

Older Americans Would Work Longer if Jobs Were Flexible[†]

By JOHN AMERIKS, JOSEPH BRIGGS, ANDREW CAPLIN, MINJOON LEE,
MATTHEW D. SHAPIRO, AND CHRISTOPHER TONETTI*

Older Americans, even those who are long retired, have strong willingness to work, especially in jobs with flexible schedules. For many, labor force participation near or after normal retirement age is limited more by a lack of acceptable job opportunities or low expectations about finding them than by unwillingness to work longer. This paper establishes these findings using an approach to identification based on strategic survey questions, purposefully designed to complement behavioral data. These findings suggest that demand-side factors are important in explaining late-in-life labor market behavior and need to be considered in designing policies aimed at promoting working longer. (JEL D91, J15, J22, J26)

In many advanced economies, the share of the population that is of standard working ages 20–64 is projected to fall significantly in the coming decades (Gruber and Wise 1998, 2007; OECD 2006). This shift poses several economic challenges, notably increased financial strain on public pension and health care programs.¹ In response, many countries are starting to enact or at least consider policies that encourage older workers to work longer. The appropriate policy depends on whether lack of employment beyond historically normal retirement ages more reflect the supply side of the

*Ameriks: The Vanguard Group, Inc., P.O. Box 2600, MS V36, Valley Forge, PA 19482 (email: john_ameriks@vanguard.com); Briggs: Federal Reserve Board of Governors, 20th Street and Constitution Avenue N.W., Washington, DC 20551 (email: joseph.s.briggs@frb.gov); Caplin: New York University, 19 W. 4th Street, 6th Floor, New York, NY 10012, and NBER (email: andrew.caplin@nyu.edu); Lee: Carleton University, 1125 Colonel By Drive, Ottawa, ON K1S 5B6, Canada (email: minjoon.lee@carleton.ca); Shapiro: University of Michigan, 611 Tappan Street, Ann Arbor, MI 48109-1220, and NBER (email: shapiro@umich.edu); Tonetti: Stanford University Graduate School of Business, 655 Knight Way, Stanford, CA 94305, and NBER (email: tonetti@stanford.edu). Richard Rogerson was coeditor for this article. This research is supported by a program project grant from the National Institute on Aging P01-AG026571. Caplin, Briggs, and Tonetti acknowledge the support of the Sloan Foundation Working Longer Program for this project. We thank participants at numerous seminars and conferences and anonymous referees for very helpful comments. This research uses data from the Vanguard Research Initiative (VRI) that was developed under the NIA program project P01-AG026571. The Vanguard Group, Inc. supported the data collection of the VRI. Vanguard's Client Insight Group and IPSOS SA were responsible for implementing the VRI survey and provided substantial input into its design. The design of the VRI benefited from the collaboration and assistance of Wandi Bruine de Bruin, Alycia Chin, Mi Luo, Brooke Helppie-McFall, Ann Rodgers, and Feiya Shao, as part of the program project, and from Annette Bonner (Vanguard), Sophia Bunyaraksh (Vanguard), and Wendy O'Connell (IPSOS SA). For documentation of the VRI, including a dynamic link to the survey instrument, see <http://ebp-projects.isr.umich.edu/VRI/>. The views expressed herein are those of the authors and do not necessarily reflect the views of The Vanguard Group, Inc. or the Federal Reserve Board.

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¹ See Fuchs (1984); De Nardi, Imrohoroğlu, and Sargent (1999); Lee and Skinner (1999); Kotlikoff, Smetters, and Walliser (2002); and Attanasio, Kitao, and Violante (2007).

labor market—i.e., older workers' unwillingness to work under market and institutional incentives—or the demand side—i.e., employers' unwillingness to provide work arrangements that older workers desire. Yet the relative importance of supply and demand factors remains elusive because there is no obvious behavioral imprint of frustrated desires. Little is known about the opportunity sets generating observed retirement behavior, and many of the choices are confounded by shocks, such as to the physical health of workers or financial health of firms.

In this paper, we introduce an approach to separating supply and demand-side forces using strategic survey questions (SSQs). SSQs are stated preference questions purposefully designed to complement available behavioral data on labor market outcomes.² The SSQs we design pose hypothetical situations where job opportunities are directly controlled, and therefore they do not confound a desire to work with perceived job opportunities. The SSQ responses indicate that older Americans have a strong willingness to work, especially in jobs with flexible schedules. Using this information, we estimate a key structural parameter in a model of retirement behavior, the intertemporal elasticity of substitution of labor supply (IES). Based on this estimate, we conclude that demand side factors play a large role in accounting for the observed low rates of employment among older individuals.

We implemented the SSQs in the Vanguard Research Initiative (VRI), a panel of American Vanguard clients more than 55 years old. The VRI sample is healthier, wealthier, and more educated than the general population of older Americans and most respondents work or worked in occupations that do not require much physical strength. Since physical deterioration is not a main force limiting work of the VRI sample, it is a particularly useful sample for studying the motives for continued work that are the focus of this paper.

We find that older individuals would work longer, especially if schedules were flexible. Based on the SSQs, many people would take the option to work fewer hours, even if it involved a more than proportional reduction in earnings. Even those who are long retired have strong willingness to work, especially in a job with a flexible schedule.

- About 40 percent of respondents that were not working at the time of the survey, mostly in their late 60s or 70s, are willing to work again if all the conditions were the same as their last job, including the hourly wage, the total number of hours, and the type of job.
- Willingness to work becomes much stronger if they can choose the number of hours worked instead of having to work the same number of hours as in their last job. About 60 percent of nonworking respondents would be willing to return to work with such a flexible schedule. Furthermore, 20 percent of them would be willing to take more than a 20 percent hourly wage reduction to do so.

This preference for a flexible work schedule is also consistent with actual labor-market transitions of VRI respondents: a flexible schedule is more common in

²The SSQs build on previous work using similar types of survey questions. See Barsky et al. (1997), Ameriks et al. (2011), and Ameriks et al. (2018, forthcoming).

post-career, pre-retirement bridge jobs than in career jobs and is commonly reported as a desired characteristic in respondents' post-career job searches.

