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Shopping time

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HIGHLIGHTS

- Using the American Time Use Survey we construct an indicator of shopping time.
- Average time spent shopping declined post 2007 compared to pre 2007.
- Decline was largest for the unemployed who converged to the level of the employed.
- We also find pro-cyclical consumer shopping time in the goods market.
- This poses a challenge for models in which price comparisons are a driver of business cycles.

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ABSTRACT

There is a renewed interest in macroeconomic theories of search frictions in the goods market that help solve quantitative puzzles on amplification and persistence of GDP, sales, inventory and advertisement. This requires a deeper understanding of the cyclical properties of the intensive margins of search in this market. Using the American Time Use Survey we construct an indicator of shopping time. It includes both searching and purchasing goods and is based on 25 time use categories (out of more than 400 categories). We find that average time spent shopping declined in the aggregate over the period 2008–2010 compared to 2005–2007. The decline was largest for the unemployed who went from spending more time shopping for goods than the employed to roughly the same, or even less, time. Cross-state and individual regressions indicate pro-cyclical consumer shopping time in the goods market. This evidence poses a challenge for models in which price comparisons are a driver of business cycles.

1. Introduction

Most if not all markets are subject to various frictions, including informational and search ones. Adopting this viewpoint has proved successful in the analysis of labor and credit markets. More recently, a body of research has modeled search frictional goods markets. This research has allowed for a better understanding of rationing in the goods markets, of GDP, sales, inventory and advertisement, as well as its role in the propagation of business cycles. However, there is no consensus on the cyclicality of an important variable in this search frictional goods market, namely of aggregate effort exerted by consumers, despite the fact that it is a key determinant of sales and therefore profits and investment.

In models by Bai et al. (2011) who study the role of demand fluctuations, of Gourio and Rudanko (forthcoming) and den Haan (2013) who study the joint behavior of inventory and GDP and Petrosky-Nadeau and Wasmer (2015) who focus on amplification and persistence of technology shocks, endogenous consumer shopping effort is pro-cyclical. Notably, it increases with income. In Kaplan and Menzio (forthcoming), consumer effort is exogenous and fixed over time but, by fixing the effort of the unemployed above that of the employed, as the former are assumed to search harder to find better prices, aggregate time shopping appears to be countercyclical.

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In this paper we use the detailed daily time use diaries of the American Time Use Survey (ATUS) conducted by the Bureau of Labor Statistics (BLS) to measure the cyclicality of consumer search in the goods market. In a very related line of research, Hall (2012) was the first to show the strong procyclicality of advertising and its macroeconomic implications, advertising spending being the dual of consumer efforts in the present paper.

From a theoretical perspective, under standard assumptions on utility and cost functions of shopping effort, shopping time is pro-cyclical. Purchasing effort increases with income because higher income reduces the opportunity cost of buying search goods. A less trivial result is that pre-match search effort increases with the surplus from consumption. The consumption surplus itself depends on income. Consumers therefore spend more time and effort to consume following a rise in income. Prices, when they are bargained, respond positively to income and attenuate the procyclicality result. When quantities can adjust, they respond positively to income and thus further raise the consumption surplus. This strengthens the procyclicality under price bargaining. However, the cyclicality of shopping time disappears under competitive pricing. There are also forces in the opposite direction. In the face of price dispersion and a reservation search strategy for consumers, an increase in income is associated with a higher reservation price less search effort for goods. Similarly, when working time can be chosen freely, shopping effort and working time covary negatively. Hence, a rise in the hourly wage – due for instance to a productivity innovation generating the business cycle – raises hours if the substitution effect dominates the income effect. This leads to less shopping time. Finally, pre-match search effort may occur simultaneously with the effort undertaken while shopping for other goods. This would be a case, say, when in a grocery store an individual spends time searching for new yogurts after having filled the basket with salt, butter, and sour cream.

Whether procyclicality or counter-cyclicality dominates is, ultimately, an empirical question for which we use the American Time Use Survey (ATUS) from 2003 to 2013. The ATUS includes over 400 distinct time use categories. Our main task is to identify various components of shopping time. We settle on 25 time use categories that broadly encompass time spent shopping for consumer goods and services, and, separately, on groceries, gas and food (GFC).

We obtain three main results. First, we find that aggregate search by consumers in the goods market declined with the onset of the Great Recession. This is true for each of the employed, unemployed, and nonparticipants. However, we find that the time allocation to finding and acquiring goods and services declined most for the unemployed. Prior to December 2007 the unemployed, and non-participants, spent more time searching in the goods market than the employed. During the Great Recession, the unemployed drastically reduced their time searching for goods and services, spending the same amount of, or even less, time on this activity than the employed by 2012.

Second, there is a positive relation between cross-state variations in GDP per capita and our different measures of search effort in the goods markets. States with the largest declines in GDP per capita tended to have the largest declines in time spent shopping for goods and services. In Michigan, for instance, there was 21% decline in time spent in this shopping category and a 10% decline in GDP per capita. Oklahoma, with a very different experience over the period in question, experienced a 2% increase in GDP per capita and a 20% increase in shopping time.

Third, we find that search effort in the goods market is increasing in individual income and household income. This result is robust to controlling for state of residence and various demographic characteristics such as age, gender, education, and marital status. The one exception is time spent shopping for groceries, gas, and food, which is unrelated to either income variable. Overall, we do not find much evidence in favor of a negative correlation between income and shopping time.

