The Spending and Debt Response to Minimum Wage Hikes

Daniel Aaronson, Sumit Agarwal, and Eric French*

October 6, 2010

Abstract

Following a minimum wage hike, household income rises on average by about $300 per quarter and spending by $800 per quarter for households with minimum wage workers. Most of the spending response is caused by a small number of households who purchase vehicles. Furthermore, we find that the high spending levels are financed through increases in collateralized debt. Our results can partly be explained with a model where households can borrow against durables and face costs of adjusting their durables stock.

*Comments welcome at daaronson@frbchi.org, sagarwal@frbchi.org, and efrench@frbchi.org. Authors' affiliations are Federal Reserve Bank of Chicago. We thank Jim Ziliak, Bill Washer, Jeff Campbell, Nick Souleles, Chris Carroll, Robert Moffitt, Stephen Shore, John Ham, Leslie McGranahan, Victor Rios-Rull, Richard Spady, seminar participants at the Chicago Fed, Board of Governors, Federal Trade Commission, University of Illinois-Urbana Champaign, University of Alberta, Johns Hopkins, University of Maryland, AEA, APPAM, and SED meetings, NBER Summer Institute, and David Cashin, Phil Doctor, Charles Doss, Kyung Park, and Ana Rocca for outstanding assistance. More recent versions of the paper can be obtained at http://www.chicagofed.org/economists/EricFrench.cfm/. Author correspondence to Daniel Aaronson, Sumit Agarwal, or Eric French, Federal Reserve Bank of Chicago, 230 S. LaSalle St., Chicago, IL 60604. Telephone (312)322-5650, Fax (312)322-2357.

1 Introduction

Many U.S. social insurance programs provide economic assistance to low-income households. Yet there is little evidence on the spending response to income changes among such households. In this paper, we estimate the magnitude, timing, composition, and distribution of income, spending and debt among households with adult minimum wage workers after a minimum wage hike. We present four key empirical findings.

First, a $1 minimum wage hike increases total spending by over $800 per quarter in the near term. This exceeds the roughly $300 per quarter increase in family income following a minimum wage hike of similar size. These patterns are corroborated by independent data showing that debt rises substantially after a minimum wage increase. The results are particularly surprising given that most adults earning the minimum wage at a point in time make well above the minimum two years later. All told, a $1 minimum wage hike increases lifetime household income by roughly $1,500.

Second, the majority of this additional spending is in durable goods, in particular vehicles.[1] Consequently, the spending response is concentrated among a small number of households.

Third, total spending increases within one quarter of a minimum wage increase and not prior, despite the legislation passing 6 to 18 months before enactment.

Finally, high levels of durables spending and debt accumulation persist for several quarters after a minimum wage hike.

Two canonical models – the permanent income model and the buffer stock model with no borrowing – fail to match these key facts. If households were spreading an income gain over their lifetime, as in the permanent income hypothesis, the short-run spending increase should be an order of magnitude smaller than what we observe in the data. While augmenting the permanent income model to account for durables raises the predicted short-term spending

[1] A large response in durable spending is consistent with many papers that focus on sizable disposable income changes, including those based on tax refunds (Parker 1999, Souleles 1999, Parker et al. 2010), the EITC (Barrow and McGranahan 2000, Adams, Einav, and Levin 2009), job loss (Browning and Crossley 2009), and other large income changes (Krueger and Perri 2008). Moreover, Adams, Einav, and Levin (2009), Souleles (1999), and Parker et al. (2010) also find evidence that much of this additional durable spending is on vehicles. Other papers find no response in durable spending (e.g., Browning and Collado 2001, Hsieh 2003) or a highly imprecise response (e.g., Coulibaly and Li 2006). Our reading of the literature is that effects tend to be found in papers based on large relative income gains among more liquidity constrained households.

response to about $50 per quarter, it is still far smaller than what our empirical estimates imply. A buffer stock model where households cannot borrow fails to explain why many minimum wage households increase their debt after a minimum wage hike.

Therefore, we consider an augmented buffer stock model in which households are collateral constrained (i.e., they can borrow against part, but not all, of the value of their durable goods). If households face collateral constraints, small income increases can generate small downpayments, which in turn can be used for large durable goods purchases. With a 20 percent downpayment, each additional dollar of income can be used to purchase five dollars of durable goods. We find that, consistent with this model, most of the debt increase is in collateralized debt, such as auto loans.

While this model fits the data better than the others, it still underpredicts the total spending response. Furthermore, like the other models, it does not match the highly concentrated distribution of additional spending. However, for plausible parameters, an augmented buffer stock model that allows for a cost of adjusting durables with costs of adjustment can produce a spending response as large as $400 per quarter and replicate the skewness of the spending responses in the data.

Models where households can borrow against durable goods are increasingly common for understanding the dynamics of consumer durables (Fernandez-Villaverde and Krueger 2002, Campbell and Hercowitz 2003), housing (Carroll and Dunn 1997, Attanasio et al. 2008, Hryshko et al. 2009) and entrepreneurship (Kaboski and Townsend 2008). However, there is little direct micro evidence on the quantitative importance of the constraint. Our paper provides such direct evidence.

Our identification strategy is attractive relative to previous tests of consumer behavior. First and foremost, we use compelling, albeit standard, treatment and control groups from the minimum wage literature. That is, we compare households with minimum wage workers in states that experience minimum wage increases to households with minimum wage workers in states that do not within a statistical model that controls for household fixed effects. Additionally, we take advantage of the fact that minimum wage hikes should not affect income of workers making well above the minimum wage. We find that the minimum wage has no income or spending effect on workers earning at least double the minimum wage.

The second attractive feature of our identification strategy is that minimum wage increases

have large effects on the income of minimum wage workers, at least in the short-run. Some previous scholars have argued that rejection of the permanent income hypothesis is often a result of an income change that is too small in size or irregular in frequency.[2] To such a small intervention, "households will not bother to change their consumption paths when the computational costs are large relative to the utility gains" (Hsieh 2003). Although minimum wage hikes are irregular, which helps us overcome the seasonality issue, they typically legislate nominal hourly wage increases of 5 to 20 percent.

It is important to underscore our focus on households that had a minimum wage job prior to an increase in the minimum wage. It is possible that a minimum wage increase reduces the odds that those without a job will be able to find one. Moreover, we ignore most teenagers, where the evidence of disemployment is most compelling. Consequently, our estimates are silent about the aggregate effects of minimum wage hikes. However, for those adults who had a minimum wage job prior to a minimum wage hike, spending (particularly on vehicles), income, and debt rise afterward. [3]

The rest of the paper is organized as follows. Section 2 provides a description of the Consumer Expenditure Survey (CEX), Survey of Income and Program Participation (SIPP), Current Population Survey (CPS), and administrative bank and credit bureau data sets used to estimate the spending, income, and debt responses. Section 3 describes the empirical results. Section 4 outlines a calibrated model of household spending responses to a minimum wage increase when borrowing constraints are present versus absent and links these results to the empirical findings. Section 5 concludes.

2 Data

This section describes the data that we rely on to measure income, wages, spending, and debt. Appendix C and Table A1 provides additional description of the data and sample selection criteria.

Our empirical analysis draws heavily from the Consumer Expenditure Survey (CEX), a

[2]See, e.g., Browning and Collado (2001) and Hsieh (2003).

[3]While we mostly consider the impact that additional income has on spending, it is also possible that additional spending can impact income. In particular, several papers (e.g. Gurley and Bruce (2005) and cites within) claim to find causal evidence that access to cars increases the probabilities of work among low-income households.

representative sample of U.S. consumer units providing detailed information on household spending.[4] The surveys span 1982 through 2008, a period in which six federal and numerous state minimum wage increases were enacted.[5] The CEX interviews households up to four times, spaced three months apart. In each interview, households are asked about detailed spending patterns for the previous three months. While this design provides monthly data, we take the standard approach to CEX data (e.g. Johnson, Parker, and Souleles 2006) and aggregate to the quarterly frequency.

In the first and fourth interview, households are also asked about individual income and hours worked over the previous year. This information is used to calculate the hourly wage of the first two adult (older than 18) members of the household and S, minimum wage labor's share of total household income.[6] We have 206,652 observations from the CEX, of which 11 percent derive some income from the minimum wage.

Two additional datasets – the 1983 to 2003 Survey of Income and Program Participation (SIPP) and the 1979 to 2007 outgoing rotation files of the Current Population Survey (CPS) – are used to corroborate the income patterns in the CEX. We show these results because of the larger samples (785,930 and 391,089 observations for the CPS and SIPP, respectively) and, in the case of the SIPP, the longer panels they provide. Moreover, the CPS and SIPP are specifically designed to measure earnings and wages. For the purpose of identifying minimum wage workers, it is particularly useful that both surveys report the hourly wage of those paid-by-the-hour. To be comparable to the CEX, SIPP and CPS variables are coded, and wage, self-employment, and family composition restrictions are introduced, to be as close as possible to the CEX sample.

Finally, as a verification of the spending patterns documented in the CEX, we use a pro-

[4]For ease of exposition, we refer to consumer units as households.

[5]The minimum wage histories are listed in table A2 and are taken from various issues of the Monthly Labor Review.

[6]That is,

$$S = (E_{11} \times I\{w_{11} \leq w_{min,i1} \times L\} + E_{21} \times I\{w_{21} \leq w_{min,i1} \times L\})/F_{.1}, \quad (1)$$

where E_{11} and E_{21} are the salary income for persons 1 and 2 (typically, the head and spouse) in time period 1, $F_{.1}$ is total pre-tax non-asset income in the first period that the household is observed in the data, and $I\{w_{11} \leq w_{min,i1} \times L\}$ and $I\{w_{21} \leq w_{min,i1} \times L\}$ are indicators of whether persons 1 and 2 are adult minimum wage workers in the initial period. Previous research (e.g. Card and Krueger 1995, Wellington 1991, Lee 1999) has shown that minimum wage hikes increase the wages of workers that make slightly above the minimum wage. Thus we set L to be 1.2 in equation (1) (i.e. 120 percent of the minimum wage) for most of our analysis. Our results are not sensitive to reasonable parameter values of L.

prietary dataset from a large, national financial institution that issues credit cards. This institution appends quarterly credit bureau reports about the credit card holders' loan portfolio of mortgage, auto, home equity, and credit card balances to all credit card accounts. We draw two samples from this data: a two-and-half year overlapping panel containing 4,610,497 observations from 1995 to 2008 and a separate sample of 644,037 observations that begins in January 2000 and runs for four years.

3 Empirical Results

3.1 Estimating Equations

Our empirical strategy is standard. We estimate equations of the form:

$$Z_{it} = f_i + \sum_{k=-K}^{K} \phi_k w_{min,it+k} + \omega' X_{it} + u_{it} \tag{2}$$

where Z_{it} is either income, spending, or change in debt, and $w_{min,it+k}$ is the minimum wage rate for the state that individual i resides in at time $t+k$.[7] X_{it} includes year and quarter dummies or a full set of month dummies and f_i is a household fixed effect.[8]

One drawback to the debt data is the limited nature of available wage and demographic information.[9] Most importantly, the only income data available is self-reported annual earnings of the account holder at the time of the credit card application. No information on hours worked is available.

Therefore, in the debt regressions we weight the minimum wage variable $w_{min,it+k}$ in equation (2) by the probability that the holder is a minimum wage worker.[10] The regression

[7] When using quarterly CEX and debt data, $w_{min,it+k}$ is the average value of the minimum wage over the quarter.

[8] When available, we also condition on the number of adults and the number of kids in the household in order to be consistent with other research (e.g. Johnson, Parker, and Souleles 2006). However, once the household fixed effect is included, we find no observable covariates in the CEX or the debt data that substantively impact our coefficient of interest, ϕ_k.

[9] Technically, we only have information for individual card-holders, not the unit of interest, the household. We partially circumvent this limitation since debt contracts are typically written at the household level. Therefore, the credit bureau data are often, but not always, at the household level.

[10] In other words, we assume spending is as in equation (2) with probability P_i and is equal to $f_i + \omega' X_{it} + u_{it}$ with probability $(1 - P_i)$, which gives rise to equation (3).

becomes

$$Z_{it} = f_i + \sum_{k=-K}^{K} P_i \phi_k w_{min,it+k} + \omega' X_{it} + u_{it}. \tag{3}$$

To compute the weights, we use the CPS to estimate a probit model of whether a worker was within 120 percent of the minimum wage. Covariates are a quartic in annual earnings, a quartic in age, an age times annual earnings quartic, female, married, and female times married. The estimated probit model reveals that 70 percent of all individuals earning less than $15,000 per year are minimum wage workers, whereas virtually no one earning over $20,000 per year is a minimum wage worker.

3.2 The Magnitude of the Income Response

Table 1 begins by documenting the impact of a $1 increase in the minimum wage on household income.[11] Each cell in the table represents a different regression. The top number is the point estimate, the second number is the standard error corrected for within-household serial correlation, and the third is the sample size. Rows are organized by S, the share of household head and spouse earnings that come from employment at minimum wage jobs. Thus, the first row includes households with no minimum wage income ($S = 0$). The remaining rows include households with varying levels of minimum wage income. These initial results ignore dynamics, i.e. set $K = 0$ in equation (2).

Column (1), based on the CEX, shows that a $1 increase in the minimum wage causes income to rise by $218 among households with any minimum wage income (row 2) and a comparable magnitude among households with minimum wage jobs that comprise greater than 10 and 20 percent of total household earnings (rows 3 and 4). In contrast, there is no impact among households with no minimum wage income (row 1).[12] However, these estimates are not precise, particularly for the minimum wage households. In the latter case, standard errors are of similar-size to the point estimates.

Therefore, the next two columns provide estimates from the CPS and SIPP. Here, unlike

[11] A handful of studies have estimated similar income equations. Recent examples include Draca, Machin, and Van Reenen (2008), Addison, Blackburn, and Cotti (2008), and Neumark, Schweitzer, and Wascher (2004, 2005). Each of these studies finds evidence that minimum wage hikes increase household income in the short-run.

[12] The results are based on after-tax income but the results are similar for before-tax income.

the CEX, the sample is restricted to households with hourly workers.[13] For such households with minimum wage income, we find that quarterly earnings rise by \$311 (\$104) and \$164 (\$187) in the CPS and SIPP after a \$1 minimum wage increase. The estimates vary across different S cutoffs and datasets. Therefore, the final two columns report a weighted average income response, with and without the CEX, where the weights are based on the precision of the individual estimates. These calculations suggest that, in the near-term, household quarterly income rises by roughly \$250 to \$300 with standard errors, calculated using standard GMM formulas, of under \$100. The effect on non-minimum wage households is not statistically different from zero, with a standard error that is fairly small.[14]

It is important to note that household income need not rise among minimum wage workers if the legislated minimum wage increase leads to enough job loss. That does not appear to be the case, however. In table A3, we show that employment and hours do not fall after an increase in the minimum wage among our samples of adult CPS workers. Rather, wages rise among workers in minimum wage households and not among non-minimum wage households, explaining the majority of the earnings pattern that we document.[15]

Beyond the first few quarters, the long-run effect of the minimum wage on income is more difficult to measure with existing data. Neumark et al. (2004, 2005) find that any income gain from a minimum wage increase dissipates substantially, perhaps even evaporates, within two years. This result is consistent with the empirical finding that most individuals who earn the minimum wage at a point in time will earn well above the minimum wage two years later (Smith and Vavrichek 1992; Carrington and Fallick 2001). Indeed, only 38 percent of SIPP workers within 120 percent of their state's effective minimum wage are still within that range a year later. Two years later, only 28 percent are within 120 percent of the minimum wage.

xx[da: explain 1,500 estimate in paragraph above?]xx

[13] As expected, when we use a computed wage from the CPS and SIPP, we find smaller earnings responses.

[14] Furthermore, we also find that the income response is not statistically different from zero among households with workers that are near the minimum wage, say between 120 and 300 percent of the minimum, but likely not directly impacted by it. This is a bit finer test than a comparison to all $S = 0$ households. More generally, we also find roughly similar results when we exclude CPS and SIPP households that move in order to be analogous to the CEX sample design or exclude households headed by someone with a college education.

[15] Among $S \geq 0.2$ households, wages rise by roughly 0.34 per hour. Household hours worked per week average about 56. That implies roughly a \$250 increase in quarterly earnings (0.34*56*13 weeks) if all the hours are from minimum wage jobs. There is also a small positive impact of just under an hour per week, mostly driven by spouses. At a \$5.15 minimum wage, the extra hours would imply an additional \$50 in earnings per quarter.

3.3 The Magnitude of the Total Spending Response

Table 2 reports the size of the spending response to a minimum wage increase. Like table 1, each cell represents a separate regression and rows are stratified by S, the share of household income from minimum wage jobs.