If individuals would be willing to work longer were jobs flexible, what then explains the low equilibrium incidence of part-time work late in life? The findings from the SSQs on labor supply strongly support the possibility that employers do not find it profitable to employ older workers later-in-life on part-time schedules. Even though the paper does not have direct evidence on labor demand, its price and quantity findings from the supply side quantify the strength of the demand-side factors needed to explain why the modal US worker transitions directly from full-time work to complete retirement.

To relate the paper's findings to equilibrium labor market outcomes, we use the SSQs to estimate parameters of the late-in-life labor supply model developed in Rogerson and Wallenius (2013)—henceforth, RW. Many workers directly transition from a full-time career job to complete retirement. Preferences for smoothing leisure would imply a more gradual decline in labor supply. The RW model addresses the challenge this work pattern poses to standard theories of labor market outcomes. In the RW model, a preference for a smooth life-cycle profile of leisure consumption, and therefore distaste for abrupt retirement, can be overcome by either a large IES or a nonconvexity in production that discourages part-time employment. As RW note, separately identifying these two factors is difficult, and the IES values estimated from retirement transitions critically depend on the strength of the assumed nonconvexities. In addition to providing new measures of willingness to work, the SSQs are by design particularly informative of structural parameters that govern late-in-life labor market behavior. Our estimates suggest preferences for smoothing labor that are generally in line with prior estimates, providing further evidence that a lack of acceptable job opportunities, likely due to a nonconvexity in production, accounts for the discrete labor force exits. Furthermore, by directly estimating the IES using SSQs, we place bounds on the size of the production nonconvexities needed to explain observed labor market life-cycle patterns.

The remainder of the paper is structured as follows. In Section I, we provide an overview of our sample and survey, and analyze the observed late-in-life labor market behavior of our sample, focusing on evidence that flexibility in the work schedule is associated with working longer. Section II introduces the SSQs and documents the reservation wages at which workers would accept job offers of various types. In Section III, we address the challenge of separately identifying supply and demand-side factors based on the RW model and use the SSQs to place bounds on the nonconvexities on the production side that discourage part-time work. We discuss related literature in Section IV. Section V concludes.

I. Labor Market Activity after a Career Job: The Role of Flexible Schedules

In this section, we first introduce the sample and survey used in this paper. We then present the main findings from our measures of historical employment and job search that speak to older Americans' interests in post-career employment and the role of flexible schedules in promoting working longer.

A. Sample and Survey

This paper uses the Vanguard Research Initiative (VRI), a linked survey administrative data panel drawn from account holders at The Vanguard Group, Inc., a leading investment management company. The VRI is composed of a sample of account holders at Vanguard who are at least 55 years old, have at least \$10,000 in their Vanguard accounts (to ensure their nontrivial engagement with Vanguard), and have internet access enabling them to complete the online surveys. See Ameriks et al. (2014) for more detailed descriptions of the sample selection criteria, summaries of demographic and financial variables, and comparison to other datasets.

VRI Survey 4, which studies labor market participation and retirement, is the primary data source for this paper.³ This survey consists of two parts. The first gathers a detailed history of employment and search behavior, extending the job history battery from the Health and Retirement Survey (HRS) to cover retirement paths and employment in post-career bridge jobs. The second section of the survey comprises the SSQs, which we analyze in Section II.

This study uses the 2,772 respondents who completed VRI Survey 4. Online Appendix A provides selected sample characteristics (online Appendix Table A.1) as well as a comparison of the VRI to the HRS (online Appendix Table A.2). The VRI sample is on average wealthier, healthier, and more educated than a representative population. These differences diminish considerably when compared to the HRS subsample that meet the VRI sample selection criteria. Forty-one percent of the HRS respondents in the age range meet the VRI sampling restrictions (HRS respondents are “VRI eligible” if they have financial assets greater than \$10,000 and have internet access). This subsample of the HRS is slightly less educated and less healthy than the VRI. Because VRI participants remain healthier longer and have higher human capital (as proxied by education), this sample represents a population strata that likely remain productive longer and for whom understanding sudden labor force withdrawals is particularly policy relevant.

Table 1 presents summary statistics on respondents’ employment status (by age) at the time of the survey. For those who are employed, it also shows whether they are working in a career job or a bridge job, where a career job is defined as the longest or main job respondents held after age 40 and a bridge job is any job held after leaving a career job.⁴ For those who are not employed, it shows whether they report being retired. We observe a significant increase in non-employment around the age group 60–64, which include the primary ages at which individuals qualify for public and private pensions. The vast majority of those that are not employed report that they are retired. The decrease in the employment rate over age is mainly driven by the decrease in the share of respondents working in their career jobs. Employment status patterns look broadly similar to those of the general population except that the share of respondents working in a bridge job is higher in the general population.⁵

³ VRI Survey 4 was administered in October 2015. See http://ebp-projects.isr.umich.edu/VRI/survey_overview.html for more details on this and all other VRI surveys.

⁴ When respondents have multiple bridge jobs, the survey focuses on the most recent one.

⁵ See online Appendix Table A.3 for comparison to the HRS. The career job in the HRS is defined solely based on the length of tenure, i.e., as the longest job respondents had in their life, because the survey does not provide

TABLE 1—EMPLOYMENT STATUS

	By age					Total
	55–59	60–64	65–69	70–74	75+	
Employed (percent)	83.5	64.5	32.9	19.8	10.8	35.3
In a career job	64.1	44.8	17.3	7.8	4.4	21.7
In a bridge job	19.4	19.7	15.6	12.0	6.4	13.6
Not employed (percent)	16.5	35.4	67.0	80.3	89.2	64.7
Retired	11.7	33.3	65.8	79.3	88.3	63.1
Not retired	4.8	2.1	1.2	1.0	0.9	1.6
Observations	273	522	646	632	699	2,772

Source: VRI Survey 4 as explained in text

Next, we turn to the characteristics of the career jobs held by the VRI sample. One key job characteristic we focus on in this paper is flexibility in work schedule. A job is defined to offer a flexible schedule if the worker has the ability to change either the number of hours per week or the number of weeks per year worked. Therefore, we focus on the ability to change the length of work, not the timing of work (which days or which weeks). To measure whether respondents worked in jobs with flexible schedules we asked:

If you wanted to work a different regular work schedule, would your employer (business) have allowed you to change your regular hours per week?