This body of evidence poses a challenge for theories in which price comparisons are a driver of business cycles, as in recently published work by Kaplan and Menzio (forthcoming). Fluctuations and the existence of multiple equilibria in the latter arise precisely from the fact that in recessions the unemployed search more for lower priced goods, depressing the economy further. Our investigation of the ATUS data does not support this mechanism.

In contrast, our result confirms a negative correlation between working hours and shopping time found in Aguiar et al. (2013). This is quite natural, since the time budget constraint is less tight in a recession. Households have more time to allocate to various non-work activities. However, this does not imply that forces pushing towards a counter-cyclicality of shopping time dominate over the business cycles, for the reasons indicated above. Our conclusion is that models where the consumption surplus and search effort in the goods market are pro-cyclical have more empirical support, and are relevant for studying business cycles, a result confirmed in recent work by Paciello et al. (2016).

Section 2 describes the ATUS and the time use categories we employ in this study.[1] Section 3 describes aggregate trends in shopping time over the sample period 2003–2012 and by labor force status. Section 4 then measures the business cycle and income elasticity of time spent searching for goods and services, and discusses some robustness issues. Section 5 discusses the individual regression of shopping time and income. Section 6 concludes.

2. Searching for goods and services in the ATUS

We use data from the 2003–2013 waves of the ATUS, conducted by the BLS drawing on individuals from the existing sample of the Current Population Survey (CPS). The types of activities recorded in the ATUS are described in detail in Hamermesh et al. (2005), and have been used to document changes in overall time use during the Great Recession (Aguiar et al., 2013), with a particular emphasis on how individuals reallocate decreased hours of market work to other activities.

We focus on time spent in the process of selecting and acquiring goods and services. Overall we select 25 categories out of more than 400, which include time spent traveling associated with purchasing *marketized* goods and services. A potential 26th category, travel time related to relaxing and leisure, was excluded even if it may include some market activities. Categories are mutually exclusive and sum to total time spent shopping[2]:

1. *Consumer goods and services* is divided into three subcategories:
   - Shopping for consumer goods: Shopping, except groceries, food and gas (07-01-04) and (07-01-99), Consumer purchases (07-99).
   - Researching goods and services (07-02).
   - Waiting associated with shopping for goods and services: waiting associated with shopping (07-01-05), waiting associated with shopping for professional and personal care services: childcare services (08-01-02), banking (08-02-03), legal services (08-03-02), medical services (08-04-03), personal care (08-05-02), real estate (08-06-02), veterinary (08-07-02); household services not done by self including general

[1] Section A of the On-line appendix reviews the various mechanisms at play between income, shopping time, prices, and working time and classifies them into pro-cyclical forces and countercyclical forces.

[2] Online Appendix B provides the ATUS time use codes that compose each category.

services (09-01-04), repair and construction (09-02-02), pet care (09-03-02), lawn and garden (09-04-02), vehicle maintenance (09-05-02); and finally waiting association with arts and entertainment (12-05-04).
2. *Groceries, Gas, and Food (GGF)* includes all time spent shopping for groceries (07-01-01), gas (07-01-02), and food (07-01-03). We present results for all three subcategories.
3. *Travel time* includes all travel associated with the purchasing of goods (18-07) and services (18-08, 18-09, and 18-12-04).

We focus on the population ages of 24 and 55. We exclude the population aged 16–24 because labor force status, such as unemployment and participation, line up very closely with the CPS based rates published by the BLS for all age groups except this younger group.[3] We remove those aged 55 and over because labor farce participation rates for these individuals decline dramatically, whereas our main results emphasize differences across labor force status. We also exclude respondents with a positive amount of unclassified time. In total we have 66,958 individuals in our sample for the baseline results.[4] We use the sample weights provided by the ATUS to aggregate responses to either year or state-year averages.

3. Aggregate trends in shopping time

Fig. 1 plots the annual data for our main components of shopping time, in the aggregate – averaging across all individuals in the sample (solid black line) – and by labor force status. Time spent by the employed is plotted by the red dashed line, time spent by the unemployed by the triangle green line, and time spent by nonparticipants by the blue circled line. Table 1 provides the average values for the sample period, 2003–2012. The table also reports averages by gender and marital status, as well as for the population over age 55.

Aggregate time spent shopping for goods and services, plotted in Panel A of Fig. 1, averaged 42 min per day over the sample period. Two main observations arise from this first look at the data. First, individuals not in the labor force spend the most time shopping for goods and services, an average of 50 min a day. Second, individuals not in the labor force and unemployed individuals display a similar pattern of total time spent shopping for goods and services, with a pronounced decline in time spent starting in 2007.

The second panel of Fig. 1 plots time spent shopping for goods and services other than groceries, gas, and food, and excluding time spent traveling associated with shopping activities. This is the core measure of search effort by consumers in the goods market. The average time spent in a day over the period 2003–2012 is 16 min, with nonparticipants spending the most time, 20 min a day. Interestingly, the unemployed start out resembling nonparticipants early in the sample time period, even spending more time shopping for goods and services by a significant margin in 2006. In the second half of the sample, after the onset of the Great Recession, the unemployed are very similar to the employed in time spent shopping for goods and services. By 2012, the unemployed spend less time shopping for goods and services than the employed.