We find that total spending increases by an economically important and usually statistically significant amount for households that derive income from minimum wage labor. That can be seen in column (1). Total spending in households where minimum wage labor is the source of at least 20 percent of total income, for example, rises by $847 (standard error of $451) per quarter, representing 13 percent of an average quarter's spending of $6,507 (column 5). In contrast, spending among households without minimum wage workers does not change in a statistically or economically significant way (-$13 with a standard error of $149). Moreover, spending and income among households with workers that are 120 to 300 percent above the minimum wage are not statistically different from zero.[16] These results provide further evidence that the spending effect is caused by the minimum wage and not a vestige of state-specific unobservable trends in consumption that are specific to low-wage families.

This basic pattern is robust to many perturbations of the sample and the statistical model. Columns (2) to (4) report two such robustness checks. In column (2), we show that the spending response is large for households that might be particularly liquidity constrained. Liquidity constraints are proxied, as in Johnson et al. (2006), by whether a household's balance in checking and savings accounts are below $5,000. The results are also strongest in states that instituted substantial hikes (columns 3 and 4).[17] More generally, we find similar estimates when we control for other factors in the regressions, including time trends (rather than year dummies), the age of the head, survey fixed effects, and changes to other relevant social policies that could conceivably be passed in tandem with a minimum wage increase.[18]

[16] For households with anyone earning 120% to 300% of the minimum, spending declines $140 ($172) per quarter.

[17] We re-estimated the model with a dummy for whether the minimum wage change was "small," where small is identified as a change in the minimum wage of less than 25 cents, and an interaction between this small indicator and the minimum wage. The small category captures hikes due to automatic CPI adjustments as well cases where the federal minimum wage change had little impact because the existing state minimum wage was already close to the new federal level.

[18] In particular, the policies that we control for are maximum state-level EITC and welfare/TANF benefits levels. We also control for state unemployment rates to account for possible UI extensions. The correlations between the change in the state minimum wage and the change in state EITC and welfare benefits are essentially zero.

The results are also robust to removing data restrictions on family composition, age, and wage levels and changes.

Using the estimated spending effect in column (1) and the income estimates from table 1, we report the marginal propensity to spend (MPS) in columns (6) and (7). We find that minimum wage households spend at least double, and perhaps four times, the short-term increase in income that arises from minimum wage hikes. There is no impact among non-minimum wage households.

To help motivate our explanation for the high MPS and to further corroborate this result, we next show a series of calculations on the composition, heterogeneity, and timing of spending and debt. Here, we take advantage of the detailed spending breakdown in the CEX and the debt data from the credit bureaus.

3.3.1 Composition of Spending Responses

Table 3 displays the estimated durable and nondurable spending response to a minimum wage increase for households where $S = 0$, $S > 0$, and $S \geq 0.2$. We find that the majority of the large MPS reported in table 2 is from spending on durable goods. For example, households with $S \geq 0.2$ increase durables spending by \$882 (\$385) per quarter following a \$1 increase in the minimum wage, an amount that, on average, doubles the typical household's quarterly spending on durables. Again, households with no minimum wage income report no additional durables spending after the minimum wage hike. By contrast, we cannot statistically reject that the impact on nondurables and services is different from 0. The results are particularly striking when considering that non-durables and services comprise 85 percent of total spending.

Since most of the spending response is in durables, the rest of the table decomposes this category more finely. In particular, we classify goods into eight categories: furniture, floors and windows, household items, large appliances, electronics, leisure activities, miscellaneous household equipment, and net outlays on transportation (measured as the difference between the price of the vehicle purchased and the vehicle sold).[19]

[19]Floors and windows include carpets, rugs, curtains, drapes, blinds. Household items include clocks, lamps, linens, silverware, plates, glasses, decorative items, and outdoor equipment. Large appliances include kitchen and laundry appliances. Electronics includes televisions, VCRS, DVDs, stereo and sound equipment, computers, telephones, PDAs, antennas, and satellite dishes. Leisure activities include musical instruments, sports equipment, bikes, camping equipment, toys, games, playground equipment, arts and crafts, CDs, and

For most categories, the impact is small and hard to distinguish from zero. The notable exception is transportation goods. Households in the full sample with $S \geq 0.2$ spend an additional \$772 (\$380) on transportation durables, representing about 90 percent of the total spending response.

Table 4 further decomposes transportation spending. In columns (1) to (3), we report estimates of the probability of buying various types of vehicles from linear probability models with individual fixed effects. For households with $S \geq 0.2$, the probability of purchasing a new vehicle rises by 2.7 percent (1 percent) per quarter. Column (4) shows that those additional purchases leads to an extra \$503 (\$209) in expenditures, on average.

Column (7) presents estimates of the spending response over the 1992 to 2008 period where additional questions were asked about the financing of new vehicle purchases. Column (8) shows that only \$44 of the \$417 spending response comes from vehicle purchases that were not financed. Of the remaining \$373, \$118 is an increase in downpayments (column 9) and the remainder comes from loans collateralized by the vehicle (column 10).

3.3.2 Distribution of the Spending Responses

Since an additional 2.7 percent of households purchase a new vehicle in the quarters immediately following a minimum wage increase, we would expect that the spending response is concentrated among a minority of households. This pattern is displayed in figure 1, which graphs a set of quantile regressions of total spending, ranging from 0.10 to 0.95 (the quantile is shown on the x-axis) for households where either $S = 0$ (connected by the dashed line) or $S \geq 0.2$ (solid line).[20] The key insight is that, for minimum wage households, the mean response is much bigger than the median response, the latter of which is not statistically or economically different from 0. In particular, the average effect reported in earlier tables appears to be substantially driven by the tails of the spending response distribution, especially households

DVDs. Miscellaneous household equipment includes small appliances, smoke alarms, cleaning equipment, tools, lawn equipment, window air conditioners, and portable heaters and coolers. Transportation includes cars, trucks, vans, motorcycles, and boats. These purchases are net of trade-ins.

[20] In order to remove the household fixed effect, we first demeaned all variables, and then used standard quantile estimation techniques. Because a quantile estimator is not a linear model, demeaning the data will generate inconsistent estimates. However, when we performed our procedure on our simulated data, we found that this problem is very minor. More importantly, we perform the same procedures on the simulated data, so the estimates on actual and simulated data are comparable.

beyond the 90^{th} percentile of the distribution.[21] We would not want to overemphasize these results given their precision. Indeed, 90 percentile error bands show that none of the estimates are statistically distinguishable from zero. But the point estimates are broadly consistent with the heterogeneity in spending responses that we would expect given that average spending is driven by expensive durables purchases.

3.3.3 Timing of Spending

Figures 2a through 2d show the timing of the spending response for the $S \geq 0.2$ households. The plots are based on equation (2) where we allow for three quarters of lags and leads of the minimum wage (K=3). The figures highlight three additional key facts.

First, the initial total spending increase (figure 2a) happens primarily in the contemporaneous quarter of the minimum wage change. There is little evidence that total spending increases prior to the minimum wage change, even though minimum wage hikes are typically passed into law 6-18 months prior to the time of the hike.[22]

Second, total spending is flat prior to the minimum wage increase. However, this masks an offsetting increase in nondurables and services (figure 2b) and a decline in durables spending (figure 2c). But when the hike occurs at t=0, durables spending, and in particular new vehicle spending (figure 2d), spikes up. Meanwhile, nondurables and service spending increases two quarters before the hike but does not increase further during the quarter of the hike.

Third, spending does not revert back to pre-hike levels after that initial increase. It bounces around $1,000 per quarter in the near term, before starting to slowly decline.

All of the figures include 90 percent confidence intervals to emphasize that the estimates are imprecise. The patterns on nondurables spending in particular are hard to interpret given the size of the standard errors. But the dynamics that we highlight are consistent with the borrowing constraint model that we describe in section 4.

[21] The spending effects are also large at the 10th percentile. However, that result does not appear to be robust to alternative ways to control for family size. Recall that we follow Johnson et al. (2006) by excluding households where the number of adults or children changed by more than two and then directly controlling for the number of adults and children in the regression. Instead, if we exclude any household with a change in family composition during the survey time period, the 10th percentile spending response goes away. The 95th percentile response declines but is still large and positive, albeit not precisely estimated.

[22] For example, of the 19 state minimum wage changes between 2000 and 2004 (excluding CPI adjustments), the median time between legislation and enactment date is 9 months. Only two increases (California in 2001 and Rhode Island in 2000) occurred less than five months after the bill's passage. Even among those, legislative debate began well before passage.

3.4 Debt

If spending rises more than income after a minimum wage increase, it follows that net worth declines. Table 5 shows quarterly changes in debt, as measured by the credit bureaus, after a minimum wage hike, broken into subcategories: vehicle loans, home equity loans, mortgages, and credit card debt. The final two columns provide sums of total and collateralized (vehicle and home) debt.

In each category, debt increases after a minimum wage increase, but particularly in collateralized loans tied to vehicles. We estimate that a $1 minimum wage increase causes auto loan balances to increase by $205 ($85), similar to the $255 increase in debt collateralized by vehicles estimated from the CEX and shown in table 4. Furthermore, home equity lines, which can be used to purchase vehicles, rise $130 ($85).[23] Total collateralized debt increases by $497 ($316).[24] There is no increase in debt among higher income ($\geq \$20,000$) individuals.

These numbers are consistent with the income and spending results presented thus far. Assuming that financial assets do not change after a minimum wage hike, rearranging a standard asset accumulation equation (like 5 below) shows that spending is equal to the sum of the debt and income response. Taking the mean income response of all ($S > 0$) minimum wage households to be roughly $250 to $300 and the auto plus home equity debt response to be a little over $300, implies an imputed spending response of about $600 (with a tight standard error of $50, calculated using GMM).[25] For $S > 0$ households, that is close to what we observe in the CEX.

Figure 3 displays the dynamics of household debt in the nine quarters that follow a minimum wage increase. To provide a longer panel, this figure is based on the sole cohort of accounts that are followed for four years starting in January 2000 rather than the series of two year panels used in table 5. Three series are plotted. For households with income below $20,000, we show combined auto and home equity debt (with 90 percent confidence intervals) and those two instruments plus credit card debt. We also plot auto and home equity debt for

[23] According to CNW Research, home equity lines were used in 12 to 14 percent of vehicle purchases made between 2003 and 2007. These data were generously provided to us by CNW. They are based on monthly phone and mail interviews of more than 14,000 households.

[24] The estimated credit card debt response of $105 ($95) is based only on our institution. However, if we use accounts where the balance ratio is high, and therefore the individual relies primarily on only our card, the change in debt following a minimum wage increase is similar albeit less precisely estimated. Our total debt also excludes loans not recorded by the credit bureau, including educational debt.

[25] Using all collateralized debt, the implied spending response would be just over $750 with a standard error of about $80.

households with income above $20,000. The figures clearly show total debt rising, particularly in auto and home equity loans, in the first year after a minimum wage increase. In subsequent quarters, debt rises by less, to the point that by the eighth quarter, debt is beginning to fall. [26] This provides direct evidence that much of the early consumption response is in fact debt-financed, and corroborates the independent CEX measures of debt-financed vehicle spending and the large MPS estimates that arise from the income and spending regressions.

Finally, figure 4 plots a set of quantile debt regressions, ranging from 0.10 to 0.95 for households with $< \$20,000$ and $\geq \$20,000$ in income. We again find that the median and mean effects are quite different. The average effect reported in table 5 is driven by the upper tails of the debt response distribution, consistent with the heterogeneity in spending responses that we would expect given that spending is driven by expensive durables purchases.

3.5 Summary of Empirical Results

We identify several stylized facts about income, spending, and debt following a minimum wage increase.

First, spending and income increase $800 and $300 per quarter immediately following a minimum wage hike among households that derive at least 20 percent of their income from minimum wage jobs. Consequently, we should see debt rising dramatically, a pattern that we document with the CEX and credit bureau data.

Second, the majority of the spending response is in durable goods and, in particular, new vehicles that are debt financed. Consequently, the spending response is concentrated among a small number of households.

Third, total spending begins to rise within one quarter of a minimum wage increase not at the legislation's passage, which typically occurs 6 to 18 months prior. Moreover, there are some compositional differences in the timing. Prior to the minimum wage hike, durables spending falls and non-durables spending rises by roughly equal amounts, so the total spending response is almost zero. After the minimum wage hike, non-durables spending

[26] Indeed, despite the rise in debt, we find no evidence of an increase in default six months after a minimum wage increase. The probability that an account is 60 days-past-due actually falls slightly from 5.79 to 5.64 percent (with a standard error of 0.15 percent) six months after a minimum wage increase. This result is again based on a single cohort of credit bureau accounts, but the cohort is large, followed for four years, and the linear probability models include controls for fixed effects, as well as typical predictors of default like FICO scores, debt levels, credit limits, the APR on outstanding loans, and time dummies.

barely increases further, but durables spending immediately spikes upward.

Finally, high levels of durables spending and debt accumulation persist for several quarters after a minimum wage hike.

4 A Model with Durable Goods and Borrowing Limits

In this section, we describe a model that can explain many of these key empirical findings. Define C_t as consumption of non-durable goods at time t and S_t as the durables stock at time t (where time is measured in quarters). The household maximizes

$$E_{t_0} \sum_{t=t_0}^{T} \beta^t (C_t^{1-\theta} S_t^{\theta})^{1-\gamma} / (1-\gamma) \tag{4}$$

subject to the constraints below. Within period preferences are Cobb-Douglas between durables and non-durables. Thus, consistent with the evidence, expenditure shares are assumed constant.[27] We model individuals for 188 quarters, from age 18 to 65.

The asset accumulation equation is:

$$A_{t+1} = (1+r)A_t + Y_t - C_t - I_t \tag{5}$$

where A_t denotes assets, r the interest rate, I_t investment in consumer durables, and Y_t income. The law of motion for durables is

$$S_{t+1} = (1-\delta)S_t + I_t \tag{6}$$

where δ is the depreciation rate.

In contrast to much of the literature, but often observed in practice, we allow individuals to borrow against durable goods. Assets must satisfy the borrowing constraint

$$-A_t \leq (1-\pi)S_t \tag{7}$$

[27] For example, among CEX households with no adult minimum wage earners, the durables share of expenditures is roughly 17 percent. Among those households where income comes entirely from minimum wage labor, it is 12 percent. Fernandez-Villaverde and Krueger (2002) review the evidence on the substitutability of durables and non-durables and conclude that Cobb-Douglas is consistent with the evidence.

where π is the downpayment rate, or the fraction of the value of newly purchased durable goods that do not serve as collateral. Such a constraint may exist because of limited enforcement, where collateral guards against the temptation to default (e.g. Kiyotaki and Moore 1997).

Finally, the income process is:

$$\ln Y_t = \alpha_t + P_t + u_t \tag{8}$$

where α_t is the life cycle profile of income. We assume that $\alpha_t = \alpha_{t_0} + \alpha_1 t$ for the first 80 quarters of an individual's life, and is constant at $\alpha_t = \alpha_{t_0} + \alpha_1 \times 80$ afterwards. The stochastic components of income are the white noise term u_t and the AR(1) term P_t:

$$P_{t+1} = \rho P_t + \epsilon_{t+1} \tag{9}$$

where $\epsilon_t \sim N(0, \sigma_\epsilon^2)$ and $u_t \sim N(0, \sigma_u^2)$.

The model is complex and thus we solve it numerically. We describe our calibration and results immediately below and the solution techniques in appendix A.

4.1 Calibration of the model

To calibrate the model, parameters are set to the values listed in table 7. Here, we highlight those that are less standard.

First, we pick θ to match the CEX's estimate of non-residential durables share of aggregate non-residential expenditure, $I_t/(I_t + C_t)$. Second, for δ, we use Campbell and Hercowitz's (2003) estimate of quarterly depreciation rates for non-residential durable goods, which is similar to those in Adda and Cooper (2000).

Third, we assume the downpayment rate, π, is 0.4. The Federal Reserve's G19 Consumer Credit release reports that the loan-to-value ratio, (1-π), on new cars averaged 90 percent between 1982 and 2005, the years in our CEX sample. However, only 57% of the durables spending response came from new vehicles.[28] The rest of durables spending likely requires larger downpayments, including some products for which collateralized financing may not be readily available (e.g., small applicances).

[28] Tables 3 and 4 show that for $S \geq 0.2$, the durables response is \$882 and the new vehicle response is \$503.

We choose $1+r=\sqrt[4]{1.03}$ to correspond to a 3 percent real rate of interest, a standard in the literature. We choose β to match the share of households who are liquidity constrained. The 25th, 50th, and 75th percentile of the "buffer" (defined as $A_t+(1-\pi)S_t$) are XX, XX, and XX. Equation (7) shows that this must be non-negative. To match this we use $\beta=\sqrt[4]{0.95}$, or 0.95 at an annual rate.