If you wanted to work a different regular work schedule, would your employer (business) have allowed you to change your regular weeks per year?

Table 2 presents key characteristics of career jobs of the VRI sample for those who retired from their career jobs and those who are still working on their career jobs. Most of the career jobs are full-time jobs. The most common number of working hours is 2,080 per year, which is 40 hours per week for 52 weeks. Note that the average salary of those who are still working on their career job is lower, partly because those who are still on their career job are more likely to work a small number of hours. More than half of the sample worked in their career jobs for more than 20 years. The most common industry is professional, scientific, and technical services while the most common occupation is management.⁶ Few are self-employed. Having a flexible work schedule is rare. In short, this paper examines labor market transitions of those who were mainly employed on long, full-time career jobs that are typically professional and not physically demanding, and typically had

information on subjective importance of the jobs they had. A part of the difference in the incidence rates of a bridge job may come from this difference in the definition of the career job.

⁶The survey uses the two-digit North American Industry Classification System categories for industry classification and the two-digit Standard Occupational Code categories for occupation classification.

TABLE 2—CAREER JOB CHARACTERISTICS

	Age, years worked, salary, hours worked					Mean
	10p	25p	50p	75p	90p	
<i>Panel A. Retired from career job</i>						
Age	60	64	69	75	79	70
Age when left	50	55	60	63	67	59
Years worked	8	14	22	31	37	22
Salary (in 2015 dollars)	30,866	58,253	91,467	133,398	196,379	111,698
Hours worked (per year)	1,260	1,924	2,080	2,184	2,600	2,027
Self-employed (percent)	Yes					6.9
	No					93.1
Had a flexible schedule (percent)	Yes					27.6
	No					72.4
Health insurance provision (percent)	Yes					86.2
	No					13.8
Most common industries (percent)	Professional, scientific, and technical services					17.8
	Manufacturing					14.5
	Educational services					12.7
Most common occupations (percent)	Management					25.6
	Education, training, library					10.6
	Business and financial operations					9.8
<i>Panel B. Working on career job</i>						
Age	58	59	62	66	72	63
Years worked	8	14	21	30	38	22
Salary (in 2015 dollars)	14,089	44,000	78,000	117,000	165,000	92,428
Hours worked (per year)	480	1,664	2,080	2,080	2,600	1,842
Self-employed (percent)	Yes					15.9
	No					84.1
Had a flexible schedule (percent)	Yes					47.7
	No					52.3
Health insurance provision (percent)	Yes					72.0
	No					28.0
Most common industries (percent)	Professional, scientific, and technical services					18.6
	Manufacturing					10.7
	Educational services					10.5
Most common occupations (percent)	Management					19.1
	Business and financial operations					11.3
	Computer and mathematical					9.0

Note: Observations = 2,149 for panel A and 601 for panel B.

Source: VRI Survey 4 as explained in text

no flexibility in their schedules. We find similar career job characteristics for the VRI-eligible HRS sample (see online Appendix Table A.5).

The career job characteristics are overall similar between those who have already quit their career jobs and those who are still working on their career jobs, though the latter group is more likely to be self-employed and more likely to have a flexible schedule. This may be confounding two effects. On the one hand, it may be due to selection along job characteristic dimensions that encourage working longer. On the other hand, those who are still working are also more likely to be in younger cohorts

and those characteristics might be related to that cohort. These confounding effects are demonstrated by the fact that those who are still working on their career jobs, compared to those who already quit their career jobs, tend to be younger but at the same time tend to stay on those jobs until older.

To disentangle these factors, we examine career job characteristics for those who are still working on their career jobs over different age groups (see online Appendix Table B.1). The share of workers with a flexible schedule goes up from 36 percent before age 63 to 71 percent after age 65. The share of self-employment changes from 9 percent to 24 percent between these two age groups. These findings show that it is primarily the selection effect that makes these characteristics more common among those who are still on their career jobs compared to those who have already quit them. This, in turn, suggests that these characteristics are preferred by older workers and hence encourage them to work longer, consistent with the findings by Ramnath, Shoven, and Slavov (2017). Online Appendix B.1 presents more detailed descriptions of career job characteristics by age groups.

B. Labor Market Activity after a Career Job: Lessons from Bridge Jobs Held and Search Behavior

In what follows, we document three main findings from our measures of historical employment and job search behavior. First, about half of the sample who have separated from their career jobs either had a post-career bridge job or at least looked for such an opportunity. Second, bridge jobs are much more likely to have a flexible work schedule compared to career jobs. Third, flexibility in work schedule was the most popular job characteristic among those who searched for a bridge job. These findings suggest a significant willingness to work beyond a career job and an important role of flexibility in work schedule in encouraging working longer.

Bridge Jobs.—Though a sudden withdrawal from the labor force around typical retirement ages is the most common retirement pattern in our sample, a significant fraction of the sample work beyond age 65 either on their career job or a bridge job.⁷ Of 2,772 respondents, we find that 2,149 respondents have separated from their career jobs, with 811 of these individuals engaging in a post-career bridge job. Given that some might still return to the labor market, this is clearly a lower bound. Hence, the 38 percent of VRI respondents that had a bridge job in the VRI is roughly comparable to the 52 percent of HRS respondents documented in Maestas (2010).

Characteristics of bridge jobs and how they compare to those of career jobs hint at which job characteristics are valued by older Americans. Table 3 compares characteristics of bridge jobs and career jobs for the respondents who had a bridge job. There are several notable patterns. First, both wages and hours of bridge jobs are lower than those of the career job for the majority of observations (panel A).⁸

⁷ Recall that the survey defines the career job as the longest and most important job held since age 40. The survey asks about one subsequent job (if any)—either the current job for those still working or the last job. We define this post-career job as the bridge job for this analysis.

⁸ The median number of hours worked decreases from 2,080 hours for career jobs to 1,560 hours for bridge jobs.