Average time spent in researching goods and services is small, averaging 0.07 min a day. However, we note that nonparticipants spent the most time, 0.20 min, and that the employed spent on average more time than the unemployed researching goods and services (see Table 1). "Research" done during other shopping related activities, or passively when, for example, seeing an advertisement, is poorly measured by the corresponding ATUS category. While a concern for identifying the amount of time researching goods and services, to the extent that it is pick up by the other shopping time categories in the ATUS this should not affect our conclusions regarding the shopping time over the business cycle. Finally, time spent waiting associated with acquisition of goods and services averages 0.67 min a day. The employed and unemployed spent about the same amount of time waiting, while individuals not in the labor force waited twice as long, or 1.3 min.

Individuals spend on average 8 min a day purchasing groceries, gas, and food, the bulk of which is spent purchasing groceries (6 min), and an average of 18 min a day in travel associated with purchasing goods and services.

The last columns of Table 1 report the time spent shopping for goods and services for men and women, each according to marital status, as well as for individuals aged 55 and older. Women spend 15 more minutes a day shopping for goods and services relative to men. The largest difference is in the shopping for goods and services category. Conditioning on marital status reveals little difference in the pattern of time spent searching for and acquiring goods and services across married and single men. Married women spend 7 more minutes a day in total shopping time than single women. Time spent shopping for groceries shows the most important differences across married and single women, along with travel time associated with shopping for goods and services. The last column reports that individuals over age 55 spend, on average, 3 more minutes a day shopping than individuals aged 25–54.

4. Shopping time over the business cycle

The ATUS does not cover an entire business cycle at the moment. This renders the discussion of trends and cycle in time use data delicate. We address this question in the first subsection by comparing average time spent shopping for goods and services by individuals in the three years leading up to and three years following the start of the Great Recession. Next, we estimate the elasticity of time spent on different goods market search categories over the business cycle in the manner of Aguiar et al. (2013). That is, we exploit cross-state variations in time spent and a measure of state business cycles. We then look at the relationship between individual and household incomes and our measure of shopping time, as well as changes in hours of market work. In each section we emphasize differences across labor market statuses.

4.1. The cycle and goods market search

A first step in examining the cyclicality of search time in the goods market, presented in Table 2, is to compare the average time spent on our different subcategories over two time periods. This also has the advantage, as argued by Aguiar et al. (2013), of smoothing some year-to-year noise in the ATUS.[5] The periods we compared are the expansion years of 2005–2007 prior to the onset of the Great Recession in December 2007, to the following three years, 2008–2010. The sample in Table 2 Panel A are all individuals in the age category 25–54, our baseline. Panel B reports the results for employed individuals, while Panels C and D, respectively, report

[3] We have attempted to identify the reasons for this discrepancy with the BLS in private communications but have so far been unsuccessful.

[4] Online Appendix B provides more details for these deletions. The results for the whole age sample change very little.

[5] It does not appear appropriate to remove a time trend from the data when the sample does not cover an entire business cycle. Such a transformation will introduce a bias in the direction of the differences that reflects the fraction of the cycle actually covered by the said sample, and on the state of the cycle at the start of the sample. The next section will use cross-state changes in GDP and time use in order to further investigate the cyclicality of shopping time.