Finally, we estimate the parameters of the income process using the SIPP. We estimate $\alpha_1=0.0108$ through a household fixed effects regression of log income on age for households with minimum wage workers.[29] Income growth of this magnitude is similar to income growth among other low skill workers of the same age. Thus we assume that the deterministic component of income growth for minimum wage households is similar to the profile for households headed by someone without any college. Because income growth tapers off after 20 years in the labor force (Gourinchas and Parker 2002), we assume that income grows at rate α_1=0.01 for 80 quarters and does not grow thereafter. We choose α_{t_0} to match the average income of SIPP minimum wage households headed by 18 year olds.[30]

4.2 Initial Joint Distribution of the State Variables

Each simulated individual begins its life with the state vector, where the state variables are the permanent component of income, financial assets less durables debt,[31] and the stock of durable goods, of an individual aged 18 to 25 observed in the data. We compute the state vector from random draws of households headed by an individual aged 18 to 25 in the 1989, 1992, 1995, 1998, 2001, 2004, and 2007 waves of the Survey of Consumer Finances (SCF). Appendix D and table A2 present some key descriptive statistics. Unsurprisingly, many minimum wage households have very little in the way of financial assets and are therefore likely to face binding borrowing constraints. For example, median financial assets less durables debt are $18.

[29] This translates into 4 percent average annual income growth, close to estimates for early career low-skill workers (e.g. French, Mazumder, and Taber 2006).

[30] Because $E(Y_{t_0})=\exp(\alpha_{t_0}+(\sigma_P^2+\sigma_u^2)/2)$, and earnings variance varies across specifications, we adjust α_{t_0} across specifications.

[31] More precisely, the state variable is cash-on-hand, which is the sum of assets and current income.

4.3 Modeling Minimum Wage Hikes

In order to assess the impact of the minimum wage, we simulate the model with and without a minimum wage hike. The hike is modeled as an innovation to the deterministic component of income, α_t. Given our estimated income responses in section 3.2, we assume that income rises by \$300 per quarter following a minimum wage hike.

Of course, at any given point, there is a distribution of minimum wage worker ages. We approximate this as a three point distribution – ages 22, 34, and 50 – to be consistent with the midpoints of the age tertiles among minimum wage workers in the CEX.

Figure 4 plots the difference in income profiles between simulated individuals who received a minimum wage hike and those who did not. The immediate \$300 gain is assumed to dissipate over the next 10 quarters. At ages 22 and 34, this means that rather than grow at 1 percent per quarter, we assume α_t remains constant in the first ten periods after the hike for households receiving a minimum wage increase. This allows any income gain from the minimum wage to be eroded after $2\frac{1}{2}$ years, as in figure 4. After 10 quarters, income once again grows by 1 percent per period for younger households and 0 percent for older households. Consequently, in total, a 10 percent minimum wage hike increases total discounted lifetime income by just over \$1,500.

xx[da: age 50, declines by 1 percent. but you also say it grows by 0i took this out but it might have to go back in? At age 50, income declines by 1 percent per quarter.]

Finally, we assume that households learn about the minimum wage hike three quarters before it occurs. This is consistent with the observation that minimum wage legislation is typically passed into law at least three quarters before the minimum wage hike is implemented.

4.4 Model Results without Uncertainty and Borrowing Constraints

We first describe the calibration results for the case when households face neither borrowing constraints (so π is unimportant) nor income uncertainty ($\sigma_\epsilon^2 = 0$) to clarify the dimensions on which this model succeeds in describing the empirical facts. We use the parameters in table 7, with the exception that the time discount factor β is set to 1 to allow the model to generate a more plausible wealth distribution. When $\beta = \sqrt[4]{0.95}$, median assets

at the time of the minimum wage hike are implausibly low.[32]

Figure 5 shows the predicted spending response to a minimum wage hike, i.e., the predicted difference between spending of those who received a minimum wage hike and those who did not. Three key features of the figure are worth highlighting.

First, the initial spending increase is \$60, followed by \$15 spending per quarter thereafter. The present value of this stream of spending is roughly \$1,500, the lifetime income gain from the minimum wage hike. These estimates are substantially smaller in the near-term than what we observe in the spending data. To better understand the size of the spending responses, we use the parameter values in table 7 and formulas in appendix B to show that if T is large or there is a resale market for durables, the marginal propensity to spend on non-durables and durables is well below 1:

$$\left.\frac{\partial C_0}{\partial A_0}\right|_{S_0} = (1-\theta)\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right] = 0.01, \tag{10}$$

$$\left.\frac{\partial I_0}{\partial A_0}\right|_{S_0} = (\beta(1+r))^{\frac{1}{\gamma}}\left(\frac{\theta}{r+\delta}\right)\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right] = 0.04 \tag{11}$$

where θ and $1-\theta$ are the shares of lifetime expenditure devoted to non-durables and durables, respectively. The term $r+\delta$ is a user cost, or the per period price of durables relative to non-durables, and $\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right]$ is an annuitization factor.

Second, the household purchases large quantities of durables and more modest quantities of non-durables upon learning about the minimum wage hike. The reason for the durables increase is that if the household wishes to permanently increase the *service flow* of durables by a small amount, she must increase durables *spending* by a larger amount. After an initial jump, durables spending can decline again as the household only spends to maintain the new higher durables stock (Mankiw 1982).

Third, the spending response occurs when the household learns about minimum wage hike in quarter -3, not when the hike occurs in quarter 0.

[32] When $\beta = \sqrt[4]{0.95}$, households are more impatient, and spend more in the short-run. For example, the short-run spending response increases from \$60 when $\beta = 1$ to \$90 when $\beta = \sqrt[4]{0.95}$.

The magnitude, composition, and timing of these predictions are inconsistent with the empirical findings described in section 3.

4.5 Model Results with Borrowing Constraints and Income Uncertainty

Next, we introduce collateral constraints and income uncertainty to the model. Figure 6 plots the spending response to a minimum wage hike that emerges from this model. It illustrates several noteworthy, and ultimately testable, implications.

The first is the sheer magnitude of the spending increase. Total spending increases by over $300 per quarter, or $1,200 in the year after the minimum wage hike. This increase in spending is larger than the gain in income in the first year.

The second finding relates to timing. Much of the spending increase occurs at the date of the minimum wage change, not when the household learns about the impending hike in quarter -3. Because households are unable to borrow against future income in order to finance current spending, their spending does not rise until the minimum wage increases. Between quarters -1 and 0, the total spending response increases from under $100 to almost $400.

The last two features of the model have to do with the composition of spending before and after the minimum wage increase. Prior to its implementation but after its legislative enactment (quarters -3 to -1), there is a small increase in spending. This spending increase is heavily skewed toward nondurables. Indeed, durables spending declines slightly. However, once the minimum wage is implemented in quarter 0, durables spending soars by almost $250, while nondurables spending continues along a relatively stable path that began at quarter -3. In the face of borrowing constraints, fluctuations in durables spending is optimal because a short-run decline in durables spending has a small effect on the durables stock and its corresponding service flow. Put simply, it is easier to postpone buying a car than food. xxbrowning cite herexx

That leads us to our final notable result – the persistence of durables spending. Although durables spending begins to decline after period 0, it remains elevated and is as high as the nondurables response at least a year later.

One of the striking aspects of this model is that spending exceeds income in the near-term. To see the intuition behind this result, and why spending may be concentrated in durables expenditures, assume that the borrowing constraint (7) always binds, i.e. $A_t = -(1-\pi)S_t$.

Combining it with the asset accumulation equation (5) and the law of motion for durables, equation (6), it can be shown that:

$$\pi I_t + C_t + (1-\pi)(r+\delta)S_t = Y_t. \tag{12}$$

Households spend income on durables I_t, nondurables C_t, and interest payments on durables S_t. Since the household only needs $\$\pi$ to purchase \$1 worth of durables, spending gains can temporarily exceed income gains.

The magnitude, timing, composition, and persistence of spending following a minimum wage increase observed in the data are consistent with the model with borrowing constraints and income uncertainty but inconsistent with a model without these features.

4.6 Robustness Checks

Table 8 describes a number of checks of our model predictions. In particular, we report how spending responses vary with the size of the downpayment constraint and the income process. The particular way parameters are adjusted for each of these tests is explained in the first column. The next three columns report non-durables, durables, and total spending responses to minimum wage hikes with the new parameter values. These are estimated on the simulated data using a household fixed effects regression similar to equation (2). In order to be consistent with the empirical methods and CEX data, we use simulated spending data three quarters before to three quarters after the minimum wage hike.[33] The fifth column reports assets, A_{it}. The final column reports resources for spending, $A_{it}+(1-\pi)S_{it}$, a measure of how borrowing constrained the agent is. Equation (7) shows that this term must be non-negative.

For convenience, the first row reviews our estimated spending response. The second row reviews our baseline borrowing constraint model, as described in section 4.5, table 7, and figure 6. Non-durables and durables spending rise by \$113 and \$196 per quarter or \$309 in total per quarter.

The next two rows explore the sensitivity of the results to changes in the downpayment rate, π. Reducing the downpayment rate from 40 to 20 percent leaves the total spending response largely unchanged at \$299. However, increasing the downpayment rate to 100

[33]To further match the empirical methodology, we assume the share of minimum wage households that receive minimum wage hikes is similar to that in the data.

percent, as in the standard buffer stock model, reduces the spending response to $221. The lower the downpayment rate, the more goods can be purchased with a given level of income. Thus, spending is more sensitive to income when the downpayment is lower.

The next two rows explore the sensitivity of the results to differences in the income process. When there is no income uncertainty, the total spending response rises to $359 per quarter. However, allowing for moderately higher innovation variance (σ_ϵ^2=0.005 and σ_u^2=0.05), as in Meghir and Pistaferri (2004) or Gourinchas and Parker (2002), leads to a reduced spending response of $89.

The sensitivity of the spending response to the income process arises from the extent to which precautionary motives are important. When there is no income risk, there is little incentive for agents to hold precautionary wealth. With little precautionary wealth, the borrowing constraint is more likely to bind. When the borrowing constraint binds, equation (12) shows that we should expect large spending responses. For example, in the absence of income uncertainty, median "resources" available for spending (defined as $A_{it} + (1 - \pi)S_{it}$) is $81. Because agents are borrowing constrained in this framework, the spending response is $359 per quarter.

But when income risk is high, agents hold larger amounts of wealth and, consequently, borrowing constraints do not bind. Consequently, these households behave as if they are unconstrained and spend less in response to a minimum wage hike.

Note that the intuition of equation (12) – that $1 can be used to purchase $\frac{1}{\pi}$ worth of durables – suggests that the simulated spending response can be very large. For example, if $\pi = 0.2$, an extra $300 in income can generate $1,500 in extra durables spending. Our predicted responses are much smaller for three reasons. First, we set π at 0.4, which we believe is a more plausible level. Second, as we pointed out above, income uncertainty means the borrowing constraint does not always bind, creating smaller spending responses. Third, much of the spending increase is devoted to non-durables, and non-durables cannot be leveraged. To better assess the importance of these issues, the next two rows show the results under two alternative scenarios: (i): $\theta = 0.4$ (simulated households have a high preference for durables), $\pi = 0.1$ (simulated households can heavily leverage those durables), and there is no income uncertainty (so the borrowing constraint is more likely to bind); and (ii): $\theta = 1, \pi = 0.2$, and no income uncertainty. In both simulations, the spending responses are much larger than our

baseline. However, the model generates implausibly high debt levels.

The next row shows spending responses when there are adjustment costs, which we discuss in greater detail in section 4.7. For completeness, the final two rows report spending responses in the model without borrowing constraints, as in section 4.4.[34] As noted earlier, spending barely responds under this version of the model.

4.7 Adjustment Costs and the Distribution of Spending Responses

[ebf: move this para up to sec 3]

Because much of the spending increase comes from vehicles, there is considerable heterogeneity in spending after a minimum wage increase. This point is displayed in figure 7, which graphs a set of quantile regressions of total spending, ranging from 0.10 to 0.95 (the quantile is shown on the x-axis) for households where either $S = 0$ (connected by the dashed line) or $S \geq 0.2$ (solid line).[35] The key insight is that, for minimum wage households, the mean response is much bigger than the median response, the latter of which is not statistically or economically different from 0. In particular, the average effect reported in earlier tables appears to be substantially driven by the tails of the spending response distribution, especially households beyond the 90^{th} percentile of the distribution.[36]

Figure 8 compares the estimated distribution of the spending response to that predicted by our model. It plots the quantiles of the spending response for minimum wage households. The XX line shows the estimated distribution of responses (the same line as shown in figure 7XX) Compare this to the solid pink line labeled baseline. The baseline model predicts roughly the same sized effect throughout the spending distribution and thus underpredicts the spending response at the 90^{th} and 95^{th} percentile relative to what is seen in the data.

Now, consider the possibility that households face a cost of adjusting their durables stock,

[34] As in section 4.4, we set $\beta = 1$ to generate a plausible wealth level.

[35] The estimates are presented without leads or lags of the minimum wage (i.e., $K = 0$ in equation (2)). In order to remove the fixed effect, we first demeaned all variables, then used standard quantile estimation techniques. Because a quantile estimator is not a linear model, demeaning the data will generate inconsistent estimates. However, when we performed our procedure on our simulated data, we found that this problem is very minor. More importantly, we perform the same procedures on the simulated data, so the estimates on actual and simulated data are comparable.

[36] The spending effects are also large at the 10th percentile. However, that result does not appear to be robust to alternative ways to control for family size. Recall that we follow Johnson et al. (2006) by excluding households where the number of adults or children changed by more than two and then directly controlling for the number of adults and children in the regression. Instead, if we exclude any household with a change in family composition during the survey time period, the 10th percentile spending response goes away. The 90th and 95th percentile response declines but is still large and positive, albeit less precisely estimated.

as in Carroll and Dunn (1997) and Kaboski and Townsend (2008). Households might face transactions costs of adjusting their durables stock because, for example, it takes time to shop for a new car or the trade-in-value of a used car is less than the price of buying the same car off a used car lot. We follow Grossman and LaRoque (1990) and Eberly (1994) by assuming that in order to increase the durables stock, five percent of the previous stock would be lost.[37] This adjustment cost transforms equation (5) into:

$$A_{t+1} = (1+r)A_t + Y_t - C_t - I_t - 0.05S_t \times 1\{I_t \neq 0\} \tag{13}$$

where $1\{I_t \neq 0\}$ is an indicator of when the individual either purchases or sells a durable good.

When we make this modification, but leave other parameters at the baseline, the average total spending response falls from \$309 to \$188 per quarter (see table 8). Part of the reason for the decline is an artifact of timing. As pointed out by Caballero (1993) and others, short-run spending is sluggish in models with adjustment costs. Recall that to be consistent with the methods to obtain our estimates, we estimate the calibrated model's spending response using data only through the third quarter after the minimum wage hike. Because some of the spending response is delayed to later quarters, the mean effect looks smaller when allowing for adjustment costs. Regardless, the model with adjustment costs does no better in terms of explaining large mean spending responses in the data.

That said, adjustment costs, combined with the baseline borrowing constraint model, have important implications for heterogeneity in spending responses. This is displayed in the green dotted line in figure 8. The baseline model with adjustment costs displays a significant spike in spending at the top end of the spending distribution. In particular, for those at the 95^{th} percentile, the spending response is \$1,700 per quarter, almost identical to what is observed in the data.

This result comes about because households upgrade their durables stock periodically in the adjustment cost model. The model predicts that purchases occur every 12 quarters, which is consistent with actual vehicle expenditures in the CEX. Thus, for the majority of households, the durables spending response is 0 in any given quarter. Conditional on a minimum wage increase, the probability of a durables purchase, as well as the amount spent

[37] See also Attanasio (2000) and Bertola, Guiso, and Pistaferri (2005) for more evidence.

conditional on a purchase, rises. This causes the spending response to be very large at the 95^{th} percentile but small below that. Consequently, the model with adjustment costs better matches the right tail of the spending distribution than the model without them.

5 Discussion

We estimate the spending, income and debt responses to minimum wage hikes. We show that a life cycle consumption model in which households face collateral constraints fits the data better than a standard permanent income model, for the following reasons.

First, spending increases substantially after the hike, with most of the spending occurring on durable goods, and in particular transportation goods. This near-run spending increase, perhaps in the order of $800, exceeds the $300 or so per quarter of additional family income caused by a minimum wage hike. Using different data, we find that debt rises about $550 per quarter, which corroborates the spending and income evidence. This is particularly surprising given that minimum wage hikes likely increase income of minimum wage workers for a short period, about two to three years according to some research. If households were spreading the income gain over their entire lifespan, the spending increases should be far smaller than what we observe in the data. Augmenting the permanent income model to account for durable goods increases the short term spending response, but is still far smaller than what our estimates imply. As we show, however, our estimates are consistent with a model in which households must make a small downpayment for their durables. Thus small increases in income can generate small downpayments and thus large increases in durables spending.