TABLE 3—COMPARISON: BRIDGE JOBS VERSUS CAREER JOBS

<i>Panel A. Hours and earning</i>						
	Ratio of bridge/career					
	10p	25p	50p	75p	90p	Mean
Hours	0.06	0.21	0.74	1	1	0.65
Hourly wage	0.19	0.44	0.80	1.14	1.7	1.06
Annual salary	0.03	0.10	0.44	0.87	1.18	0.54

<i>Panel B. Job characteristics, career to bridge (percent)</i>					
Self-employed		Flexible schedule		Health insurance	
Career	Bridge	Career	Bridge	Career	Bridge
6.4	23.3	24.0	53.5	87.8	41.0

<i>Panel C. Gaining/losing work schedule flexibility (percent)</i>		
Career job schedule	Bridge job schedule	
	Flexible	Not flexible
Flexible	17.6	6.4
Not flexible	36.0	40.0

Notes: Observations = 812. Characteristics of career versus bridge jobs for respondents with bridge jobs. Winsorization at 1 percent and 99 percent levels is used in calculating the mean values in panel A.

Source: VRI Survey 4 as explained in text

Second, in panel B, we observe that bridge jobs are more likely to be self-employed (23 percent, compared to 6 percent in career jobs) and more likely to have a flexible work schedule (54 percent, compared to 24 percent in career jobs). The increase in the share of jobs with a flexible work schedule comes from the fact that 36 percent of observations moved from a career job with a non-flexible schedule to a bridge job with a flexible schedule, while the share of transitions from a career job with a flexible schedule to a bridge job with a non-flexible schedule is only 6 percent (panel C). Third, bridge jobs are much less likely to provide health insurance (panel B). In particular, the share of bridge jobs providing health insurance is lower above age 65 (35 percent, compared to 54 percent below age 65), when workers become eligible for Medicare. Taken together, Table 3 suggests that older workers want to move to jobs with less burdensome work and greater flexibility in work schedule and that they are willing to accept a decrease in earnings and benefits.

The above patterns are consistent with workers' preference for more flexible employment. It could be, however, that workers transitioning to post-career employment move to industries and occupations that incidentally have more flexibility. We indeed observe that a significant fraction of bridge jobs entail a change in industry (43.6 percent) or occupation (35.1 percent), though major changes in occupation characteristics are less common (Table 4, panel A).⁹

⁹To examine changes in occupation characteristics, we classify occupations into three categories based on the type of abilities most required per occupation: human capital, social capital, and physical strength. The classification

TABLE 4—FROM CAREER TO BRIDGE JOBS: CHANGES IN OCCUPATION, INDUSTRY, AND FLEXIBILITY

<i>Panel A. Changes in industry/occupation (percent)</i>						
	Yes	No				
Changed industry	43.6	56.4				
Changed occupation	35.1	64.9				
Changed occupation category ^a	26.7	73.3				

<i>Panel B. Fraction who gained flexibility (percent)</i>						
	Conditional on					
	Changed industry		Changed occupation		Changed occupation category	
	Yes	No	Yes	No	Yes	No
Gained flexibility	51.1	44.3	53.0	44.3	47.7	46.6
Stayed fixed-schedule	48.9	55.7	47.0	55.7	52.3	53.4

Notes: Panel A tabulates the share of workers who changed industry, occupation, or occupation category between career and bridge jobs. It includes every respondent who had a bridge job (observations = 812). Panel B calculates the share of respondents who obtained flexibility in work schedule in the bridge job, conditional on whether they changed industry/occupation or not. The panel includes the subset who did not have a flexible schedule in their career jobs (observations = 617).

^a We define three broad occupation categories based on the type of abilities most required per occupation: human capital, social capital, and physical strength. The classification is based on a principal component analysis on the list of required abilities from ONET.

Source: VRI Survey 4 as explained in text

To address these confounding effects, we examine whether the likelihood of obtaining work schedule flexibility in a bridge job depends on whether the worker changed industry or occupation (Table 4, panel B). Those who change either industry or occupation are indeed more likely to have a flexible schedule on bridge jobs, but the effect is quite small. Slightly more than half gained flexibility when they changed industry (51 percent) or occupation (53 percent). The numbers are smaller but similar for those who stayed in the same industry (44 percent) or in the same occupation (44 percent). Changing occupation category does not significantly affect the likelihood of gaining work schedule flexibility. In online Appendix B.2, we provide a more detailed analysis of the transitions between industries and occupations on the one hand and changes in the share of flexible jobs within each industry and occupation on the other hand, confirming this broad finding. We conclude that changes in industry or occupation do not fully explain the increased prevalence of flexible schedules in bridge jobs.

Job Search after Career Job.—The willingness to work reflected in the actual job histories analyzed above is likely underestimated, both because some workers may still find post-career-job employment after we fielded the survey and because some workers who desired a bridge job might not have been able to find one. To provide

is based on a principal component analysis on the list of required abilities from Occupational Information Network (ONET).

TABLE 5—SEARCH BEHAVIOR: WHAT WORKERS LOOKED FOR

Characteristic	Percent who looked for
Change life:	
Different industry	23.5
Different occupation	27.4
Move to a better location	20.8
Flexibility:	
More flexible hours	39.9
More flexible schedule	31.0
Autonomy:	
Less responsibility	32.5
More of my own boss	29.7
Other job characteristics:	
More pay	19.9
Less commuting time	25.1
More job security	15.3
Better health insurance	7.8

Notes: Observations = 804. Respondents who searched after career job.

Source: VRI Survey 4 as explained in text

further insight into willingness to work and more information on the job characteristics that are desired and not just found, we turn now to job search behavior.¹⁰

Among those who directly transitioned to complete retirement after their career jobs, only 11 percent (147 out of 1,336) report having looked for a new job opportunity. In contrast, 80 percent (657 out of 812) of those who had a bridge job actively looked for such an opportunity, while only 20 percent of those found their bridge job without reporting searching. Thus, most workers who report having searched actively successfully found employment. This suggests either that most older nonworkers are not interested in post-career employment or that they are not interested in the jobs they believe they would be likely to find.