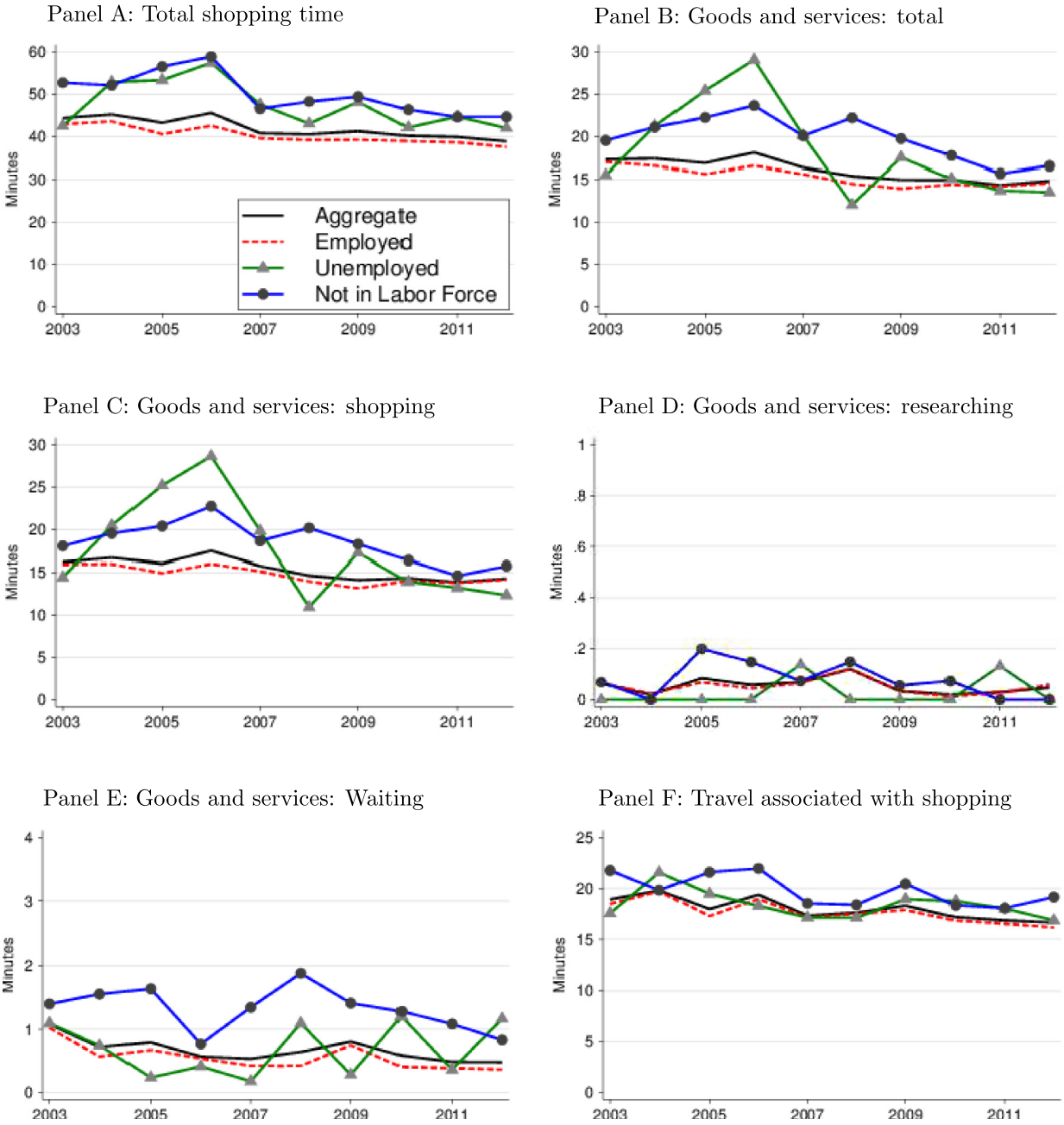

Fig. 1. Shopping time: ages 25–54 by labor force status. The solid black line represents the aggregate for the age category 25–54 years. Time spent by the employed is plotted by the red dashed line, time spent by the unemployed by the triangle green line, and time spent by nonparticipants by the blue circled line. The ATUS definitions for time spent in Panels A though F are detailed in the Online Appendix B. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

the results for unemployed individuals and persons not in the labor force.

The first two columns of each panel in Table 2 present the average time spent in each category for the two periods. The third column presents the unconditional difference in time spent over the two periods. The last columns present the difference, in percentage change, in time spent conditioning on age, education, race, gender, marital status, and the presence of children.

Overall time spent shopping saw a statistically significant decline of 2.5 min per day in 2008–2010 compared with 2005–2007, or approximately 4.5 percent. A closer examination reveals that the decline is concentrated in the consumer goods and services category. None of the increases in time spent shopping is statistically significant, with the exception of time spent purchasing gas. Presumably individuals are willing to commute greater distances to work at scarce jobs. Moreover, the conditional difference in time spent is almost identical to the unconditional difference.

We find that the largest decline in time spent shopping for goods and services is by the unemployed. Time spent shopping for consumer goods and services declines by 10 min for the unemployed, compared with 1.7 min for the employed. Both declines are highly statistically significant. This decline is slightly larger for the unemployed after controlling for other individual characteristics. The corresponding time use categories for nonparticipants also decline, but the difference is not statistically significant.

This finding relates to the composition of individuals across labor market statuses and aggregate search effort in the goods market. Prior to the onset of the Great Recession, the unemployed spent more time searching for goods and services than the

Table 1
Shopping time by labor force status and by age—minutes per day.

Categories	Agg.	Ages: 25–54									Age:
		Labor force status			Men			Women			55+
		Emp.	Unem.	NLF	All	Married	Single	All	Married	Single	
Total shopping time	42.0	40.2	47.3	50.1	34.2	34.9	32.7	49.8	52.2	44.7	44.9
Consumer Goods and Services	16.1	15.3	18.3	20.0	12.3	12.8	11.5	19.8	20.7	18.1	17.4
- Consumer Goods	15.3	14.7	17.6	18.4	11.8	12.2	10.9	18.9	19.9	16.8	15.7
- Researching G&S	0.07	0.05	0.03	0.20	0.06	0.07	0.03	0.09	0.06	0.15	0.07
- Waiting for services	0.67	0.55	0.68	1.32	0.51	0.50	0.53	0.82	0.69	1.10	1.55
Groceries, Gas, and Food	7.91	7.31	10.7	10.3	5.82	5.94	5.55	10.0	10.77	8.37	8.48
- Groceries	6.25	5.56	9.36	9.06	4.22	4.34	3.96	8.31	9.09	6.58	7.32
- Gas	0.41	0.43	0.35	0.30	0.42	0.45	0.37	0.39	0.38	0.41	0.38
- Food	1.25	1.32	0.94	0.95	1.18	1.15	1.22	1.33	1.30	1.38	0.78
Travel time	18.0	17.6	18.4	19.8	16.0	16.21	15.63	20.0	20.74	18.30	19.0

Notes: ATUS, sample restricted to respondents with no unclassified time. "Agg.", "Emp.", "Unem.", and "NLF" correspond to "Aggregate", "Employed", "Unemployed", and "Not in Labor Force". For the baseline sample of individuals aged 25 to 54, there were 10,434 respondents per year, on average. Marital status includes unmarried partners in the "Married" category.

employed: 24.5 min against 15.3 by the employed. As such, the rapid increase in unemployment in 2008 and 2009 could have led to an increase in aggregate search effort in the goods market. The ATUS data show that this was not the case. Shopping time of the unemployed declined to an average of 14 min in the 2008–2010 period, below the average of 13.7 for the employed. Since shopping time declined for every labor force status, aggregate search time declined (Panel A of Table 2). Again, the search effort of the unemployed declined most during the recession. By the end of the sample, the unemployed spent less time than the employed searching in the goods market.

