate consumption. On the one hand, they command a larger share of aggregate consumption; on the other hand, their MPCs (at least out of permanent income changes) are lower.

\(^{16}\) The permanent effect of recessions is particularly strong for people who are displaced, enter the labor market, or start new jobs during recessions, see Oreopoulos, von Wachter, and Heisz (2008) and von Wachter and Davis (2011).
5 The Great Recession and the Income Distribution

We now look at the Great Recession as a case study for understanding the potential relation between income inequality, income volatility, income expectations and aggregate consumption.

Figure 3 (adapted from Petev, Pistaferri and Saporta-Eksten, 2011) shows the evolution of real per-capita consumption and disposable income. Both series are normalized to 100 in the last quarter before the recession. Consumption drops for three quarters before disposable income starts to drop. At the trough, consumption falls more than 4% below its pre-recession level; income, a little bit more than 2%. While disposable income recovers back to pre-recession levels by the end of 2010, consumption is still 2% below pre-recession levels in the second quarter of 2011 (i.e., 2 years after the recession is officially over).

What drives this aggressive drop in consumption, despite the much milder drop in disposable income? Two prime suspects include the massive wealth destruction that occurred during the recession, and the tightening of credit supply. Households whose wealth was destroyed by the collapse of the housing and stock markets of 2008 had to save in order to rebuild their buffer stock of assets. Moreover, there were important interactions between housing wealth shocks and high levels of debt at the start of the recession. Households with high levels of debt reduced their consumption (i.e., de-leveraged) to repair their impaired balance sheets. The zero-lower-bound monetary policy regime implied no compensating increase in consumption by households with low levels of debt.\(^{17}\) Tighter credit supply in the recession prevented purchases of durable goods that are typically financed through borrowing (such as cars) and prevented smoothing of even transitory shocks.

While these factors are likely to have played an important role in the sharp decline of aggregate con-

\(^{17}\)Mian, Rao and Sufi (2011) examine the importance of the interaction of large housing wealth shocks with high levels of debt at the start of the recession, and indeed find that consumption declined more strongly in counties with high leverage and large house price declines. They argue that this "household balance sheet" channel can explain potentially a large fraction of the consumption decline. For example, they calculate that "shutting down" the household balance sheet channel would have resulted in auto sales declines of only 13%, compared to the actual 36% decline.
sumption, changes in the income distribution have contributed to this decline as well. First, there are several pieces of evidence supporting the view that consumers perceived the shocks that hit them during the Great Recession as very persistent - and permanent income shocks always require larger consumption adjustments than temporary shocks. In Figure 3 we add a plot of the mean expected change in income from the Michigan Survey of Consumers. The decline in expectations appears very persistent, and indeed there is almost perfect synchronization between the trends in expectations and the trends in aggregate consumption. Additionally, Petev, Pistaferri and Saporta-Eksten (2011) document that the breakdown of disposable income into its various components reveals that the stabler pattern of disposable income (relative to consumption) is driven completely by the strong increase in government transfers (+18.6 percent from the last quarter of 2007 to the last quarter of 2009), while both wages (-6.9 percent) and particularly financial income (-26.5 percent) fell, as predictable given the nature of the recession. To the extent that government transfers are transitory and the decrease in wages is at least partly permanent, one might expect consumption to respond to the drop in the wage component of disposable income, but not as much to the increase in government transfers. Finally, there is independent evidence that indeed changes that occurred in the labor market during the Great Recession were persistent. Jaimovich and Siu (2012) document jobless recoveries in “routine” occupations over the last three recessions, and especially in the Great Recession. These “routine” occupations are those more likely to be replaced by technology. To the extent that the drop in the wage bill is related to technological change, we would expect workers in these occupations to experience a permanent decrease in the price of their skill, and hence a permanent decrease in their lifetime resources.