Second, we find that the spending response occurs within one quarter of the actual increase in the minimum wage, although minimum wage increases are typically passed into law 6 to 18 months prior to their effective date. This result is found in both the CEX and credit card accounts. We interpret this finding as evidence that households respond to current, not lifetime, income, a result that can be reconciled with models that allow for borrowing constraints.

Third, the composition of spending is consistent with forward looking behavior and borrowing constraints. Prior to the minimum wage hike, durables spending falls and non-durables spending rises by roughly equal amounts, so the total spending response is almost 0. After the

minimum wage hike, non-durables spending barely increases further, but durables spending increases significantly.

Fourth, the high levels of spending and debt appear to persist for longer than the permanent income hypothesis would imply. Again, this persistence is consistent with a model in which households are borrowing constrained for several periods after the minimum wage hike.

Finally, we show that the borrowing constraint model augmented with an adjustment cost to durables transactions can help explain the distribution of spending responses.

It is appropriate to emphasize that we focus only on households who had a minimum wage job before the minimum wage went up. It is possible, perhaps even likely, that a minimum wage increase reduces the odds that those without a job will be able to find one. Moreover, we ignore teenagers, where there is some evidence of disemployment. Consequently, our estimates are silent about the aggregate effects of minimum wage hikes. However, for those adults who had a minimum wage job before the minimum wage went up, there is compelling evidence that consumption, income, and debt rise afterwards, and that these responses are consistent with the existence of borrowing constraints and the important role of durables in the borrowing process.

Appendix A: Solving the model (not for publication)

In order to reduce the number of state variables, we follow Deaton (1991) and redefine the problem in terms of cash-on-hand:[38]

$$X_t = (1+r)A_t + Y_t. \tag{14}$$

Assets and cash-on-hand follow:

$$A_{t+1} = X_t - C_t, \tag{15}$$

$$X_{t+1} = (1+r)(X_t - C_t - I_t) + Y_{t+1}. \tag{16}$$

Thus, the borrowing constraint becomes

$$-\left(\frac{X_t - Y_t}{1+r}\right) \leq (1-\pi)S_t. \tag{17}$$

Note that all of the variables in X_t are known at the beginning of period t. We can thus write the individual's problem recursively, using cash-on-hand as a state variable. In recursive form, the household's problem is to choose non-durables consumption and durables investment to maximize :

$$V_t(Z_t) = \max_{C_t, I_t}\{(C_t^{1-\theta}S_t^{\theta})^{1-\gamma}/(1-\gamma) + \beta \int V_{t+1}(Z_{t+1})dF(Z_{t+1}|Z_t, C_t, I_t, t)\} \tag{18}$$

subject to the constraint in equation (17), where the state variables of the model are $Z_t = (X_t, S_t, P_t)$, and $F(.|.)$ gives the conditional cdf of the state variables, using equations (6), (8), (9), and (16). Solving the model gives optimal consumption and durables investment decision rules.

The source of uncertainty in the model is from income. We integrate over the distribution of income by discretizing P_t using discrete state Markov Chains (Tauchen 1986).

To simulate the model, we take the initial joint distribution of the state variables from the data. We then take draws of income from the data generating process of income. Given the initial joint distribution of (X_0, S_0, P_0) that we observe in the data, we use the decision

[38] Using cash-on-hand allows us to combine assets and the transitory component of income u_t into a single state variable.

rules to obtain C_0, I_0, which gives us a value of (X_1, S_1). We take a draw for P_1, which then gives income. We repeat this for $T = 200$ periods. The figures presented are based on 5,000 simulations of the model.

Appendix B: Certainty and no borrowing constraints (not for publication)

Using assets instead of cash on hand as the state variable, Bellman's equation (18) without uncertainty is:

$$V_t(A_t, S_t, P_t) = \max_{C_t, I_t} \{U(C_t, S_t) + \beta V_{t+1}(A_{t+1}, S_{t+1}, P_{t+1})\}. \tag{19}$$

The only constraints in this case are the law of motion for assets (equation 5) and durables (equation 6) and that final period assets must be non-negative. The first order conditions for non-durables consumption and durables investment are, respectively:

$$\frac{\partial U_t}{\partial C_t} = \beta \frac{\partial V_{t+1}}{\partial A_{t+1}} \tag{20}$$

$$\frac{\partial V_{t+1}}{\partial A_{t+1}} = \frac{\partial V_{t+1}}{\partial S_{t+1}}. \tag{21}$$

Differentiating with respect to assets and the durables stock and using the envelope condition yields, respectively:

$$\frac{\partial V_t}{\partial A_t} = \beta(1 + r) \frac{\partial V_{t+1}}{\partial A_{t+1}} \tag{22}$$

$$\frac{\partial V_t}{\partial S_t} = \frac{\partial U_t}{\partial S_t} + \beta \frac{\partial V_{t+1}}{\partial S_{t+1}}(1 - \delta). \tag{23}$$

Combining equations (21), (22), and (23) yields

$$\beta(1 + r) \frac{\partial V_{t+1}}{\partial A_{t+1}} = \frac{\partial U_t}{\partial S_t} + \beta \frac{\partial V_{t+1}}{\partial A_{t+1}}(1 - \delta). \tag{24}$$

Combining equations (20) and (24) yields

$$(r + \delta) \frac{\partial U_t}{\partial C_t} = \frac{\partial U_t}{\partial S_t}. \tag{25}$$

Inserting the specific functional forms for the utility function from equation (4) into equation (25) yields

$$(r+\delta)\left(\frac{1-\theta}{\theta}\right)S_t = C_t. \tag{26}$$

Combining equations (20), (22), and (26) yields the Euler Equation

$$C_{t+1} = C_t(\beta(1+r))^{\frac{1}{\gamma}}. \tag{27}$$

Define

$$PV \equiv A_0 + \sum_{t=0}^{T}\left(\frac{1}{1+r}\right)^t Y_t \tag{28}$$

as "full wealth", i.e., the present value of lifetime income plus wealth. Given that the present value of lifetime spending is equal to full wealth (and given that the annual cost of durables is $(r+\delta)$), the lifetime budget constraint is

$$\sum_{t=0}^{T}\left(\frac{1}{1+r}\right)^t (C_t + (r+\delta)S_t) = PV. \tag{29}$$

Inserting equation (26) into equation (29) yields

$$\sum_{t=0}^{T}\left(\frac{1}{1+r}\right)^t \left(C_t + \left(\frac{\theta}{1-\theta}\right)C_t\right) = PV. \tag{30}$$

Combining equation (27) with equation (30) yields

$$\sum_{t=0}^{T}\left(\frac{1}{1+r}\right)^t \left(\left(1+\left(\frac{\theta}{1-\theta}\right)\right)C_0(\beta(1+r))^{t/\gamma}\right) = PV. \tag{31}$$

Using the formula for an infinite sum and rearranging yields

$$C_0 = (1-\theta)\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right]PV \tag{32}$$

where $(1-\theta)\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right]$ is the marginal propensity to consume non-durables. Inserting equation (26) into equation (32) yields

$$S_0 = (\frac{\theta}{r+\delta})\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right]PV. \tag{33}$$

Holding last period's durables stock fixed, increases in this period's durables stock can only come from increases in investment. Thus

$$\left.\frac{\partial I_0}{\partial PV}\right|_{S_0} = \left.\frac{\partial S_1}{\partial PV}\right|_{S_0} = (\beta(1+r))^{\frac{1}{\gamma}}(\frac{\theta}{r+\delta})\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right] \tag{34}$$

is the marginal propensity to spend on durables. Inspection of equation (29) shows that the marginal propensity to spend is the same for increases in assets and the present value of lifetime income. In order to get time period 1 non-durables and durables spending, note that equation (27) shows that consumption grows at rate $(\beta(1+r))^{\frac{1}{\gamma}}$, and thus the marginal propensity to consume non-durables at time 1, given an increase in full wealth at time 0, is $(\beta(1+r))^{\frac{1}{\gamma}}(1-\theta)\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right]$. To derive the time 1 durables spending response, note that the ratio of durables to non-durables is a constant, and thus the durables stock grows at a rate $(\beta(1+r))^{\frac{1}{\gamma}}$. Using this result, the law of motion for durables, and equation (34) yields the marginal propensity to spend on durables at time 1:

$$\begin{aligned}
\left.\frac{\partial I_1}{\partial PV}\right|_{S_0} &= \left.\frac{\partial S_2}{\partial PV}\right|_{S_0} - (1-\delta)\left.\frac{\partial S_1}{\partial PV}\right|_{S_0} \\
&= (\beta(1+r))^{\frac{1}{\gamma}}\left.\frac{\partial S_1}{\partial PV}\right|_{S_0} - (1-\delta)\left.\frac{\partial S_1}{\partial PV}\right|_{S_0} \\
&= \left[(\beta(1+r))^{\frac{1}{\gamma}} - (1-\delta)\right]\left.\frac{\partial S_1}{\partial PV}\right|_{S_0} \\
&= \left[(\beta(1+r))^{\frac{1}{\gamma}} - (1-\delta)\right](\beta(1+r))^{\frac{1}{\gamma}}(\frac{\theta}{r+\delta})\left[\frac{1-\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}}{1-\left(\frac{(\beta(1+r))^{\frac{1}{\gamma}}}{1+r}\right)^{T+1}}\right].
\end{aligned} \tag{35}$$

Solving for time period 2 spending propensities is straightforward.

Appendix C: Data Appendix

The Consumer Expenditure Survey (CEX)

The empirical analysis primarily relies on the CEX and is briefly described in section 2. In this appendix, we provide further details about the sample selection criteria.

Our sample is driven by requirements to compute S. This is particularly relevant in two cases. State codes are needed to know effective minimum wage levels, but the CEX does not report actual state of residence for the 24 percent of the sample residing in smaller states.[39] Another 16.7 percent of the remaining sample has incomplete income responses.

To further refine the sample to households with adults that have well-measured hourly wages, we also exclude the self-employed (6.6 percent of remaining sample)[40], households headed by those under 18 or over 64 (20.7 percent), households in the survey for only one period (11.2 percent), households without an initial wage for the head and spouse (14.7 percent), and households where either of the two member's hourly wage is only 60 percent (that is, implausibly low) or 40 times greater than the effective minimum wage in the initial survey (4.2 percent). Finally, we exclude 2.4 percent of the remaining sample because of large changes in family composition (either the number of kids or the number of adults changes by more than 2), head's age (greater than two years), or head's gender, or log hourly wages between the initial survey and the last survey (log change of 1.5 of greater). These restrictions are meant to reduce the impact of measurement error or to exclude large and hard-to-model changes in circumstances likely unrelated to minimum wage legislation.

We ultimately use 206,652 household-surveys, representing 62,478 households. Of these, 11.1 percent, or 22,923 household-surveys, are from households with some minimum wage income in the initial period (i.e. $S > 0$). Just over 16,000 are from families where minimum wage income makes up over 20 percent of total pre-tax income (i.e. $S \geq 0.2$).

Panel A of table A1 includes descriptive statistics of the key variables, including real total, durables, and nondurables and services spending, real family income, and selected demographics.

The Survey of Income and Program Participation (SIPP) and The Current

[39] The CEX assigns states to these residents. Our results do not change if we use the CEX-assigned state rather than dropping those residents. We also drop the District of Columbia because of its complicated minimum wage structure.

[40] The percentages reported are ordered in that each one reflects the share of excluded observations relative to the sample that remains up to that point.

Population Survey (CPS)

To provide corroboration of the income results estimated from the CEX, we also compute the income response to a minimum wage hike using the SIPP and CPS. Besides providing larger samples and longer panels, the main advantage to these datasets is that they are specifically designed to collect high-quality earnings, wage, and income information.

The first SIPP panel we use begins in 1986 and the last ends in 2003. Each panel lasts between two and four years and provides interviews with between 12 and 40 thousand households. Households are interviewed every four months during the time they remain in a panel. While they are asked to recall labor market information for each month between interviews, we only use the current month information.

Variables are coded, and wage, self-employment, and family composition restrictions are introduced, to be as close as possible to the CEX sample. Like the CEX, the numerator on S – total income from minimum wage earners – is also computed on the household head and, when applicable, spouse, only in the first period that we observe them.

The one important difference, relative to the CEX, is that we restrict the SIPP sample to workers who are paid by the hour. This restriction is meant to increase the liklihood that minimum wage workers are correctly identified. As can be seen in table A1, this also reduces the family income of the $S = 0$ control group.[41] There are 391,089 household-survey observations remaining after all our sample restrictions,[42] of which 11.1 percent report some minimum wage earnings and 8.6 percent report at least 20 percent of their total household nonproperty income from minimum wage earners.

Panel B of table A1 provides summary statistics for the key SIPP variables.

The CPS data that we use begins in 1979 and ends in 2007. Individuals are in the CPS for four months, out for the following eight, and then in again for four more months. Those in the fourth and eight months of their participationn are known as the outgoing rotation files and are asked questions specifically about weekly earnings and hours and hourly wages for those paid-by-the-hour. Therefore, we have up to two responses for each CPS respondent.

[41] We can compute a wage from monthly income and monthly hours worked, which is more analogous to the CEX wage measure. In this case, SIPP mean income would be about 20 percent higher. Those results are available upon request.

[42] The definition of a household is not as straightforward as in the CEX. We rely on the variable *ppentry* to define households. Experimentation with other methods, such as holding composition fixed (stable households), does not qualitatively change the results.

Again, we define variables and sample restrictions to be analogous to the CEX.

Like the SIPP, variables are coded, and wage, self-employment, and family composition restrictions are introduced, to be as close as possible to the CEX sample. The numerator on S is likewise computed on the household head and, when applicable, spouse, in the first period that we observe them.

Using the sample of hourly wage workers, there are 785,930 observations remaining after our sample restrictions, of which 14.7 percent report some minimum wage earnings and 11.5 percent report at least 20 percent of their total household nonproperty income from minimum wage earners. Panel C of table A1 provides summary statistics for the key variables.[43]

Credit Bureau Reports

Section 2 describes our use of a proprietary dataset from a large financial institution that issues credit cards nationally. We primarily rely on the credit bureau reports that are appended to these accounts because it allow us to directly test whether financing of large durables, particularly vehicles, rise after a minimum wage increase. There are important limitations to this data that give us some pause. First, by construction, the sample is selected on individuals holding a credit card. Minimum wage workers with credit cards are plausibly a selected sample of all minimum wage workers. According to the Survey of Consumer Finances, only 43 percent of households in the bottom quintile of the income distribution own a credit card (Johnson (2007)).

Second, as section 2 notes, demographics and income measures are limited. In particular, we only have the annual income of the account holder at the time of application. However, that data allows us to compute the probability that a worker is paid at the minimum wage (see section 3.1).

Panel D of table A1 provides some key descriptive statistics. See Agarwal et al (2007) for more details.

Appendix D: The Survey of Consumer Finances (not for publication)

This appendix provides descriptive information on the initial joint distribution of the state variables used in the dynamic programming problem. The three state variables are the permanent component of income P_{it}, cash on hand (which is the sum on income and assets

[43]Mean family income is significantly higher, about \$51,000 for $S = 0$ households, if the sample is not restricted to hourly workers.

net of durable goods A_{it}), and the stock of durable goods S_{it}. We assume that permanent income is the same as current income, and define the durables stock as the sum of vehicles plus the stock of non-vehicle durables. We define assets net of durables as net financial assets less debt against durable goods.

Table A4 shows key descriptives about these three variables from the 2004 SCF. The table also includes total debt and assets (last two rows) which contain other assets, such as housing and business wealth, to provide a more complete picture of household balance sheets.

We present means for both minimum wage households ($S = 0$) and above minimum wage households ($S \geq .2$). To compute S, we use a methodology very similar to the CEX (described in section 3.1). First, we define someone as a minimum wage worker if that individual makes between 60 and 120 percent of the minimum wage. Next, if an individual is a minimum wage worker, we multiply that individual's hourly wage by hours per week times weeks per year. Because the SCF reports pay at frequencies chosen by the respondent, we compute the wage using given pay and frequency of pay, adjusted appropiately by hours per year. Finally, we take total household income from minimum wage workers and divide through by total household wage income (where wage income is the income of respondent and spouse and is derived using the procedure described above) which gives S, the share of income from minimum wage workers.

Table A4 shows that for minimum wage households[44], mean income, durables, debt, and financial wealth are all about one third as large as for non-minimum wage households. Although, on average, financial assets are high, the distribution is skewed. Median financial wealth for minimum wage households is $359. Another thing to note is that our definition of assets and durables excludes housing and business wealth. Roughly 35 percent of all minimum wage households own their home. For these households, housing represents close to 50 percent of all wealth and over 50 percent of all debt.

[44]Similar to the CEX, the unit of observation in the SCF is the "primary economic unit," which is usually a household. In order to preserve confidentiality of respondents, noise is added to SCF data. Each responding economic unit is turned into five observations.

References

[1] Adams, William, Liran Einav, and Jonathan Levin, 2009, "Liquidity Constraints and Imperfect Information in Subprime Lending," *American Economic Review*. 99(1), pp 49-84.