Average time spent shopping for groceries, gas, and food, just as travel time associated with shopping, saw essentially no change across time periods. This is true across labor force statuses, with one exception. There is a 2.3 min decline in time spent shopping for groceries by individuals not in the labor force.

4.2. Cross-state variations in shopping time

We define the state-level aggregates of time use of category j as follows:

$$\tau_{st}^{j} = \sum_{i=1}^{N_{st}} \left(\frac{\omega_{ist}}{\sum_{i=1}^{N_{st}} \omega_{ist}} \right) \tau_{ist}^{j}, \tag{1}$$

where τ_{ist}^{j} represents minutes per day by individual i from state s during period t spent on time use category j. N_{st} is the total number of individuals in our sample from state s during period t and ω_{ist} is the ATUS sampling weight.[6] We then construct state-level differences in shopping between the 2005–2007 period and 2008–2010 period, along with corresponding changes in state real GDP per capita. Fig. 2 plots the log change in state GDP per capita against the log change in different categories of shopping time in the corresponding state. Weighted by state population, and unweighted regression coefficients are reported in Table 3. Panel A of Fig. 2 corresponds to total shopping time, panel B corresponds to time spent shopping for goods and services, panel C for groceries, gas and food, and panel D corresponds to the travel time associated with shopping. Each panel also plots a cross-state regression line using state population as regression weights.

The pattern in panel A of Fig. 2 is clear. States with the strongest decline in GDP per capita experienced the most significant decline in total shopping time. Likewise, states that saw an increase in GDP per capita also saw an increase in total shopping. In Michigan for instance, there was a 21% decline in time spent and a 10% decline in GDP per capita. Oklahoma, with a very different experience over the period in question, experienced a 2% increase in GDP per capita and a 20% increase in shopping time. The regression line has a positive slope with coefficient 1.09, implying that, on average, a 1% decline in state GDP per capita coincided with a 1.1% decline in total time spent shopping.

Time spent shopping for goods and services, in Panel B, shows a similar pattern of decline with the contraction of state GDP. The regression line has a slope of 1.60, implying a stronger positive relation than in the case of total shopping time.

The state-level changes in time spent shopping for groceries, gas, and food or travel time associated with shopping have a weaker positive relation to changes in state GDP per capita, but neither is significant. Most states, especially the most populous, saw virtually no change in the time spent shopping for groceries, gas, and food (see Panel C).

5. Individual regressions

This section examines the relationships between two measures of income, household and individual, and search activity in the goods market in the ATUS. In the first case we use reported household income brackets. In the second case we use reported weekly earnings in the CPS files. Both approaches uncover a positive relation between income and search effort in the goods market. The results are strongest for shopping for goods and services and time spent traveling associated with shopping. We find no evidence in the time use data that individuals with lower incomes search far and wide.

5.1. Household income

We consider the relation between household income and consumer search in the goods market using six income categories: (1) \$0–\$24,999; (2) \$25,000–\$49,999; (3) \$50,000–\$74,999; (4) \$75,000–\$99,999; (5) \$100,000–\$149,999, and; (6) \$150,000 and over, and running the following regression[7]:

$$\tau_{ist}^{j} = \alpha^{j} + \beta^{j} F_{ist} + D_{t} + S_{i} + \delta X_{ist} + \epsilon_{ist}, \tag{2}$$

[6] Unlike the CPS, which is designed to produce reliable estimates at both the state and national level, the ATUS only has a national reliability requirement. Less populous states constitute a smaller proportion of the ATUS sample and will not produce estimates as reliable as for the more populous states. We use the average state population between 2003 and 2012 as weights in the regressions to account for this concern regarding the state-level estimates.

[7] The ATUS provides two family income variables – hufaminc for 2002–2009 and hefaminc for 2010–2012 – with the distinction that the second variable has been edited to leave no empty responses.

Table 2
Shopping time by period—minutes per day.

Panel A: Full sample

Categories	Average 2005–2007 (1)	Average 2008–2010 (2)	Difference, % of 2005–2007 Average: Unconditional (3)	Difference, % of 2005–2007 Average: Conditional (4)
Total Shopping Time	43.1	40.7	−5.77**	−5.64**
Consumer Goods and Services	17.1	15.1	−11.54***	−11.24***
- Consumer goods	16.4	14.4	−12.57***	−12.24***
- Researching G&S	0.07	0.11	60.99	62.34
- Waiting for services	0.63	0.67	7.23	6.62
Groceries, Gas, and Food	7.83	7.84	0.16	0.42
- Groceries	6.17	6.13	−0.65	−0.20
- Gas	0.38	0.46	21.89***	22.15***
- Food	1.28	1.25	−2.41	−3.04
Travel time	18.2	17.7	−2.90	−3.00

Panel B: Employed

Categories	Average 2005–2007 (1)	Average 2008–2010 (2)	Difference, % of 2005–2007 Average: Unconditional (3)	Difference, % of 2005–2007 Average: Conditional (4)
Total Shopping Time	40.9	39.1	−4.34*	−4.58*
Consumer Goods and Services	15.9	14.3	−10.51***	−10.56***
- Consumer goods	15.3	13.7	−10.78***	−10.81***
- Researching G&S	0.06	0.06	−6.03	−4.83
- Waiting for services	0.56	0.52	−3.31	−4.07
Groceries, Gas, and Food	7.14	7.42	3.97	3.79
- Groceries	5.42	5.6	3.26	3.27
- Gas	0.39	0.48	22.34**	22.44***
- Food	1.32	1.34	1.41	0.37
Travel time	17.8	17.4	−2.16	−2.57