Second, during the Great Recession income volatility (and probably uncertainty) also increased. In general, uncertainty is counter-cyclical, i.e., it rises during recessions. Economic theory predicts that prudent households will respond to increased uncertainty by delaying purchases of durable goods and by saving for precautionary reasons (Bertola, Guiso and Pistaferri, 2005; Carroll and Samwick, 1998). Recent research has also pointed to the effect that “uncertainty shocks” may have on economic recessions (Bloom et al., 2011). In Figure 3 we then also add a measure of income uncertainty, again using the Michigan Survey of Consumers. The measure we use is the cross-sectional spread (IQR) of the change in expectations for a particular individual over 6 months. As this measure indicates, many more individuals are experiencing large changes in their expectation for future income over 6 months in the recession period. There seems to be a strong association between increasing uncertainty and declining aggregate consumption. Evidence from Guvenen, Ozkan and Song (2012) suggests larger increases in volatility at the bottom of the income distribution (where people are not well equipped to insure, and hence need to save or cut their consumption) than at the top. Alan, Crossley and Low (2012) estimate that increased uncertainty can explain half of the decline in aggregate consumption in the UK’s Great Recession, with permanent recession-related shocks explaining another quarter, while little role is played by the tightening of credit supply. There are three distinct features of the Great Recession that might have played a role in amplifying the precautionary savings effect. First, as Guvenen, Ozkan and Song (2012) show using social security data, in recessions, and

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18De Nardi, French, and Benson (2012) test whether the drop in consumption observed during the Great Recession can be explained by downward revisions in wealth and income expectations (which they take from Reuters/University of Michigan Surveys of Consumers data set). They find that, depending on what assumptions are made concerning future income growth beyond the time horizon covered by their data, they can explain the entire drop in consumption with just the observed drop in wealth and income expectations.

19Bertola, Guiso and Pistaferri (2005) estimate that a 10% increase in consumption uncertainty decreases household car expenditure by about 1% on average in a sample of Italian households. While uncertainty is consistent with the drop in durable purchases, other factors were likely to play an important role including tightening credit (making it harder to buy “big ticket” items), as well as the excess accumulation of durables in the pre-recession years, see for example Hall (2011).
particularly in the Great Recession, the likelihood of drawing a very negative shock to earnings is much higher. Interpreting these as higher probabilities for a “disaster” at the household level potentially amplifies the precautionary savings motive. Second, in normal times, the increase in demand for precautionary savings would drive down the real interest rate. However, as the economy is currently at the zero-lower bound for nominal interest rates, the real interest rate is bounded. In the presence of a zero lower bound, the precautionary savings motive is therefore amplified (see Basu and Bundick, 2011). Third, precautionary saving effects may have been exacerbated by the tightening of credit supply which increased the probability of being subject to liquidity constraints in the future.

6 Conclusions

In this paper we have discussed how changes in the income distribution can potentially affect aggregate consumption. These changes originate from variations in the economic environment faced by individuals, such as labor and credit market reforms, technological innovations, institutional changes, and policy interventions. These more or less exogenous forces are then followed by endogenous choices by households, which make inequality in disposable income an outcome rather than an input to aggregate changes in the economy.

We have focused on three aspects of the income distribution that policy can potentially influence: income expectations (and revisions thereof), income inequality, and income volatility. We have also discussed the role of left skewness, which recent studies have found increasing in importance and relevance over the last few decades. Finally, we have noticed that the changes in the income distribution are characterized by pervasive heterogeneity. We have highlighted important dimensions of heterogeneity: individuals differ in terms of how they respond to idiosyncratic and aggregate shocks, how they receive income shocks, form income expectations, and experience wage volatility (especially depending on their initial position in the income distribution), and with what ease they access financial and insurance markets. This heterogeneity has challenges, because it makes much more difficult to assess the effect of policies, but it also offers opportunities, in the sense of creating potential for effective policies through appropriate "targeting" - even in conditions when traditional policies would fail or predict only small impacts. The good news is that a growing macro literature recognizes the importance of individual heterogeneity - in terms of preferences, talents, history of shocks, access to credit and insurance markets, and life cycle position - for explaining the behavior of aggregate variables and it has developed tools to incorporate such heterogeneity in formal models of the economy. The bad news is that most of the empirical evidence on the issues discussed in this paper displays still too much variability in terms of estimated responses. An example in point is the evidence on consumption inequality (another is the trends in income volatility). A number of studies written on the subject have still failed to find a consensus on whether consumption inequality in the US has risen in parallel with income inequality (as suggested early on by Cutler and Katz, 1992, and more recently by Attanasio, Hurst and Pistaferri, 2012) or stayed rather stable (as suggested by Krueger and Perri, 2006). The two conclusions, of course, have dramatic implications for how we judge the welfare implications of the rise in inequality of the last three decades, if we consider consumption to be a more accurate measure of living standards. A combination of various measurement issues in available consumption data sets and small sample sizes that exclude the very top of the income distribution have contributed to make the answer to this simple question elusive. On the positive side, recent attention put by academics and institutions onto resolving these issues seems promising and bodes well for future research.
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A  Appendix: Michigan Survey of Consumers