Table 5 summarizes what job characteristics individuals looked for when they searched. We find further suggestive evidence that flexibility is an important characteristic for workers pursuing bridge jobs: 40 percent want flexibility in deciding the number of hours and 31 percent want flexibility in how to allocate these hours. Furthermore, 33 percent want less responsibility, suggesting pursuit of jobs that are less burdensome, while 30 percent want to be more of their own boss. We also find strong heterogeneity in what older workers look for—there is no single characteristic that is searched for by more than 40 percent, and all considered characteristics, except for better health insurance, are searched for by at least 10 percent of the sample.

Overall, these findings echo those from analyzing bridge jobs held. Flexibility appears to be an important factor among those considering working after their career jobs.

¹⁰Faberman et al. (2017) also fields an original survey to study job search behavior. Their focus is on the differences in search behavior and labor market outcomes between employed and non-employed individuals.

Summary.—From our measures of employment history and job search behavior we derive the following two main findings. First, about half of our sample reveal an interest in working after exiting a career job by either searching for or securing such employment. Second, when searching for post-career employment, older workers prioritize flexibility in their work schedule. Hence, we find a significant desire for post-career employment in general and for a bridge job with a flexible work schedule in particular. Still, about half of the sample retired from a career job without even looking for a post-career employment opportunity. This, however, does not necessarily imply that these respondents are not interested in working longer, as their behaviors also reflect their perception of available jobs in the market. Direct measurement of labor supply preferences requires controlling for demand-side factors, which is achieved in the SSQs introduced in the next section.

II. Measurement of Willingness to Work Using SSQs

In this section, we introduce and analyze measures of individual preferences for supplying labor. The SSQs we pose directly control for job opportunities in hypothetical situations. This approach allows us to identify willingness to work independently of what workers expect to or are able to find in the actual labor market. By measuring labor supply in different working environments, we can quantify workers' interest in considered job characteristics. In particular, we focus on the role of flexibility in schedule, defined as the ability to change the number of regular working hours, in encouraging working longer. By comparing how willingness to work varies depending on the number of working hours, the SSQs also allow us to infer a labor supply parameter that is crucial in retirement decisions, the intertemporal elasticity of labor supply (IES) (see Section III for the estimation of the IES). In addition to presenting details of SSQ design and the information they contain on willingness to work, we also present a number of internal and external validation checks on the responses.

A. Design of SSQs

The SSQs considered in this paper all have a similar structure. The SSQs ask respondents that are currently not working (“nonworkers” hereafter) whether or not they would accept a hypothetical job opportunity. Characteristics of the hypothetical job offer are based on a “reference job,” which is constructed based on the characteristics of the most recent job the respondent had (recorded from the first part of the survey). Hence, the reference job is the career job for those who did not have a bridge job, and it is the last bridge job for those who had a bridge job. Anchoring hypothetical job opportunities to the job characteristics from actual work history helps respondents put themselves in the hypothesized situation and also links their SSQ responses to the actual choices they have made.

We use four SSQs that differ in characteristics of the job or in timing of the job offer. For the job characteristics, we focus on whether the job allows a flexible schedule or not. In the “fixed schedule” scenario, the number of hours is fixed to that which respondents worked in the last year of their reference job. In the

“flexible schedule” scenario, the respondents are allowed to choose the number of hours. Jobs with fixed and flexible schedules are hypothetically made available at two points of time—at the moment of the survey and at the moment of retirement from the reference job.¹¹

For each job offer, the SSQ first asks whether the respondent would accept it if the salary were the same as that in the reference job and then elicits the respondent’s reservation wage.¹² If the respondent accepts the job offer, the SSQ further asks for the lowest salary at which the respondent would still accept the offer. If the respondent rejects the job offer, the SSQ further asks for the lowest salary at which the respondent would switch to accepting the offer. This reservation wage allows us to quantify a respondent’s willingness to work in each circumstance.

We illustrate key features of the SSQs by presenting one in detail: a job with a fixed schedule available at the moment of the survey. At the beginning of the question, the following text is shown to the respondents:

In the questions that follow, we are interested in what you would choose if you were to have certain decisions to make about your employment situation. While the choices that we describe are hypothetical, we ask you to do your best to assess what you would choose if you were to face these choices today.

In the scenario that follows, you will be asked to make a choice between Options A and B. Option A will be to immediately accept a specified employment opportunity that will be open only for a short window (say one week) and will then become unavailable. Option B is instead to pursue other possibilities including searching for another employment situation or not working.

- Option A is a new employment situation that involves a **fixed work schedule**. Other than this possible difference, the new employment situation matches **your reference employment situation** in terms of occupation, annual earnings, and all other characteristics.
- Option B is instead to pursue other possibilities including searching for another employment situation or not working.

To better clarify the situation, the question provides additional details:

- Option A matches **your reference employment situation** not only in terms of occupation, annual earnings, and current work schedule, but also in all other aspects that are important to you that are not specified in the above table [that summarizes the reference job characteristics].
- If you choose Option B, Option A is no longer available.
- If you choose Option A you will be able at any later point to quit and to pursue other possibilities, including searching for another employment situation or not working.
- Pay in Option A changes over time as you would expect it to in **your reference position**.
- [Omitted if single] In this choice and in all that follow, please suppose that your spouse behaves in a manner that is consistent with your choices. If your spouse’s employment situation would differ depending on whether you choose Option A or Option B, please take this dependence into account in answering the question.

¹¹ Additional SSQs were asked but not used in this paper. See online Appendix C for the complete list of the SSQs and detailed scenarios.

¹² Under the flexible schedule scenario, the offered salary varies proportionally with the chosen number of hours.

Then the respondent is asked to choose between Option A and Option B. A respondent who chose Option A (Option B) is further asked:¹³

- Starting at the **reference salary**, imagine that earnings for Option A were to decline (increase). What earnings level for Option A would be just low (high) enough that you would switch to Option B (Option A)?

Respondents are allowed to skip the SSQs, but conditional on completing the survey the item nonresponse rate to the SSQs is almost zero. There are 1,771 nonworkers who answered all four of the SSQs used in this paper. We divide this group further into those who never had a bridge job and those who had a bridge job because these two groups may have different preferences for labor supply and because the reference job is qualitatively different across these two groups. There are 1,337 nonworkers without a bridge job and 434 respondents with a bridge job.