Panel C: Unemployed individuals

Categories	Average 2005–2007 (1)	Average 2008–2010 (2)	Difference, % of 2005–2007 Average: Unconditional (3)	Difference, % of 2005–2007 Average: Conditional (4)
Total Shopping Time	52.7	44.4	−15.81	−17.09*
Consumer Goods and Services	24.9	14.9	−40.12***	−41.56***
- Consumer goods	24.5	14	−42.84***	−44.51***
- Researching G&S	0.05	0	−100	−102.57
- Waiting for services	0.27	0.86	213.42	233.855
Groceries, Gas, and Food	9.59	11.3	17.41	16.67
- Groceries	8.1	10	23.96	23.25
- Gas	0.27	0.49	79.23	79.67
- Food	1.22	0.73	−39.90*	−41.12*
Travel time	18.3	18.2	−0.16	−1.51

Panel D: Individuals not in the labor force

Categories	Average 2005–2007 (1)	Average 2008–2010 (2)	Difference, % of 2005–2007 Average: Unconditional (3)	Difference, % of 2005–2007 Average: Conditional (4)
Total Shopping Time	54	48.3	−10.5*	−9.43*
Consumer Goods and Services	22	20.3	−7.72	−6.58
- Consumer goods	20.6	18.3	−11.29	−9.19
- Researching G&S	0.14	0.5	253.08	198.85
- Waiting for services	1.25	1.52	21.82	13.27
Groceries, Gas, and Food	11.3	8.99	−20.39***	−19.71**
- Groceries	9.96	7.75	−22.22**	−21.62**
- Gas	0.33	0.35	7.91	10.24
- Food	1.01	0.89	−11.56	−10.50
Travel time	20.7	19	−8.07	−6.84

Notes: ATUS using individual demographic and time use information. Sample restricted to respondents of age 25–54 (Panel A), who are employed (Panel B), unemployed (Panel C), or not in the labor force (Panel D), and have no amount of unclassified time use. Columns 1 and 2 report average minutes per day spent on various shopping activities during 2005–2007 and 2008–2010. Column 3 reports the unconditional difference and Column 4 reports the conditional difference in a regression controlling for age, education, race, gender, marriage status, and the presence of children, with robust standard errors.

* Statistical significance at 10% level.
** Statistical significance at 5%, level.
*** Statistical significance at 1% level.