[2] Adda, Jerome, and Russell Cooper, 2000, "Balladurette and Juppette: a Discrete Analysis of Scrapping Subsidies, " *The Journal of Political Economy*, 108(4), pp. 778-806.

[3] Addison, John, McKinley Blackburn, and Chad Cotti, 2008, "The Effect of Minimum Wages on Labor Market Outcomes: County-level Estimates from the Restaurant-and-Bar Sector," working paper, University of South Carolina.

[4] Agarwal, Sumit, Chunlin Liu, and Nicholas Souleles, 2007, "The Reaction of Consumption and Debt to Tax Rebates: Evidence from the Consumer Credit Data," *Journal of Political Economy*, 115(6), 986-1019.

[5] Attanasio, Orazio P, 2000, "Consumer Durables and Inertial Behavior: Estimation and Aggregation of (S,s) Rules for Automobile Purchases," *Review of Economic Studies*, 67 (4) 667-696.

[6] Attanasio, O., A. Leicester, and M. Wakefield, 2008, " The Coincident Cycles of House Prices and Consumption in the U.K.: Do House Prices Drive Consumption Growth," working paper, University College London.

[7] Barrow, Lisa and Leslie McGranahan, 2000, "The Effects of the Earned Income Credit on the Seasonality of Household Expenditures, " *National Tax Journal*, 53, 1211-43.

[8] Bertola, Giuseppe, Luigi Guiso, and Luigi Pistaferri, 2005, "Uncertainty and Consumer Durables Adjustment," *Review of Economic Studies*, 72, 973-1007.

[9] Browning, Martin, and Collado, M. Dolores, 2001, "The Response of Expenditures to Anticipated Income Changes: Panel Data Estimates," *American Economic Review*, 91, 681-92.

[10] Browning, Martin, and Thomas Crossley, 2009, "Shocks, Stocks and Socks: smoothing consumption over a temporary income loss" *Journal of the European Economic Association*, 8(6), 1169-1192.

[11] Caballero, Ricardo, 1993, "Durable Goods: An Explanation for their Slow Adjustment," *Journal of Political Economy*, 101(2), 351-384.

[12] Campbell, Jeffrey, and Zvi Hercowitz, 2003, "The Dynamics of Work and Debt," Chicago Fed Working Paper.

[13] Card, David and Alan Krueger, 1995, *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton, NJ: Princeton University Press.

[14] Carrington, William and Bruce Fallick, 2001, "Do Some Workers Have Minimum Wage Careers?," *Monthly Labor Review*, 124(5), 17-27.

[15] Carroll, Christopher, and Wendy Dunn, 1997, "Unemployment Expectations, Jumping (S,s) Triggers, and Household Balance Sheets," in *NBER Macroeconomics Annual*, 1997, ed. by Benjamin S. Bernanke, and Julio J. Rotemberg. MIT Press, 165-229.

[16] Coulibaly, Brahima and Geng Li, 2006, "Do Homeowners Increase Consumption after the Last Mortgage Payment? An Alternative Test of the Permanent Income Hypothesis," *Review of Economics and Statistics*, 88, 10-19.

[17] Deaton, Angus, 1991, "Saving and Liquidity Constraints,' *Econometrica*, 59 (5), 1221—1248.

[18] Draca, Mirko, Stephen Machin, and John Van Reenen, 2008, "Minimum Wages and Firm Profitability," forthcoming, *American Economic Journal: Applied Economics*.

[19] Eberly, Janice, 1994, "Adjustment of Consumers' Durables Stocks: Evidence from Automobile Purchases," *Journal of Political Economy*, 102, 403-436.

[20] Fernandez-Villaverde, Jesus and Dirk Krueger, 2002, "Consumption and Saving over the Life Cycle: how Important are Consumer Durables?", mimeo, University of Pennsylvania.

[21] French, Eric, Bhashkar Mazumder and Christoper Taber, 2006, "The Changing Pattern of Wage Growth for Low Skilled Workers," in Blank, Danzinger, and Schoeni (eds) *Working and Poor: How Economic Challenges and Policy Changes Have Affected Low Wage Workers*, New York: Russell Sage Foundation.

[22] Gourinchas, Pierre-Oliver and Jonathan Parker, 2002, "Consumption over the Life Cycle," *Econometrica*, 70, 47-89.

[23] Gross, David, and Nicholas Souleles, 2002, "Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data," *Quarterly Journal of Economics*, 58, 25-51.

[24] Grossman, Sanford, and Guy Laroque, 1990, "Asset Pricing and Optimal Portfolio Choice in the Presence of Illiquid Durable Consumption Goods," *Econometrica*, 117, 149-185.

[25] Gurley, Tami and Donald Bruce, 2005, "The Effects of Car Access on Employment Outcomes for Welfare Recipients," *Journal of Urban Economics*, 58, 250-272.

[26] Hryshko, D., M. Jose Luengo-Prado, and B. Sorensen, 2009, "Home Prices and Risk Sharing," forthcoming, *Journal of Monetary Economics*.

[27] Hsieh, Chang-Tai, 2003, "Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund," *American Economic Review*, 93, 397-405.

[28] Johnson, Kathleen, 2007, "Recent Developments in the Credit Card Market and the Financial Obligations Ratio," in Agarwal, S. and B. Ambrose (eds.), *Household Credit Usage: Personal Debt and Mortgages*, Palgrave-McMillian Publishing, 13-36.

[29] Johnson, David, Jonathan Parker, and Nicholas Souleles, N.S., 2006, "Consumption and Tax Cuts: Evidence from the Randomized Income Tax Rebates of 2001," *American Economic Review*, 96, 1589-1610.

[30] Kaboski, Joseph and Robert Townsend, 2008, "A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative," working paper, Ohio State University.

[31] Kiyotaki, Nobuhiro, and John Moore, 1997, "Credit Cycles," *Journal of Political Economy*, 105 (2), 211-248.

[32] Krueger, Dirk, and Fabrizio Perri, 2008, "How does Household Consumption Respond to Income Shocks? Evidence, Theory and Implications", mimeo, University of Pennsylvania.

[33] Lee, David, 1999, "Wage Inequality in the United States During the 1980s: Rising Dispersion or Falling Minimum Wage", *Quarterly Journal of Economics*, 114, 977-1023.

[34] Mankiw, N. Gregory, 1982, "Hall's Consumption Hypothesis and Durable Goods," *Journal of Monetary Economics*, 10, 417-425.

[35] Meghir, Costas and Luigi Pistaferri, 2004, "Income Variance Dynamics and Heterogeneity", *Econometrica*, 72, 1-32.

[36] Neumark, David, Mark Schweitzer, and William Wascher, 2004, "Minimum Wage Effects throughout the Wage Distribution " *Journal of Human Resources*, 39, 425-450.

[37] Neumark, David, Mark Schweitzer, and William Wascher, 2005, "The Effects of Minimum Wages on the Distribution of Family Incomes: A Nonparametric Analysis" *Journal of Human Resources*, 40, 867-894.

[38] Parker, Jonathan, 1999, "The Reaction of Household Consumption to Predictable Changes in Social Security Taxes," *American Economic Review*, 89, 959-973.

[39] Parker, Jonathan, Nicholas Souleles, David Johnson, and Robert McClelland, 2010, "Consumer Spending and the Economic Stimulus Payments of 2008," working paper, Northwestern University.

[40] Smith, Ralph and Bruce Vavrichek, 1992, "The Wage Mobility of Minimum Wage Workers," *Industrial and Labor Relations Review*, 46, 82-88.

[41] Souleles, Nicholas, 1999, "The Response of Household Consumption to Income Tax Refunds," *American Economic Review*, 89, 947-958.

[42] Tauchen, George, 1986, "Finite state Markov chain approximations to univariate and vector autoregressions, " *Economics Letters*, 20, 177-181.

[43] Wellington, Alison, 1991, "Effects of the Minimum Wage on the Employment Status of Youths: An Update," *Journal of Human Resources*, 26, 27-46.

Table 1
Total Household Nonproperty Quarterly Income Response to Change in the Minimum Wage

Share of income from minimum wage jobs (S)	CEX	CPS	SIPP	Weighted average: All 3	Weighted average: CPS/SIPP
	(1)	(2)	(3)	(4)	(5)
0	23	-48	-50	-40	-49
	(100)	(42)	(80)	(35)	(37)
	183,729	670,593	347,586		
>0	218	311	164	264	276
	(174)	(104)	(187)	(81)	(91)
	22,923	115,337	43,503		
>=0.1	182	317	150	258	275
	(190)	(105)	(182)	(82)	(91)
	19,249	107,371	39,786		
>=0.2	181	218	281	221	232
	(175)	(105)	(192)	(81)	(92)
	16,073	90,267	33,737		
Time period	1983-2008	1979-2007	1986-2003		
Sample of workers	All	Hourly wage workers	Hourly wage workers		

Notes:
Each cell represents a separate regression. S is the share of pre-tax total household income from near minimum wage salaries earned by the top two adults in the household.
The CEX sample includes all workers and is based on a computed wage equal to annual earnings divided by annual hours worked. The SIPP and CPS samples are of workers paid by the hour.
See the text for additional details. All standard errors are cluster corrected by household.

Table 2
Total Spending Response to Change in the Minimum Wage
CEX, 1983-2008

Share of income from minimum wage jobs (S)	All (1)	Liquid assets[1] <$5,000 (2)	Size of increase[2] Small (3)	Size of increase[2] Large (4)	Real average quarterly spending (5)	Implied MPS[3] CEX income (6)	Implied MPS[3] CPS/SIPP/CEX income (7)
0	-13	62	148	-16	11,068		
	(149)	(167)	(427)	(149)			
	183,729	85,278					
>0	566	643	-31	586	7,708	2.6	2.1
	(407)	(354)	(756)	(409)			
	22,923	13,703					
>=0.1	1,114	1,029	539	1139	7,124	6.1	4.3
	(406)	(371)	(813)	(408)			
	19,249	11,748					
>=0.2	847	883	-37	897	6,507	4.7	3.8
	(451)	(394)	(668)	(455)			
	16,073	9,988					

Notes:
Each cell represents a separate regression. S is the share of pre-tax total consumer unit income from near minimum wage salaries (<120% of the state minimum wage) earned by the top two adults in the consumer unit. See the text for details.
All standard errors are cluster corrected by consumer unit.
[1] Liquid assets are defined as savings plus checking accounts, as in Johnson et al. (2006).
[2] Small increases include years when a minimum wage increase was less than 25 cents or automated by CPI adjustments.
[3] MPS is equal to the CEX spending response reported in column (1) divided by the CEX income response from table 1 (Column 1 or Column 4).

Table 3
Decomposition of Spending Response
CEX, 1983-2008

Share of income from minimum wage jobs (S)	Nondurables & Services (1)	Durables (2)	Durables subcomponents: Furniture (3)	Floors and windows (4)	HH items (5)	Big appls. (6)	Electr. (7)	Leisure activities (8)	Misc HH equip. (9)	Transp. (10)	Non-Transp. (11)
0	11	-24	21	1	-8	3	8	-3	-5	-40	27
	(76)	(123)	(18)	(7)	(6)	(7)	(11)	(8)	(6)	(119)	(84)
>0	155	411	9	12	-1	48	-8	-20	42	328	238
	(158)	(365)	(35)	(10)	(9)	(35)	(28)	(37)	(14)	(354)	(178)
>=0.2	-36	882	-5	11	5	16	18	10	55	772	75
	(188)	(385)	(34)	(8)	(7)	(12)	(31)	(15)	(15)	(380)	(195)
Real average amount spent (2000$):											
0	9,224	1,844	167	36	99	48	230	110	56	1,097	9,971
>0	6,569	1,138	88	15	51	32	151	69	33	699	7,008
>=0.2	5,615	892	69	9	36	23	124	53	24	552	5,955
Conditional on purchase (2000$):											
0		1,969	613	348	180	690	303	174	209	11,825	
>0		1,316	420	199	114	506	245	131	163	7,546	
>=0.2		1,069	385	152	92	439	219	112	143	6,692	

Notes
Each cell represents a separate regression. All standard errors are cluster corrected by consumer unit.

Table 4
Decomposition of Transportation Spending Response
CEX, 1983-2008

	Probability of Purchase (1983-2008)			Expenditure (1983-2008)			Expenditures on new cars and trucks (1992-2008)			
									Financed with loan	
Share of income from minimum wage jobs (S)	New Cars/ Trucks	Used Cars/ Trucks	Other transp.	New Cars/ Trucks	Used Cars/ Trucks	Other transp.	Expenditure	Net outlay, not financed	Down-payment	Expenditure less downpayment
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
0	-0.003	0.006	-0.001	-7	29	-62	-104	-60	-12	-31
	(0.004)	(0.005)	(0.002)	(92)	(65)	(39)	(118)	(60)	(18)	(92)
>0	0.023	-0.002	-0.005	408	-38	-42	334	78	105	151
	(0.009)	(0.021)	(0.008)	(180)	(197)	(227)	(192)	(60)	(62)	(142)
>=0.2	0.027	0.005	-0.006	503	43	226	417	44	118	255
	(0.010)	(0.026)	(0.007)	(209)	(201)	(259)	(226)	(69)	(73)	(169)
							373			
Average (2000$ for expenditures):										
0	0.027	0.058	0.010	562	466	70	560	82	59	419
>0	0.013	0.075	0.008	226	424	49	212	12	24	176
>=0.2	0.009	0.070	0.005	152	367	34	133	6	16	111
Conditional on positive number:										
0				20,769	8,003	6,688	22,618	22,560	4,414	19,876
>0				18,007	5,681	6,426	19,803	15,456	3,687	17,668
>=0.2				16,971	5,278	6,203	18,214	15,392	3,313	16,068

Notes:
Probability of a purchase is estimated with a linear probability model with individual fixed effects.
Each cell represents a separate regression. All standard errors are cluster corrected by consumer unit.

Table 5
Debt Response to Change in the Minimum Wage
Credit Bureau and Credit Card Data, 1995-2008

Income at credit card application	Auto debt	Home equity debt	Mortgage debt	Credit card debt	Total debt	Collateralized debt
>=$20,000	16	10	6	12	46	34
	(99)	(85)	(136)	(7)	(133)	(101)
<$20,000	205	130	155	105	602	497
	(85)	(85)	(371)	(95)	(337)	(316)

Notes:
Collateralized debt (auto+home equity+mortgage) are from the credit bureau. Credit card debt is based on cards from our institution.
All observations are weighted by P, the probability that an individual account holder is a minimum wage worker. See text for details.
Sample sizes are 4 million and 582,000 for account holders with income of at least $20,000 and income less than $20,000.
Each cell represents a separate regression. All standard errors are cluster corrected by account holder.