In sections 4 and 5 we use the Michigan Survey of Consumers (MSC) to construct measures of mean, median and dispersion of the change in income expectations by demographics. The MSC is a monthly telephone survey of about 500 households. It is implemented as a rotating panel, where some respondents are re-interviewed 6 months after their first interview. Other than demographics, the main question which we use from this survey is (A15a):

"By about what percent do you expect your (family) income to (increase/decrease) during the next 12 months?"

We use the MSC data for the years 1981 to 2011 (a total of 199,030 observations), dropping households with more than 2 interviews, and households where the difference between interviews is not 6 months (548 observations).

We use this sample to construct the three measures reported in the paper:20

1. The Mean of the expected percentage change in family income (as reported in the question above), smoothed using 5 leads and 5 lags. This measure (normalized to 100 for 2007:q3) is reported in Figure 3 (triangle markers).

2. Excess sensitivity of expectation revisions: To construct this measure we focus on households that have 2 consecutive observations in the survey (6 months apart), a total of 74,031 observations. Using this sample, we first calculate the aggregate median of the change in expectations by month. For each household we next calculate a measure of the change in expectations, net of the aggregate median. We then calculate the median of these net measures by demographic groups (either income quintiles or education). The resulting variable is then smoothed using 5 leads and 5 lags and aggregated at the quarterly level. The left panel of Figure 2 reports this measure for the bottom, middle and high income quintiles. The right panel of Figure 2 plots, for each quintile of the income distribution, the coefficient of a regression of the excess sensitivity measure on a recession dummy using 1981-2011 data.

3. The inter-quartile range (IQR) of the change in expectations: Similar to the excess sensitivity measure, this measure uses the longitudinal component of the survey. We calculate the IQR of the household-specific change in expectations by month. We then smooth this measure using 5 leads and 5 lags and aggregate at the quarterly level. This measure (normalized to 100 for 2007:q3) is reported in Figure 3 (diamond markers).

20 We use the survey weights for all measures.
### Table 1: Appendix to Table 1

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<th>Reference</th>
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<th>data</th>
<th>consumption measures</th>
<th>demographics</th>
<th>Disposable income (transitory)</th>
<th>Permanent income</th>
<th>comments (predicted/unpredicted, negative/positive)</th>
<th>Method</th>
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### Notes
- MPC: Marginal Propensity to Consume
- IVQR: Instrumental Variables Quantile Regression
- CEX: Consumer Expenditure
- PSID: Panel Study of Income Dynamics
- MLE: Maximum Likelihood Estimation
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<td></td>
<td></td>
<td>lowest 25% of liquid wealth/earnings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upper 50% of liquid wealth/earnings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upper 25% of liquid wealth/earnings</td>
</tr>
<tr>
<td>Parker (1999)</td>
<td>Change in SS over the year (cap)</td>
<td>CEX</td>
<td>Nondurables</td>
<td>Hit the cap (&gt;55K)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>high consumption</td>
</tr>
<tr>
<td>Gruber (1997)</td>
<td>Variation in UI replacement rates over states</td>
<td>PSID</td>
<td>Food</td>
<td>average for the unemployed</td>
</tr>
</tbody>
</table>

Note: The translation from tables to MPC is from the text.