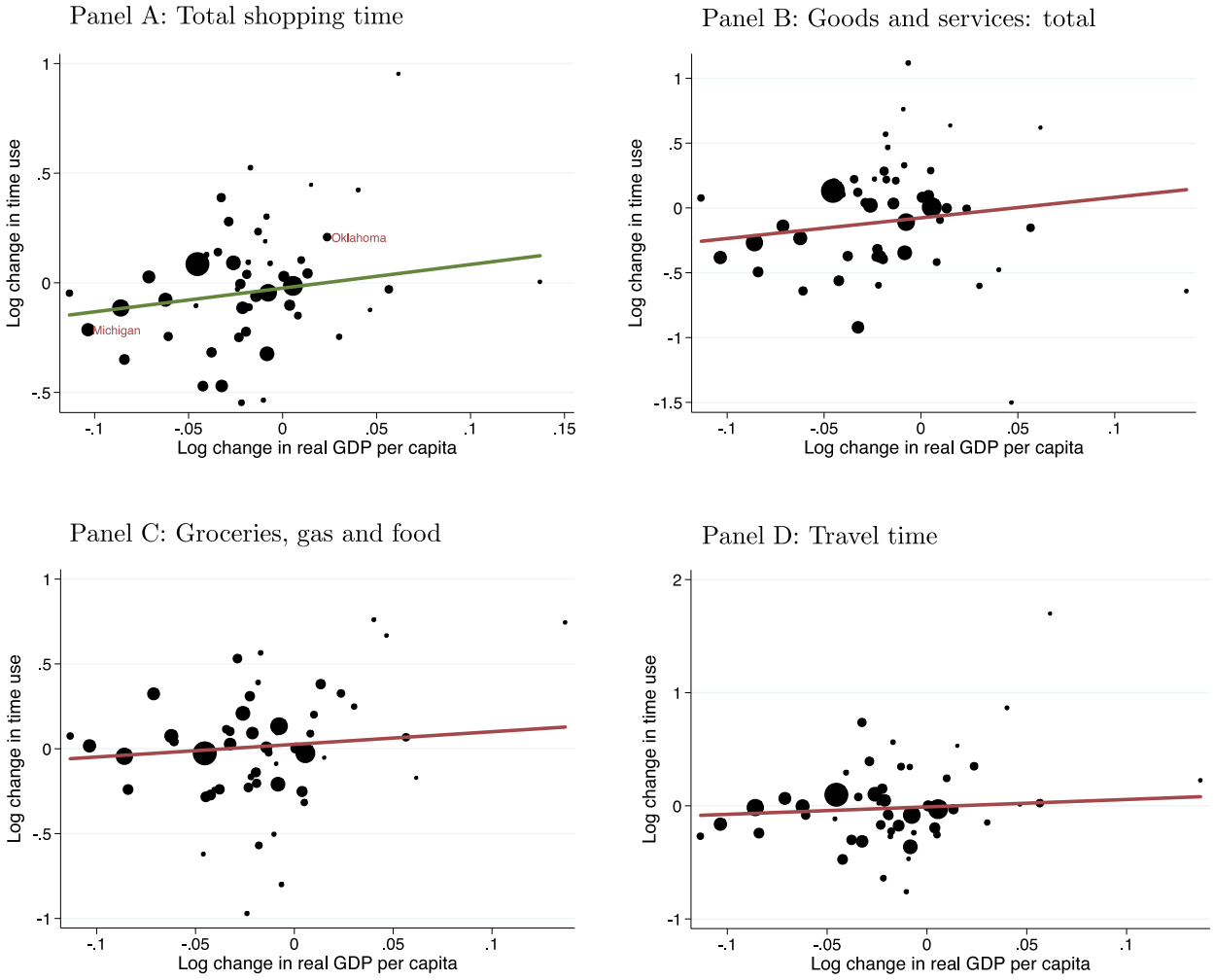

Fig. 2. Cross-State variations in shopping time: 2008–2010 vs. 2005–2007.

Table 3
Regression coefficients: change in shopping time on GDP growth.

Category	Unweighted	Population-weighted
Total Shopping Time	198.04	107.95
	(0.03)	(0.18)
Consumer Goods and Services	−33.17	158.94
	(0.83)	(0.20)
Groceries, Gas, and Food	262.89	74.52
	(0.02)	(0.41)
Travel time	313.59	65.64
	(0.02)	(0.49)

The table reports the estimate of percent change in time spent shopping between 2005–2007 and 2008–2010 associated with a 1% increase in GDP per capita over that period. *P*-values are in parentheses, with robust standard errors..

where F_{ist} is a vector of family income categorical variables, D_t is a time dummy, S_i is a state dummy, and X_{ist} is a vector of demographic and educational variables.

Table 4 reports the estimated coefficients on income categories 2–6. Each coefficient represents the increment in shopping time for an increment in the household income categories relative to the first household income category $0–$24,999. For instance, total shopping time for households with an income between $100,000 and $150,000 (category 5) is 5–7 min greater than average shopping time by an individual in a household with income in the $0–$24,999 bracket (category 1). After controlling for various individual characteristics (column I), this is robust to including both time and state (columns II and III), as well as labor force status dummy variables (column IV).

The three broad subcategories show that both time spent shopping for consumer goods and services, as well as the associated travel time, are increasing in household income, and the differences are highly statistically significant. For instance, households in the $50,000–$75,000 income bracket (category 3) spend an extra 1.3 min shopping for goods and services and an extra 1.8 min waiting. Households in the $100,000–$150,000 income bracket (category 5) spend an extra 3.9 min shopping for goods and services and an extra 2.6 min waiting. There appears not to be any statistically significant relationship between time spent shopping for groceries, gas, and food and household income.

5.2. Individual income

Reported weekly income for employed respondents averages $37,856 per year. We use this information to estimate the following relation between income and search effort in the data:

$$\tau^j_{ist} = \alpha^j + \beta^j I_{ist} + D_t + S_i + \delta X_{ist} + \epsilon_{ist}, \quad (3)$$

where j is the time use category, I_{ist} is annual personal income (in thousands of dollars) for individual i in state s, D_t is a time dummy, S_i a dummy for the individual's state, and X_{ist} is a vector of demographic and educational variables (age, gender, race, education, marital status, and presence of children). The coefficient of interest, β^j is reported in Table 5, with standard errors in parentheses, for total shopping time and the three broad subcategories: consumer goods and services; groceries, gas, and food; and travel time.

Table 4
Individual level regression of shopping time on household income.

Category	HH. Income	I	II	III	IV
Total Shopping Time	2	1.53	1.52	1.41	3.00***
	3	1.34	1.42	1.37	3.30***
	4	4.01***	3.97***	3.62***	5.73***
	5	4.36***	4.99***	4.45***	6.59***
	6	4.86***	5.69***	4.90***	6.90***
Consumer Goods and Services	2	0.86	0.84	0.82	1.52***
	3	0.41	0.43	0.47	1.32**
	4	1.85***	1.79***	1.76**	2.69***
	5	2.75***	3.06***	2.93***	3.86***
	6	1.44	1.86**	1.65*	2.52***
Groceries, Gas and Food	2	−0.02	0.00	−0.04	0.45*
	3	−0.43	−0.41	−0.45	0.14
	4	−0.34	−0.31	−0.45	0.20
	5	−0.35	−0.30	−0.51	0.15
	6	−0.32	−0.26	−0.54	0.09
Travel time	2	0.69	0.68	0.63	1.03**
	3	1.36***	1.40***	1.35***	1.84***
	4	2.51***	2.49***	2.31***	2.84***
	5	1.96***	2.23***	2.03***	2.58***
	6	3.73***	4.09***	3.79***	4.29***
Demo. controls		Yes	Yes	Yes	Yes.
Time dummy		No	Yes	Yes	Yes.
State dummy		No	No	Yes	Yes.
LFS dummy		No	No	No	Yes.