B. Willingness to Work at the Time of the Survey

In this subsection, by using the SSQs with hypothetical job opportunities that are available at the time of the survey, we confirm that older Americans have a strong willingness to work longer. This strong desire to work is present even if they cannot choose the number of hours they work. Furthermore, allowing a flexible work schedule boosts people's willingness to work significantly.

Fixed Schedule Scenario.—Even in the fixed schedule scenario, in which respondents have to work the same number of hours as in their reference job, the acceptance rate is fairly high. The blue (darker) bar in Figure 1 plots the acceptance rate in this scenario. About one-third of nonworkers with no bridge job (panel A) accept this offer while 44 percent of those who had a bridge job (panel B) accept it. Acceptance means that the respondent would come back to the labor market at a salary that is the same as in the reference job. The acceptance rate for the former group is surprisingly high, given that the vast majority of them (89 percent) did not even search for a new job opportunity after leaving their career jobs (and had not returned to work at the time of the survey). This demonstrates that, at least for these individuals, they are not working not because of their lack of interest in working, but because of a (perceived) lack of job opportunities that are as attractive as their reference jobs. A non-negligible fraction of the respondents are willing to work even at a lower wage than they used to earn. Twenty percent of those who did not have a bridge job and 30 percent of those who did are willing to accept a 10 percent wage reduction to work in the hypothesized situation. Even with a 20 percent wage reduction, some respondents (10 percent and 20 percent respectively for each group) are still willing to work.

¹³ Feldstein and Poterba (1984), Holzer (1986), and Krueger and Mueller (2016) use a similar survey approach to elicit the reservation wages of unemployed workers.

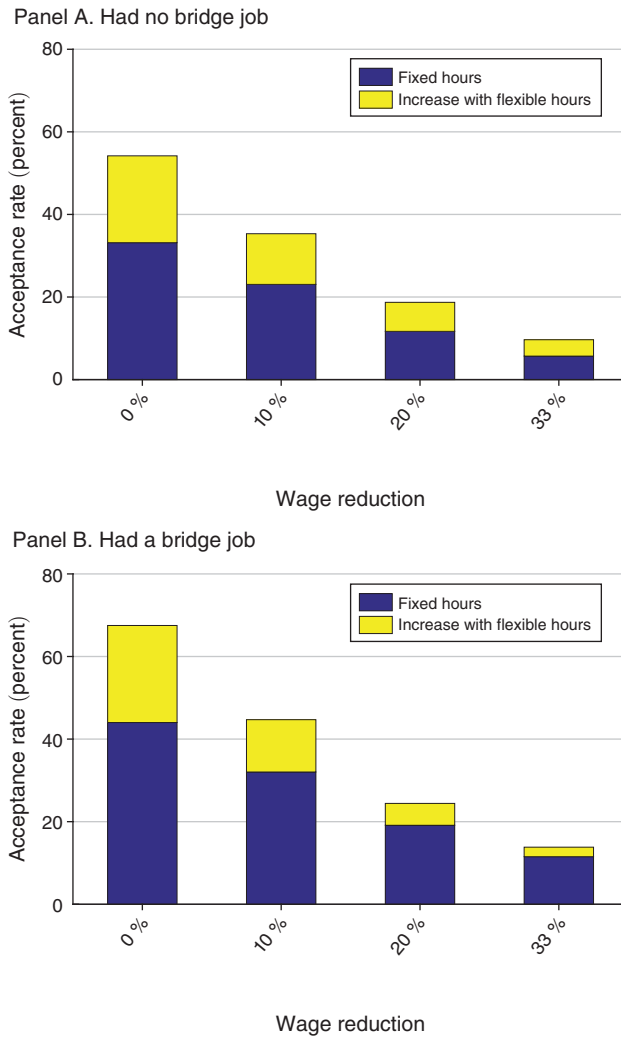


FIGURE 1. WOULD CURRENT NONWORKERS RETURN TO WORK?

Notes: Observations = 1,337 for panel A and 434 for panel B. Wage reduction is calculated relative to the wage of the reference job. The blue bars represent the acceptance rates under a fixed schedule scenario and the yellow bars represent the increases in the acceptance rates with a flexibility in the work schedule.

Source: VRI Survey 4 as explained in text

Flexible Schedule Scenario.—When the hypothetical offer adds flexibility by allowing the respondent to adjust the number of working hours, willingness to work increases significantly. The yellow (lighter) bar in Figure 1 shows the increase in the acceptance rate in the flexible schedule compared to the fixed schedule. When the schedule is flexible, at the reference hourly wage, more than half of the sample would accept the offer. This is half as many again as with the fixed schedule. The increase in the acceptance rate in both groups is about 20 percentage points. This means that 20 percent of individuals did not want to work under a

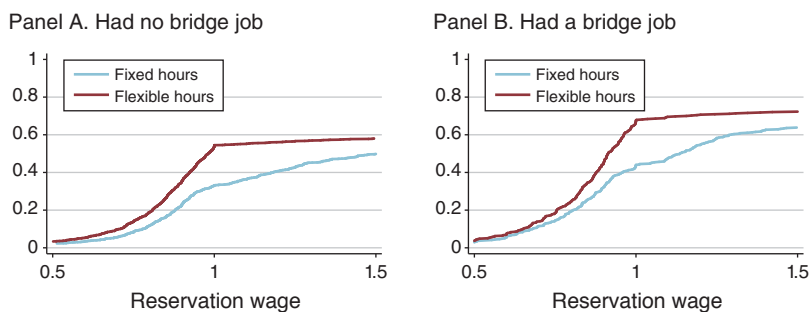


FIGURE 2. RESERVATION WAGE DISTRIBUTION OF CURRENT NONWORKERS

Notes: Reservation wage is calculated as a fraction of the wage the respondent had in their reference job. The figure plots the CDF of reservation wages in the range between 0.5 and 1.5.