Parameter	Quarterly value	Definition
β	$\sqrt[4]{0.95}$	Discount factor
γ	2	Coefficient of relative risk aversion
θ	0.15	Utility weight on durables
$T - t_0$	200	Number of time periods
r	$\sqrt[4]{1.03} - 1$	Quarterly interest rate
δ	0.034	Durables depreciation rate
π	0.4	Downpayment rate
$E(Y_0)$	\$2,900	Average income of minimum wage households
α_1	0.0108	Income growth
ρ	0.995	Autocorrelation of income
σ_ϵ^2	0.002	Variance of AR(1) innovations
σ_u^2	0.000	Variance of transitory innovations

Table 6: Parameters Used for Calibration

Parameters	Non-durables Spending	Durables Spending	Total Spending	Median assets	Median resources***
Estimates*	-9	894	885	18	1,992
Baseline**	113	196	309	-5,298	262
$\pi = 0.2$	134	165	299	-7,367	352
$\pi = 1.0$	81	140	221	241	241
$\sigma^2_\epsilon = 0$	73	286	359	-6,302	81
$\sigma^2_\epsilon = 0.005$, $\sigma^2_u = 0.05$	81	98	179	-4,193	456
$\sigma^2_\epsilon = 0, \theta = 0.4, \pi = .1$	137	413	550	-27,509	104
$\sigma^2_\epsilon = 0, \theta = 1, \pi = .2$	0	1,080	1,080	-65,746	31
Adjustment cost = 0.05	73	116	188	-4,199	700
$\beta = 1.0$, $\sigma^2_\epsilon = 0$, no borrowing constraints	9	17	26	-20,999	na
$\beta = 1.0$, $\sigma^2_\epsilon = 0$, adjustment cost = 0.05, no borrowing constraints	11	-10	1	-22,798	na

* Spending estimates from table 4, assets and resources from table A2
** Baseline parameters shown in table 7
*** Median resources defined as $A_{it} + (1 - \pi)S_{it}$

Table 7: Robustness Checks

Figure 1
Spending Response to Change in Minimum Wage, CEX
Quantile Regression

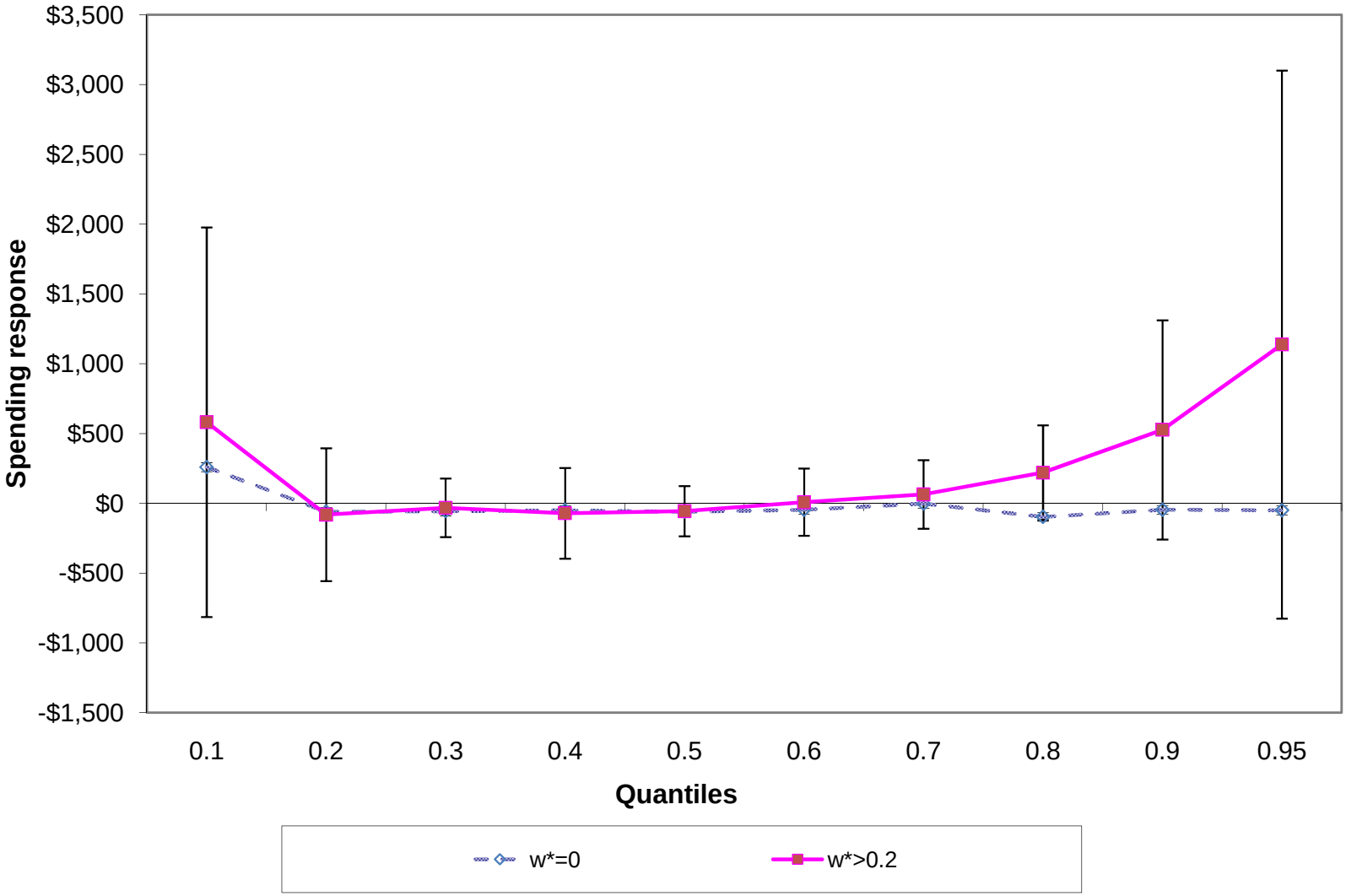

Figure 2a
Total Spending Response to a Change in the Minimum Wage

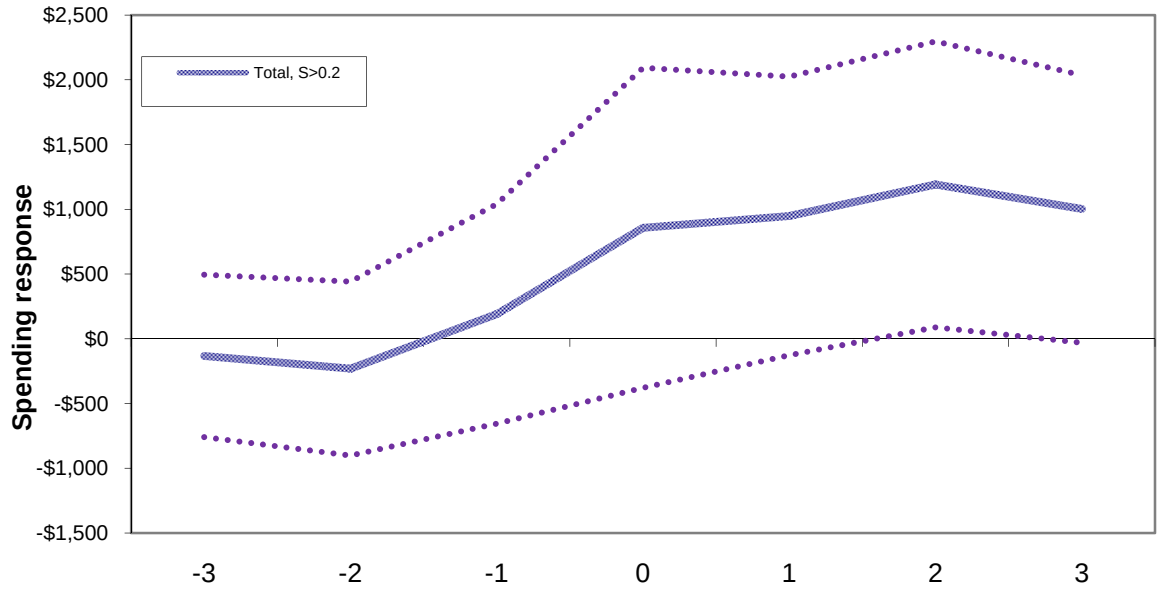

Figure 2b
Nondurable Spending Response to a Minimum Wage Change

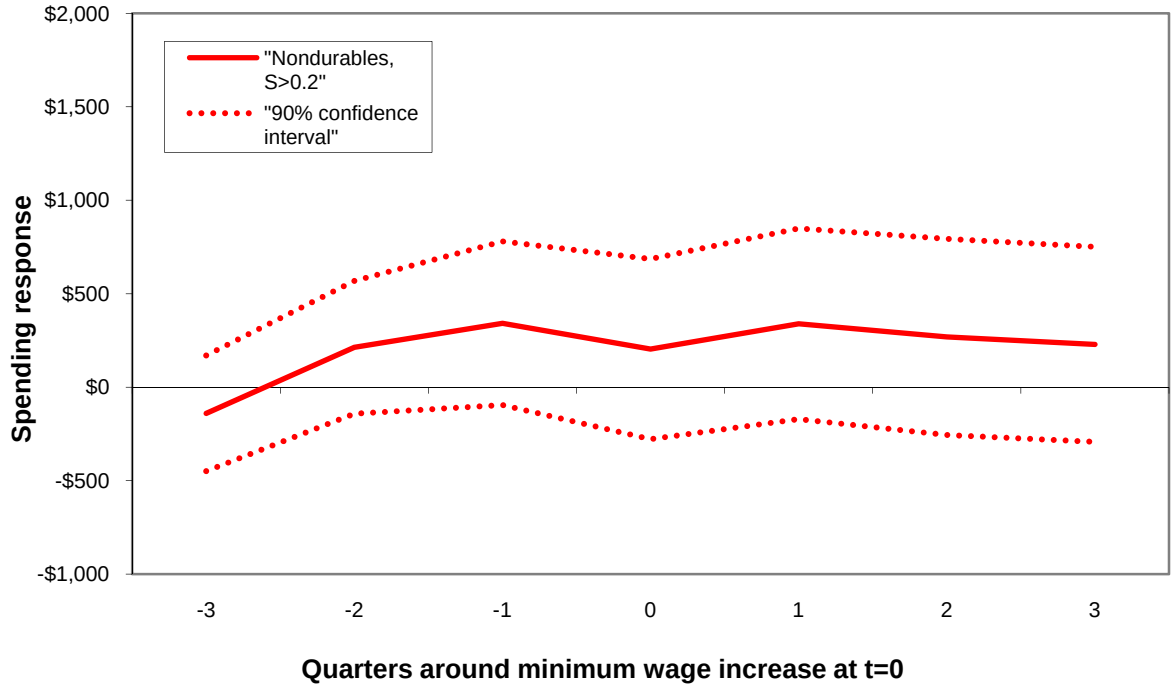

Figure 2c
Durable Spending Response to a Minimum Wage Change

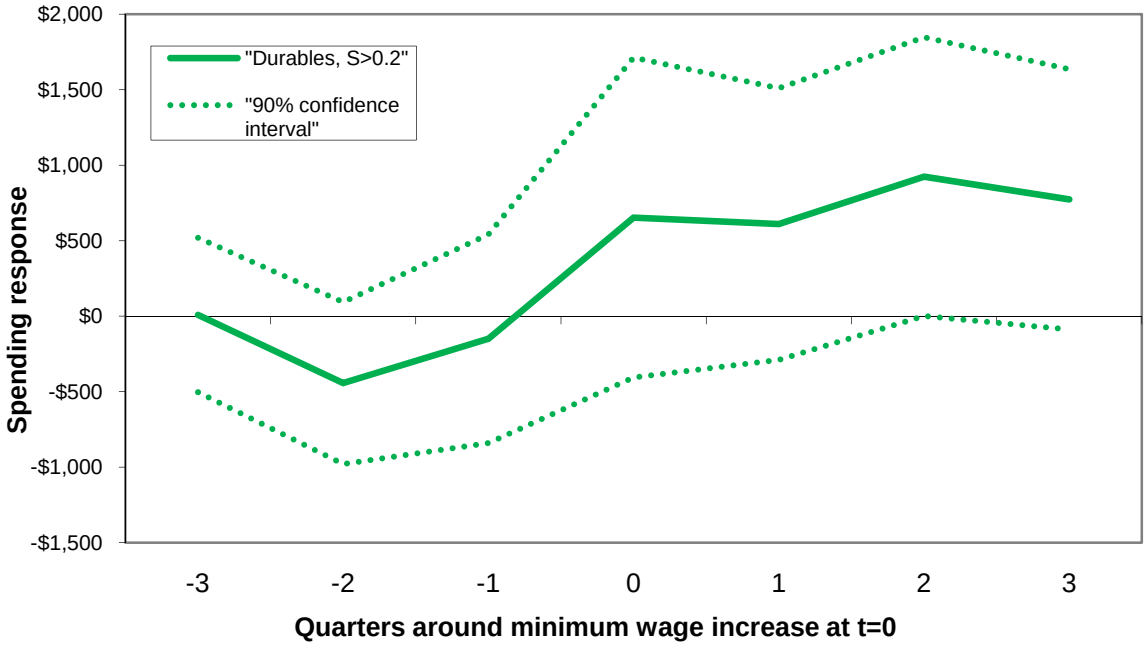

Figure 2d
New Vehicle Spending Response to a Minimum Wage Change

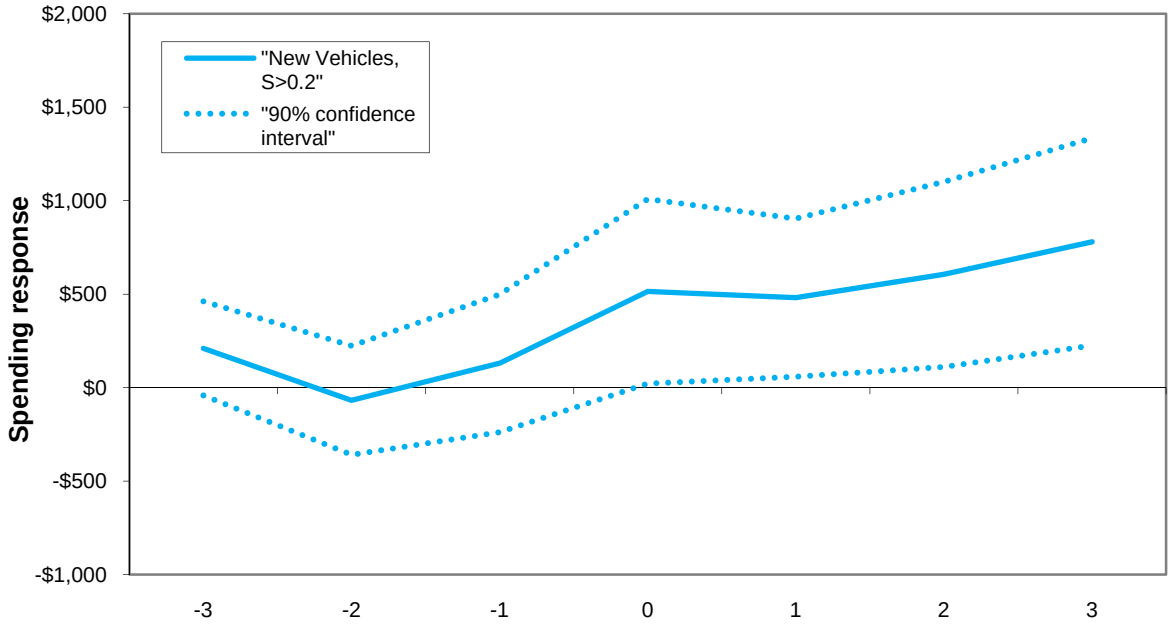

Figure 3
Debt Response to a Change in the Minimum Wage
Credit Card and Credit Bureau Data

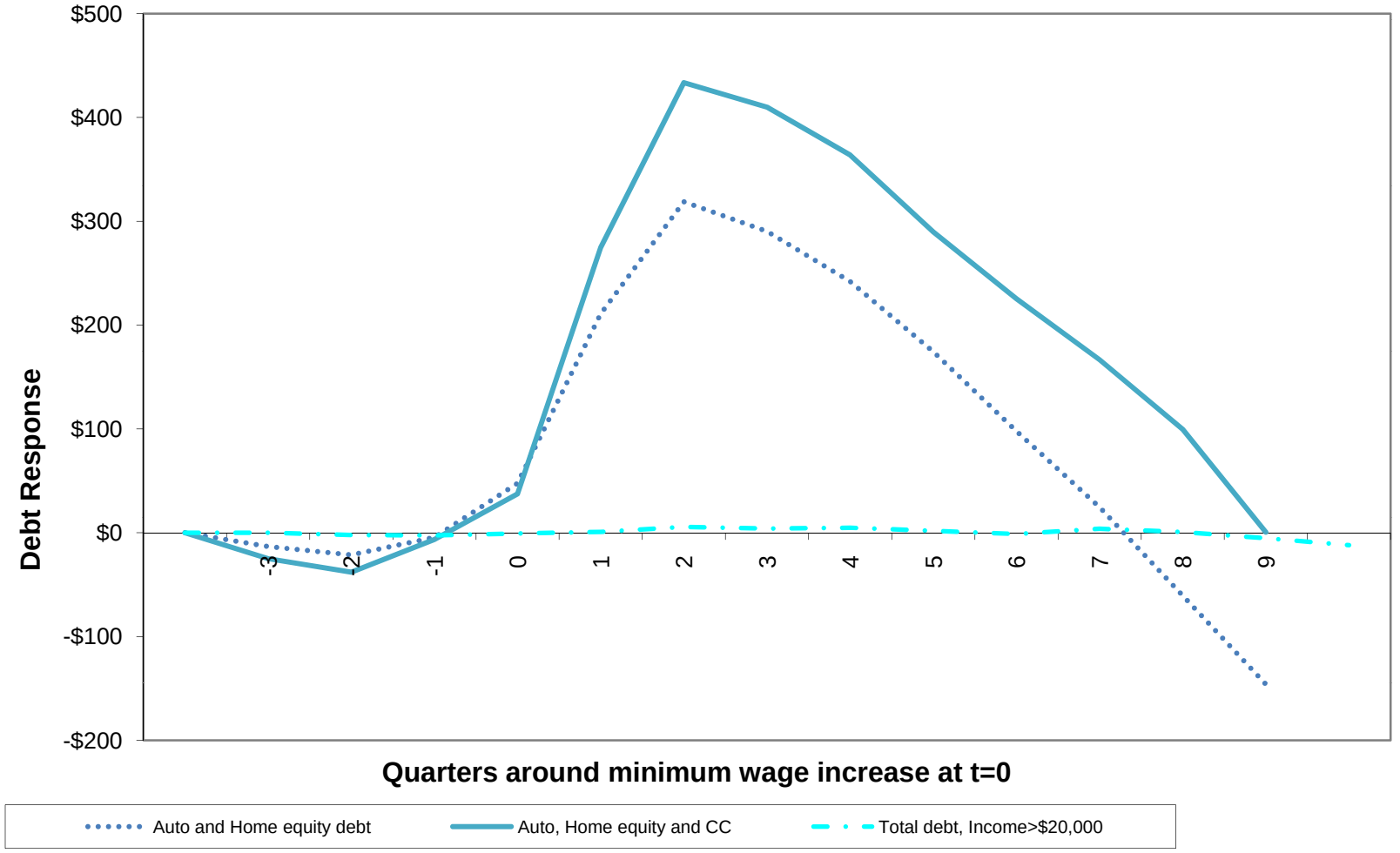

Figure 4
Debt Response to Change in Minimum Wage, Credit Bureau Quantile Regression

