



## Shopping time



Nicolas Petrosky-Nadeau<sup>a</sup>, Etienne Wasmer<sup>b,c,d,\*</sup>, Shutian Zeng<sup>e</sup>

<sup>a</sup> Federal Reserve Bank of San Francisco, 101 Market Street, San Francisco, CA 94105, United States

<sup>b</sup> Sciences Po, Département d'Economie, 28 Rue des Saint-Pères, 75007 Paris, France

<sup>c</sup> LIEPP, France

<sup>d</sup> CEPR, United Kingdom

<sup>e</sup> Tepper School of Business, Carnegie Mellon University, 5000 Forbes Ave., Pittsburgh, PA 15213, United States

### 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.

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## 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 cyclical nature 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.

\* Corresponding author at: Sciences Po, Département d'Economie, 28 Rue des Saint-Pères, 75007 Paris, France.

E-mail addresses: [nicolas.petrosky-nadeau@sf.frb.org](mailto:nicolas.petrosky-nadeau@sf.frb.org) (N. Petrosky-Nadeau), [etienne.wasmer@sciences-po.fr](mailto:etienne.wasmer@sciences-po.fr) (E. Wasmer).

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 cyclicity 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 procyclical. 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 cyclicity 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-cyclicity 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-cyclicity 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.<sup>1</sup> 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<sup>2</sup>:

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

<sup>1</sup> 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.

<sup>2</sup> Online Appendix B provides the ATUS time use codes that compose each category.

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