Source: VRI Survey 4 as explained in text

TABLE 6—DESIRED REDUCTION IN HOURS (PERCENT)

	10p	25p	50p	75p	90p	Observations
<i>Panel A. Time of the survey</i>						
Had no bridge job	-15.4	0	11.4	44.6	69.6	710
Had a bridge job	-11.8	0	9.4	39.7	62.5	291
<i>Panel B. Time of retirement</i>						
Had no bridge job	-2.9	0	19.2	50.0	71.2	545
Had a bridge job	0	0	7.7	27.3	50.0	294

Note: This table includes respondents who would accept the offer of a flexible schedule at the reference hourly wage.

Source: VRI Survey 4 as explained in text

fixed schedule at this hourly wage, but were willing to work at the same hourly wage if they could choose the number of hours. Moreover, many are willing to accept a significant wage reduction as long as they can choose their own work schedule. About 10 percent more nonworkers are willing to take a 10 percent wage reduction compared to the fixed schedule scenario, for example.

Figure 2 presents the full distribution of the reservation wages, normalized as a fraction of the individual's reference job wage. For any value of the reservation wage between 50 percent and 150 percent of the reference wage, the acceptance rate is higher (i.e., the cumulative distribution function is higher) when the offer comes with a flexible schedule. In both scenarios, the slope of the distribution, and hence the extensive margin elasticity, is the largest going from 70 percent to 100 percent of the reference wage.

Conditional on accepting the offer with a flexible schedule at the reference hourly wage, we find an overall tendency to reduce work, with a large degree of heterogeneity in the desired change in hours worked (Table 6, panel A). The median respondent (whether they had a bridge job or not) wants about 10 percent fewer hours than the

reference schedule, showing that for most nonworkers, their preference for a flexible work schedule is associated with a modest desired reduction in the number of hours.

C. Willingness to Work at the Time of Retirement from the Last Job

The second set of SSQs concern hypothetical job opportunities that were made available at the time of retirement from their last job (i.e., immediately after they separated from their last job).¹⁴ These questions aim to investigate which hypothetical job opportunities would have changed their decision to stop working. Respondents were asked to report how they would have behaved at the time of the offer, i.e., not to allow information they have since acquired to influence their answer.

Figure 3 summarizes the acceptance rates from the fixed and flexible schedule scenarios. Overall patterns are similar to those for job opportunities made available at the time of the survey. Even when the offer does not allow for any flexibility in schedule, the acceptance rate is fairly high at the reference wage. It is 30 percent for those who retired from their career jobs and 60 percent for those who retired from their bridge jobs. Some individuals would have been willing to take a significant wage reduction if they could have had such a job opportunity right after they left their last job; 20 percent of those who retired from their career jobs and 40 percent of those who retired from their bridge jobs would have been willing to take at least a 10 percent wage reduction.

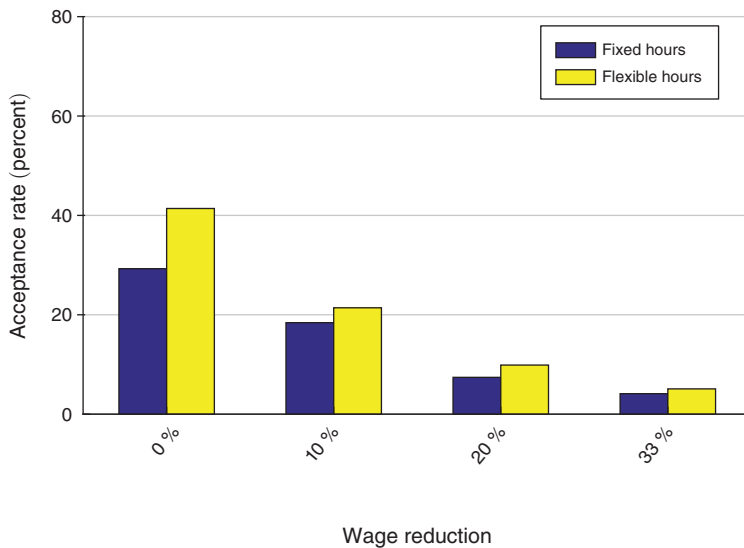
Allowing for a flexible schedule again increases willingness to work, but the effect is smaller at the time of retirement than at the time of the survey. At the reference wage, flexibility increases the acceptance rate by 10 percentage points for both groups compared to the fixed schedule scenario, which is still significant but smaller than the 20 percentage point increase we saw from the questions that offered jobs at the time of the survey. The effect is even smaller when there is a wage reduction of 10 percent or more.

For those who did not have a bridge job, the smaller effect is due to a lower acceptance rate for a job with a flexible schedule at the time of retirement. This may suggest a certain amount of burnout (Maestas and Li 2007, Jacobs and Piyapromdee 2016): some respondents did not even want to work part-time immediately after leaving their career job. Indeed, the acceptance rate for the opportunity with a flexible schedule at the time of the survey was 10 percent lower for those who stopped working less than two years ago compared to those who stopped working more than two years ago, further suggesting burnout. However, for those whose reference job is a bridge job, the smaller effect is due to a higher acceptance rate for a fixed schedule job. This may suggest that they had already adjusted hours as desired in the bridge job.¹⁵ These patterns are also clear from the full distribution of the reservation wages (Figure 4). At the time of retirement (the solid curves), reservation wages tend to be lower when the offer comes with a flexible

¹⁴ For those who retired within the last two years, the survey did not ask this set of SSQs because for them the situation at the time of retirement is too similar to that at the time of the survey.

¹⁵ Conditional on being willing to accept the offer at the reference hourly wage, the desired reduction in working hours at the time of retirement is slightly larger for those who retired from a career job and slightly smaller for those who retired from a bridge job, compared to the desired reduction at the time of the survey (Table 6, panel B).