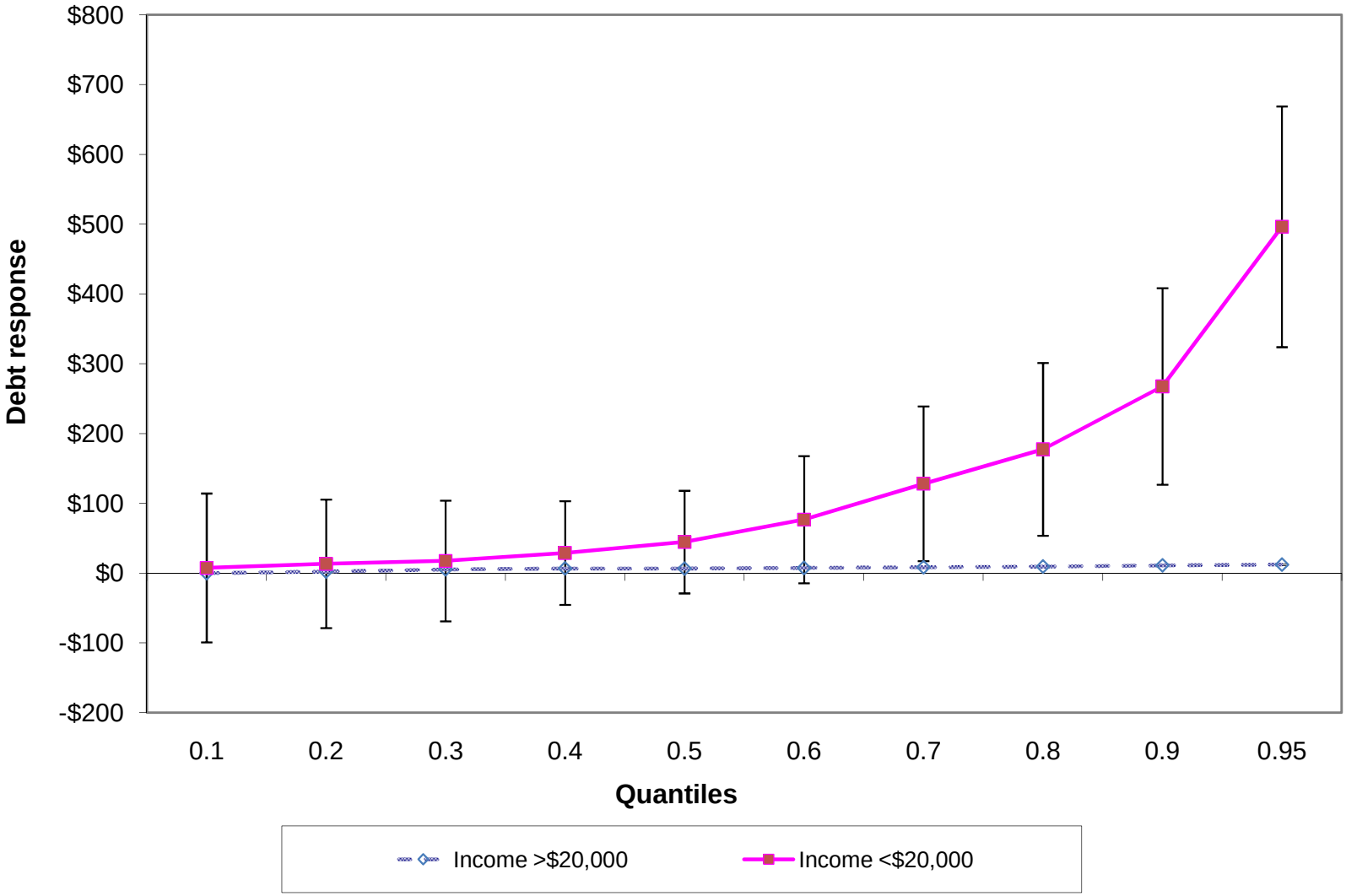

Figure 5
Simulated Income Change Around a Minimum Wage Increase

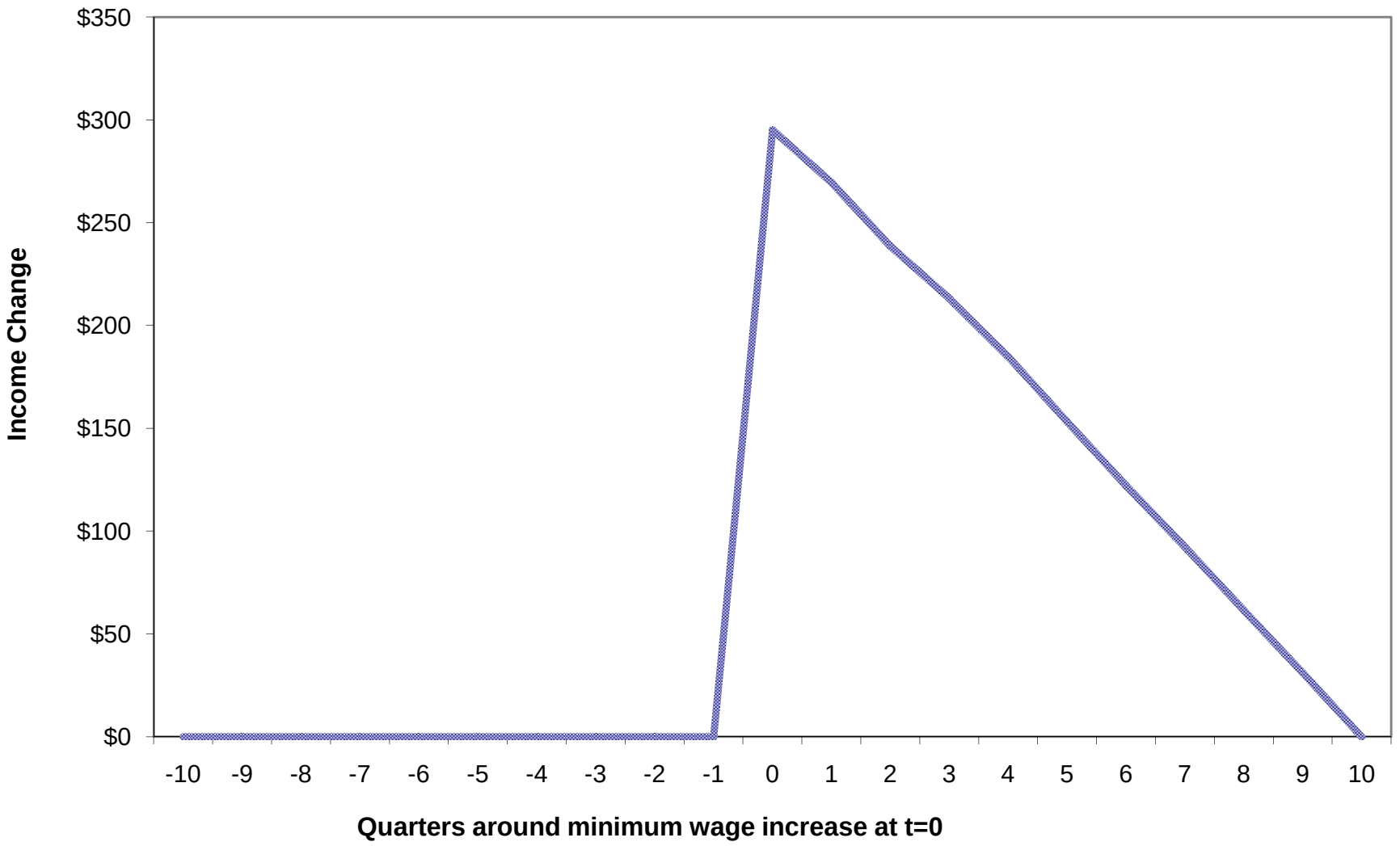

Figure 6
Spending Change Around a Minimum Wage Increase
Simulation without Borrowing Constraints

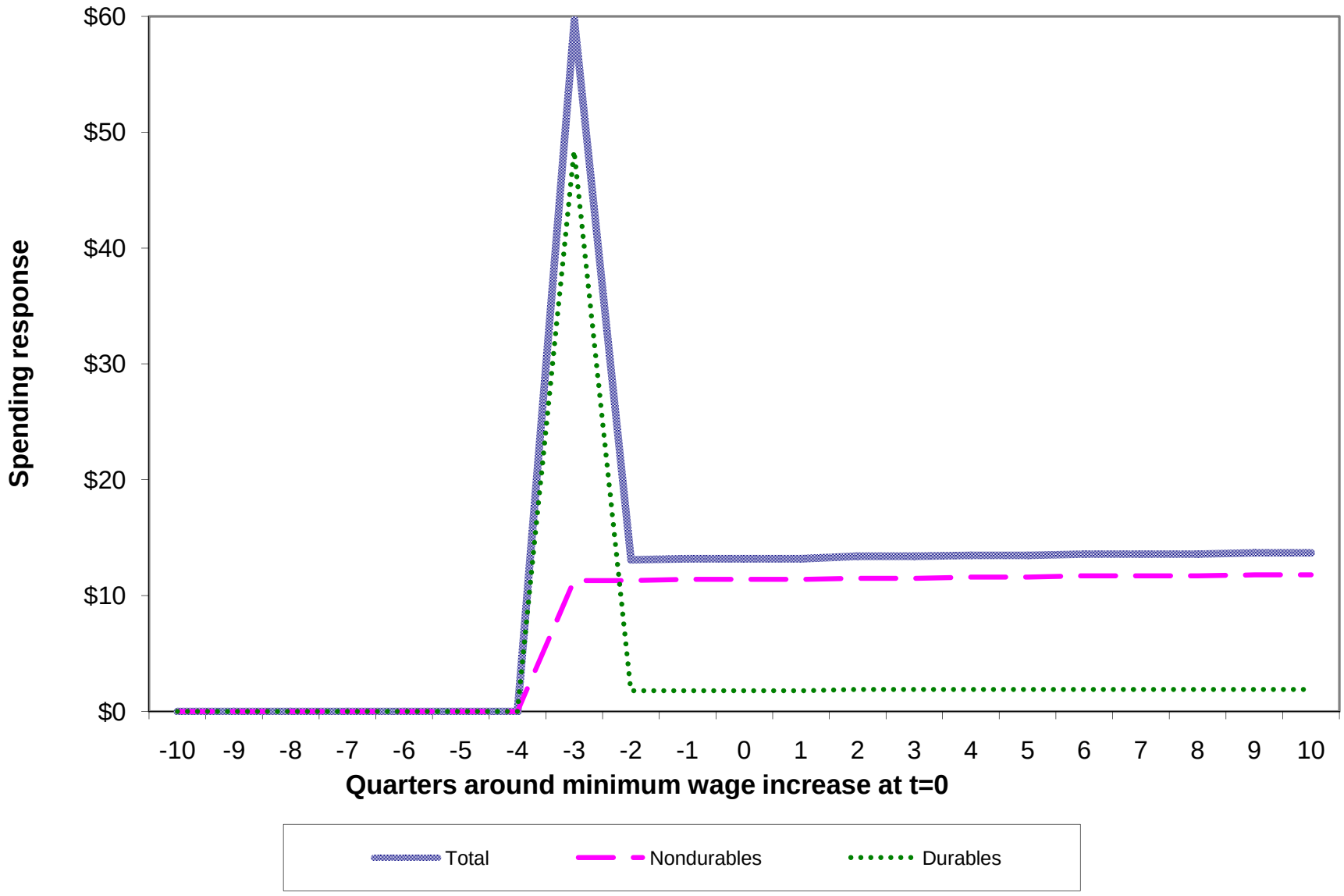

Figure 7
Spending Change Around a Minimum Wage Increase
Simulation with Borrowing Constraints

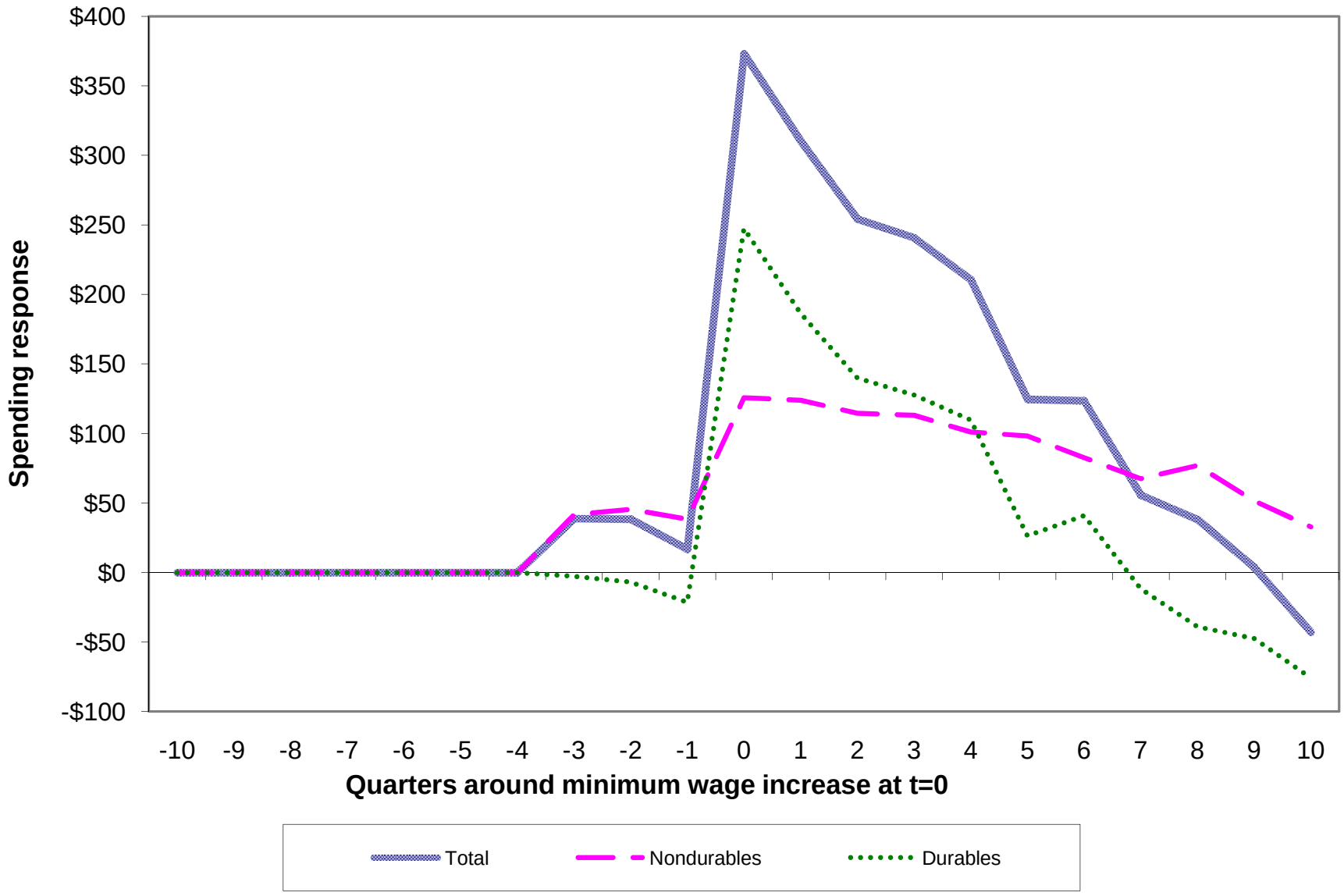

Figure 8
Model Predicted Spending Response to Change in Minimum Wage with and without Adjustment Costs
Quantile Regressions