There are six income categories: (1) $0–$24,999; (2) $25,000–$49,999; (3) $50,000–$74,999; (4) $75,000–$99,999; (5) $100,000–$149,999, and; (6) $150,000 and over. The table reports the estimated coefficients on income categories 2–6. The demographic controls are for age, education, gender, marital status, race, and the presence of children. "LFS" stands for the inclusion of a labor force status indicator. We restrict our sample to respondents aged 25–54 and with zero unclassified time for 66,958 observations in total.

* Statistical significance at 10% level.
** Statistical significance at 5%, level.
*** Statistical significance at 1% level.

The first row of Table 5 reveals that total shopping time is increasing in individual income but that none of the coefficients are statistically significant. The second row indicates that time spent shopping for consumer goods and services is increasing in individual income, yet none of the specifications yield a statistically significant coefficient. Time shopping for groceries, gas, and food, however, declines with income, and the coefficient is highly significant in each of the specifications. Last, we find that travel time associated with shopping is increasing with individual income, and the coefficient is highly statistically significant in each specification. This suggests that individuals with lower income do not travel further and search wider for goods and services.

5.3. Market work and shopping time

In this section we examine the relation of shopping time to time in market work. We apply the same definition of market work in the ATUS as Aguiar et al. (2013) and run the following regression[8]:

$$\tau^j_{ist} = \alpha^j + \beta^j \tau^M_{ist} + D_t + S_i + \delta X_{ist} + \epsilon_{ist}, \quad (4)$$

where τ^M_{ist} is the time spent on market work, D_t and S_i are the time and state dummies, respectively, and X_{ist} is a vector of demographic and educational variables (age, gender, race, education, marital status, and the presence of children). Table 6 reports the resulting estimates β^j.

The results indicate that a 1 min decline in market hours is associated with a 0.04 min decline in shopping time. The impact

Table 5
Individual level regression of shopping time on personal income.

Category	I	II	III
Total Shopping Time	0.75	1.34	0.64
	(0.55)	(0.28)	(0.61)
Consumer Goods and Services	0.40	0.69	0.41
	(0.60)	(0.37)	(0.60)
Groceries, Gas, and Food	−1.00	−0.99	−1.23
	(0.00)	(0.00)	(0.00)
Travel time	1.35	1.65	1.46
	(0.03)	(0.01)	(0.02)
Demo. controls	Yes	Yes	Yes
Time dummy	No	Yes	Yes
State dummy	No	No	Yes

The regression sample is restricted to respondents who are between the ages 25 and 54, have no unclassified time use and have positive personal income (employed). The table reports the estimate of and its standard errors in parentheses. Personal income is in thousands of dollars. Estimates of are multiplied by 100.

Table 6
Individual level regression of shopping time on market work time.

Category	I	II	III
Total Shopping Time	−8.17	−8.17	−8.18
	(0.00)	(0.00)	(0.00)
Consumer Goods and Services	−3.85	−3.85	−3.86
	(0.00)	(0.00)	(0.00)
Groceries, Gas, and Food	−1.24	−1.24	−1.24
	(0.00)	(0.00)	(0.00)
Travel time	−3.08	−3.08	−3.08
	(0.00)	(0.00)	(0.00)
Demo. controls	Yes	Yes	Yes
Time Dummy	No	Yes	Yes
State Dummy	No	No	Yes

The table reports the estimate of and its p-value in parentheses. Market work is in terms of minutes per day. Estimates of are multiplied by 100 for readability. An estimate of 1 means that the time use is expected to be 0.01 min per day if market work is 1 min higher.

[8] The ATUS time use categories used to measure market hours of work are: 05-01, 05-02, 05-99, 18-05.

of diminished hours of the employed on shopping time is very small.

6. Conclusion

The recent availability of new datasets measuring the inflows and outflows of goods and services in a household's consumption basket (Broda and Weinstein, 2010) and the presence and investment in customer relationships (Gourio and Rudanko, forthcoming) has lead to a renewal of theories in which search frictions in the goods market play an important role for macroeconomic outcomes. The cyclical properties of the intensive margins in this market, by consumers and firms, have quickly shown themselves to be important to our deeper understanding of dynamics of consumption, employment, and business cycles in general.

A precursor paper by Hall (2012) had shown that advertisement by firms is very pro-cyclical. In this paper we find, on the other side of the market, that consumers spend a varying amount of time for purchasing goods and products. This shopping time declined significantly with the onset of the Great Recession across all types of individuals, and it is positively correlated with individual and household income. In addition, consumption effort dropped more in states where economic activity decreased relatively more following the financial crisis. We also find that a decline in working time raises shopping time. Nonetheless, employed individuals spent less time shopping during the recession.

Overall, we do not find much evidence in favor of a negative correlation between income and shopping time, particularly comparison shopping possibly motivated by locating better prices. As a matter of fact, whereas total time spent purchasing goods and services is about 20 min per day, the component of shopping time devoted to comparing prices and products seems to be extremely low in the data. It is about 4 s a day on average, given the large number of respondents declaring zero. Moreover, nonparticipants and the employed spent more time than the unemployed in this activity. This may indicate that most of the effort made by consumers in the goods market is unrelated to uncovering better prices.

The data used in this paper are the best available from a macro perspective. More precise information about consumer shopping efforts should be obtained from microeconomic data such as consumer surveys. This is left for future works.

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Appendix A. Supplementary data

Supplementary material related to this article can be found online at http://dx.doi.org/10.1016/j.econlet.2016.02.003.

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