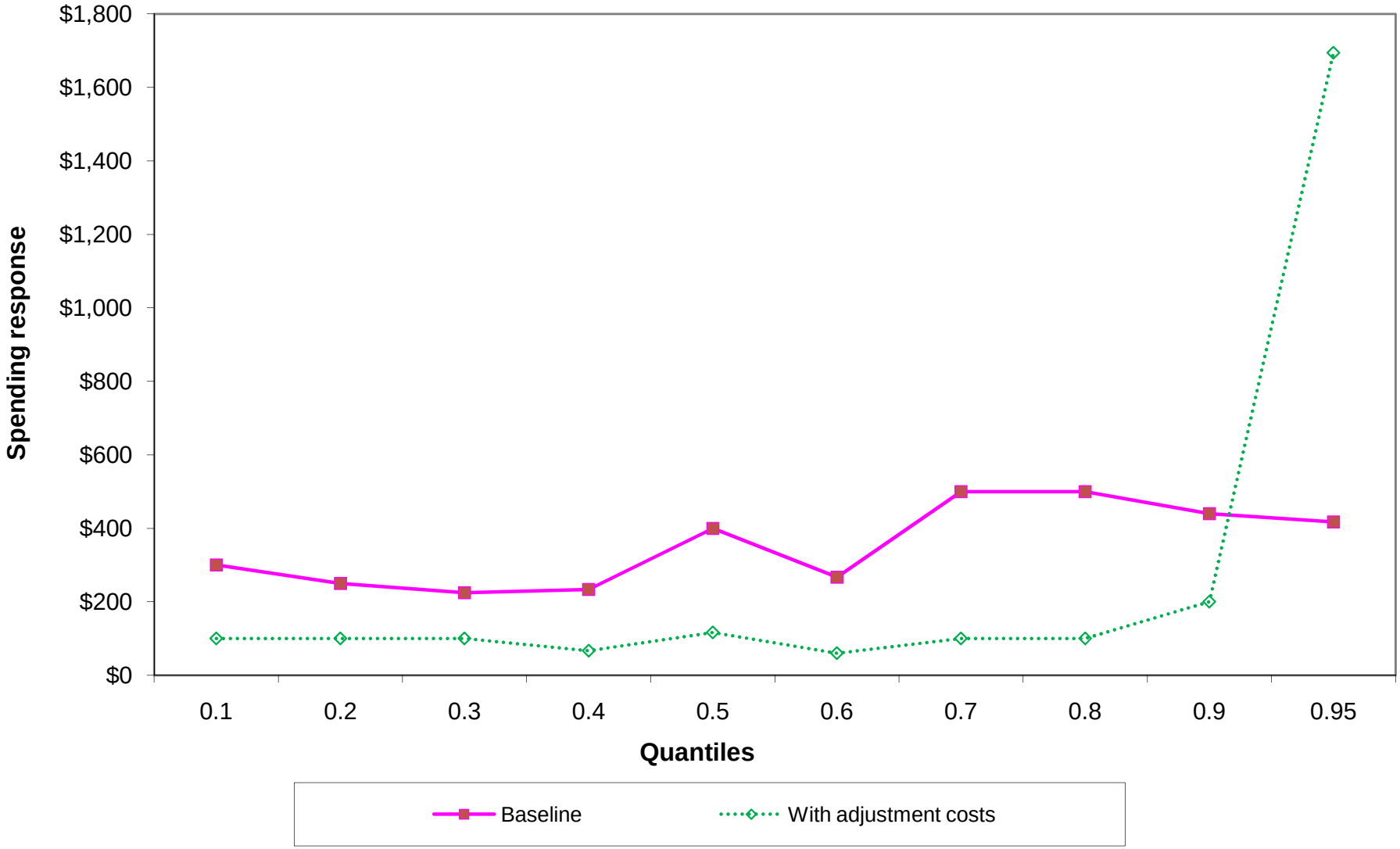

Table A1
Summary Statistics

Variable	Units with S=0 in initial survey		Units with S>=0.2 in initial survey		Income >= $20,000 at application		Income < $20,000 at application	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
A. Consumer Expenditure Survey, 1983-2008								
Real average quarterly spending	11,068	7,948	6,507	4,744				
Real Durables	1,844	4,996	892	3,076				
Real Nondurables and services	9,224	5,375	5,615	3,095				
Real before tax family nonasset annual income	62,945	45,083	20,947	16,052				
Share of income from MW earners	0.00	0.00	0.68	0.31				
Member 1 age	40.5	11.1	35.7	12.8				
Number of adults	1.92	0.81	1.80	0.85				
Number of kids under 18	0.84	1.12	0.88	1.22				
Number of unit-surveys	183,729		16,073					
Number of units	55,147		5,272					
B. Survey of Income and Program Participation, 1986-2003								
Real before tax family nonproperty annual income in initial survey	51,444	35,700	25,944	21,600				
Share of income from MW earners	0	0	0.64	0.31				
Head age	41.5	10.9	38.2	12.1				
Number of adults	1.91	0.81	1.75	0.78				
Number of kids under 18	0.97	1.15	1.12	1.26				
Number of household-surveys	347,586		33,737					
Number of households								

Table A1
Summary Statistics

Variable	Units with S=0 in initial survey		Units with S>=0.2 in initial survey		Income >= $20,000 at application		Income < $20,000 at application	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
C. Current Population Survey, 1979-2007								
Real annualized family income	34,396	20,212	19,216	13,652				
Share of income from MW earners	0	0	0.66	0.32				
Head age	42.0	10.9	41.3	12.1				
Number of adults	2.11	0.83	2.16	0.88				
Number of kids under 18	0.88	1.11	0.92	1.17				
Number of household-surveys	670,593		90,267					
D. Credit Card and Credit Bureau, 1995-2008								
Annual salary income at application					74,623	49,576	14,033	9,381
Fico Score					736	84	700	73
Active Credit Cards					3.0	2.6	2.3	2.6
Credit Card Balance on All Cards					6,162	7,775	4,713	4,368
Home Equity Balance					703	5,375	752	8,653
Mortgage Balance					20,806	162,737	30,595	118,130
Auto Balance					3,313	8,365	3,432	7,117
Number of observations					4,028,327		582,170	
Number of consumers					317,116		31,624	

Notes: Real spending and income in 2005 dollars. All CEX, SIPP, and CPS descriptive statistics are weighted.

Table A2
Minimum Wage Changes, 1982-2008

	Date	New	Change		Date	New	Change
U.S.	Apr-90	3.80	0.45				
U.S.	Apr-91	4.25	0.45				
U.S.	Oct-96	4.75	0.50				
U.S.	Sep-97	5.15	0.40				
U.S.	Jul-07	5.85	0.70				
U.S.	Jul-08	6.55	0.70				
Alaska	Jan-03	7.15	1.50	Illinois	Jan-04	5.50	0.35
Arizona	Jan-07	6.75	1.60	Illinois	Jan-05	6.50	1.00
Arizona	Jan-08	6.90	0.15	Illinois	Jul-07	7.50	1.00
Arkansas	Oct-06	6.25	1.10	Illinois	Jul-08	7.75	0.25
California	Jul-88	4.25	0.90	Iowa	Jan-90	3.85	0.50
California	Mar-97	5.00	0.25	Iowa	Jan-91	4.25	0.40
California	Sep-97	5.15	0.15	Iowa	Jan-92	4.65	0.40
California	Mar-98	5.75	0.60	Iowa	Oct-96	4.75	0.10
California	Jan-01	6.25	0.50	Iowa	Apr-07	6.20	1.05
California	Jan-02	6.75	0.50	Iowa	Jan-08	7.25	1.05
California	Jan-07	7.50	0.75	Kentucky	Jun-07	5.85	0.70
California	Jan-08	8.00	0.50	Maine	Jan-85	3.45	0.10
Colorado	Jan-07	6.85	1.70	Maine	Jan-86	3.55	0.10
Colorado	Jan-08	7.02	0.17	Maine	Jan-87	3.65	0.10
Connecticut	Oct-87	3.75	0.38	Maine	Jan-88	3.75	0.10
Connecticut	Oct-88	4.25	0.50	Maine	Jan-90	3.85	0.10
Connecticut	Apr-91	4.27	0.02	Maine	Apr-91	4.25	0.40
Connecticut	Oct-96	4.77	0.50	Maine	Jan-02	5.75	0.60
Connecticut	Mar-97	5.00	0.23	Maine	Jan-03	6.25	0.50
Connecticut	Sep-97	5.18	0.18	Maine	Jan-05	6.35	0.10
Connecticut	Jan-99	5.65	0.47	Maine	Jan-06	6.50	0.15
Connecticut	Jan-00	6.15	0.50	Maine	Oct-06	6.75	0.25
Connecticut	Jan-01	6.40	0.25	Maine	Oct-07	7.00	0.25
Connecticut	Jan-02	6.70	0.30	Maine	Oct-08	7.25	0.25
Connecticut	Jan-03	6.90	0.20	Maryland	Jan-07	6.15	1.00
Connecticut	Jan-04	7.10	0.20	Massachus	Jul-86	3.55	0.20
Connecticut	Jan-06	7.40	0.30	Massachus	Jul-87	3.65	0.10
Connecticut	Jan-07	7.65	0.25	Massachus	Jul-88	3.75	0.10
Delaware	May-99	5.65	0.50	Massachus	Apr-90	3.80	0.05
Delaware	Oct-00	6.15	0.50	Massachus	Jan-96	4.75	0.50
Delaware	Jan-07	6.65	0.50	Massachus	Jan-97	5.25	0.50
Delaware	Jan-08	7.15	0.50	Massachus	Jan-00	6.00	0.75
Florida	Jan-06	6.40	1.25	Massachus	Jan-01	6.75	0.75
Florida	Jan-07	6.67	0.27	Massachus	Jan-07	7.50	0.75
Florida	Jan-08	6.79	0.12	Massachus	Jan-08	8.00	0.50
Hawaii	Jan-88	3.85	0.50	Michigan	Oct-06	6.95	1.80
Hawaii	Mar-91	4.25	0.40	Michigan	Jul-07	7.15	0.20
Hawaii	Apr-92	4.75	0.50	Michigan	Jul-08	7.40	0.25
Hawaii	Jan-93	5.25	0.50	Minnesota	Jan-88	3.55	0.20
Hawaii	Jan-02	5.75	0.50	Minnesota	Jan-89	3.85	0.30
Hawaii	Jan-03	6.25	0.50	Minnesota	Jan-90	3.95	0.10
Hawaii	Jan-06	6.75	0.50	Minnesota	Jan-91	4.25	0.30
Hawaii	Jan-07	7.25	0.50	Minnesota	Aug-05	6.15	1.00

Table A2 -cont-
Minimum Wage Changes, 1982-2008

	Date	New	Change
Missouri	Jan-07	6.50	1.35
Missouri	Jan-08	6.65	0.15
Montana	Jan-07	6.15	1.00
Nevada	Nov-06	6.15	1.00
Nevada	Jan-07	6.33	0.18
New Hampshire	Jan-87	3.45	0.10
New Hampshire	Jan-88	3.55	0.10
New Hampshire	Jan-89	3.65	0.10
New Hampshire	Jan-90	3.75	0.10
New Hampshire	Apr-90	3.80	0.05
New Hampshire	Jan-91	3.85	0.05
New Hampshire	Apr-91	4.25	0.40
New Hampshire	Sep-07	6.50	1.35
New Hampshire	Sep-08	7.25	0.75
New Jersey	Apr-92	5.05	0.80
New Jersey	Sep-97	5.15	0.10
New Jersey	Oct-05	6.15	1.00
New Jersey	Oct-06	7.15	1.00
New Mexico	Jan-08	6.50	0.65
New York	Jan-05	6.00	0.85
New York	Jan-06	6.75	0.75
New York	Jan-07	7.15	0.40
North Carolina	Jan-07	6.15	1.00
North Dakota	Jul-07	5.85	0.70
Ohio	Jan-07	6.85	1.70
Ohio	Jan-08	7.00	0.15
Oregon	Sep-89	3.85	0.50
Oregon	Jan-90	4.25	0.40
Oregon	Jan-91	4.75	0.50
Oregon	Jan-97	5.50	0.75
Oregon	Jan-98	6.00	0.50
Oregon	Jan-99	6.50	0.50
Oregon	Jan-03	6.90	0.40
Oregon	Jan-04	7.05	0.15
Oregon	Jan-05	7.25	0.20
Oregon	Jan-06	7.50	0.25
Oregon	Jan-07	7.80	0.30
Oregon	Jan-08	7.95	0.15
Pennslyvania	Feb-89	3.70	0.35
Pennslyvania	Apr-90	3.80	0.10
Pennslyvania	Jan-07	6.25	1.10
Pennslyvania	Jul-07	7.15	0.90
Rhode Isla	Jul-86	3.55	0.20
Rhode Isla	Jul-87	3.65	0.10
Rhode Isla	Jul-88	4.00	0.35
Rhode Isla	Aug-89	4.25	0.25
Rhode Isla	Apr-91	4.45	0.20
Rhode Isla	Oct-96	4.75	0.30
Rhode Isla	Jul-99	5.65	0.50
Rhode Isla	Sep-00	6.15	0.50
Rhode Isla	Jan-04	6.75	0.60
Rhode Isla	Mar-06	7.10	0.35
Rhode Isla	Jan-07	7.40	0.30
South Dak	Jul-07	5.85	0.70
Vermont	Jul-86	3.45	0.10
Vermont	Jul-87	3.55	0.10
Vermont	Jan-89	3.65	0.10
Vermont	Jul-89	3.75	0.10
Vermont	Apr-90	3.85	0.10
Vermont	Apr-91	4.25	0.40
Vermont	Jan-95	4.50	0.25
Vermont	Jan-96	4.75	0.25
Vermont	Jul-97	5.15	0.40
Vermont	Sep-97	5.25	0.10
Vermont	Nov-99	5.75	0.50
Vermont	Jan-01	6.25	0.50
Vermont	Jan-04	6.75	0.50
Vermont	Jan-05	7.00	0.25
Vermont	Jan-06	7.25	0.25
Vermont	Jan-07	7.53	0.28
Vermont	Jan-08	7.68	0.15
Washingtor	Jan-89	3.85	0.50
Washingtor	Jan-90	4.25	0.40
Washingtor	Jan-94	4.90	0.65
Washingtor	Sep-97	5.15	0.25
Washingtor	Jan-99	5.70	0.55
Washingtor	Jan-00	6.50	0.80
Washingtor	Jan-01	6.72	0.22
Washingtor	Jan-02	6.90	0.18
Washingtor	Jan-03	7.01	0.11
Washingtor	Jan-04	7.16	0.15
Washingtor	Jan-05	7.35	0.19
Washingtor	Jan-06	7.63	0.28
Washingtor	Jan-07	7.93	0.30
Washingtor	Jan-08	8.07	0.14
West Virgir	Jul-06	5.85	0.70
West Virgir	Jul-07	6.55	0.70
West Virgir	Jul-08	7.25	0.70
Wisconsin	Jun-05	5.70	0.55
Wisconsin	Jun-06	6.50	0.80

Table A3
Employment, Hours, and Wage Responses to a Minimum Wage Increase
Current Population Survey, 1979-2007
Sample: Hourly Wage Workers

Share of income from minimum wage jobs (S)	Employment			Hours			Hourly Wage		
	Total	Head	Spouse	Total	Head	Spouse	All	Head	Spouse
0	-0.005	-0.001	-0.005	-0.14	-0.02	0.04	0.01	-0.02	0.06
	(0.003)	(0.002)	(0.003)	(0.12)	(0.06)	(0.08)	(0.04)	(0.05)	(0.06)
	670,593	654,251	520,554	670,593	601,427	427,700	871,304	497,492	373,812
>0	0.007	-0.002	0.012	0.92	0.27	0.65	0.45	0.46	0.43
	(0.010)	(0.007)	(0.009)	(0.45)	(0.24)	(0.30)	(0.11)	(0.15)	(0.11)
	115,337	111,334	96,386	115,337	99,193	86,728	161,111	77,895	83,216
>=0.2	0.009	-0.001	0.014	0.74	0.03	0.62	0.34	0.42	0.35
	(0.011)	(0.009)	(0.011)	(0.54)	(0.29)	(0.36)	(0.11)	(0.15)	(0.14)
	90,267	86,954	71,911	90,267	76,357	63,783	121,679	60,555	61,124

NOT FOR PUBLICATION

Table A4

Summary Statistics, 2004 Survey of Consumer Finances

Variable	Households with w*=0		Households with w*>=0.2	
	Mean	Median	Mean	Median
Family income	53,241	38,755	16,188	11,996
Value of durables (S(it))	19,585	13,000	8,852	4,800
Value of loans against durables	6,483	0	2,646	0
Net financial assets	125,485	13,657	32,281	369
Assets net of durables debt (A(it))	119,002	8,397	29,635	18
Resources (A(it)+(1-pi)S(it))	130,753	17,954	34,946	1,922
Homeowner (=1 if yes)	0.64	1.00	0.35	0.00
Age of head	42.3	42.0	36.3	34.0
Number of households	12,642		568	

Notes: Real income, assets, and debt in 2000 dollars. All descriptive statistics are weighted. Income variable is pre-tax earnings of husband and wife. Net financial wealth includes stocks, bonds, checking and money market accounts, less liabilities against these. Net financial wealth excludes business and housing, and durables wealth, as well as liabilities against these.