Panel A. Had no bridge job



Panel B. Had a bridge job

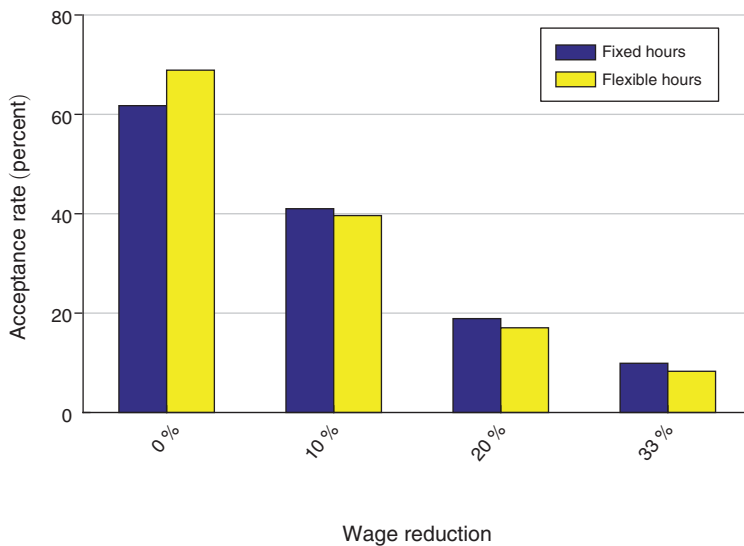


FIGURE 3. WOULD CURRENT NONWORKERS HAVE CONTINUED TO WORK?

Notes: Observations = 1,226 for panel A and 432 for panel B. Wage reduction is calculated relative to the wage of the last job.

Source: VRI Survey 4 as explained in text

schedule, but the gap between the two curves is smaller than that from the time of the survey (the dashed curves). The extensive margin elasticity is again the largest from 70 percent to 100 percent of the reference wage.



FIGURE 4. RESERVATION WAGE DISTRIBUTION AT THE TIME OF RETIREMENT

Notes: Reservation wages are calculated as a fraction of the wage respondents had in their reference jobs. The figure plots the CDF of reservation wages in the range between 0.5 and 1.5. The figure also shows the distributions for job offers at the time of the survey for the corresponding scenarios and groups in dashed curves for comparison.

Source: VRI Survey 4 as explained in text

D. Robustness and Credibility

Credibility of the findings in this paper hinges on the quality of responses to the SSQs. In the absence of a pecuniary incentive to elicit truthful and accurate survey responses as is typical in field experiments (e.g., Mas and Pallais 2017), careful design of survey questions and ex post tests on responses are necessary to make sure that respondents paid enough attention to and understood the hypothesized situations and also that the responses reflect true preferences as manifested in measured behavior. As part of the survey design, we implemented a pilot survey with a small sample who provided us detailed feedback on the SSQs that helped improve the main survey. In addition, we support credibility of the SSQ responses using a number of internal and external consistency tests. This subsection reports the results from two external consistency tests, which show that the SSQ responses are related to certain observed behaviors in a reasonable manner. Online Appendix E reports additional credibility results, including tests that document a within-person internal consistency of responses and comprehension tests that show respondents understood the hypothetical situation and questions.

Search Behaviors and SSQ Responses.—As external validation, we examine whether the SSQ responses are consistent with respondents' actual post-career-job search behavior. Table 7 compares the acceptance rate of the offer under different scenarios at the time of the survey for respondents who are grouped based on their search behavior.¹⁶ Allowing for a flexible schedule in the SSQs indeed had

¹⁶ We run this test only for the nonworkers who did not have a bridge job. For those who had a bridge job, what they were looking for after quitting the career job, e.g., fewer working hours, might have already been reflected in the bridge job they actually had, which serves as the reference job in the SSQ. If that is the case, offering further flexibility in the SSQ may have limited effect for them.

TABLE 7—SEARCH BEHAVIORS AND SSQ RESPONSES: ACCEPTANCE RATE AT THE TIME OF THE SURVEY

Search behavior	Observations	Acceptance rate (percent)	
		Fixed	Flexible
Did not search	1,188	33.7	51.5
Did search:			
Searched for flexibility	63	34.9	71.4
Searched for other characteristics than flexibility	84	33.3	64.3

Note: The tabulation includes only nonworkers who did not have a bridge job.

Source: VRI Survey 4 as explained in text

the largest impact on those who actually searched for a flexible schedule. The increase in the acceptance rate due to flexibility in work schedule for that group (36 percentage points) is larger than that for those who never searched (18 percentage points) and for those who searched for other job characteristics (31 percentage points). Despite the small sample size of the first group, the increase in the acceptance rate for that group is significantly different from that for those who never searched at the 5 percent level. Online Appendix E.1 confirms a similar pattern from the search for another job characteristic that is not the focus of this paper. The consistency between the SSQ responses and actual search behavior suggests that the SSQ responses contain information on individuals' true preferences.

Reasons for Separation and SSQ Responses.—The first part of the survey includes a battery of questions adapted from the HRS concerning the reasons why individuals separated from their previous jobs. Respondents are asked to choose the most important reason from options such as retirement, family obligation, health issues, etc. Most nonworkers (in particular, 90 percent of those who did not have a bridge job) report that they quit to retire.¹⁷ Yet, some indicate that they were forced to leave the job by reporting reasons such as being laid off, discharged, and employer closing or selling the business.

In Table 8, we compare the SSQ responses between those who were forced to leave their previous job (defined as those who report any of “laid off,” “discharged,” “employer closed business,” and “employer sold business” as the main reason for the separation) and those who were not forced to leave the previous job (defined as the complement of the former, most of them reporting “retirement” as the main reason). We expect those who were forced to leave their last job to be more likely to accept an offer made at the time of that separation. Table 8 confirms that this is indeed the case. In both fixed and flexible schedule scenarios at the time of retirement, the acceptance rate is higher for those who report being forced to leave their last job. The difference is larger for those who did not have a bridge job. This pattern is consistent with those who were forced to leave their job having wanted to continue to work if they could find a reasonably good offer while those who were not forced to leave having wanted to have at least some time off.

¹⁷ We debated whether or not to include retirement on the list of choices because it obscures the reason for separation, but for comparability with the HRS we did include it.

TABLE 8—REASONS FOR SEPARATION AND SSQ RESPONSES: ACCEPTANCE RATE AT THE TIME OF RETIREMENT (PERCENT)

Group	Separation reason	Fixed	Flexible	Observations
No bridge job	Forced to leave	50.4	57.0	130
	Not forced to leave	29.9	43.1	1,105
Had a bridge job	Forced to leave	67.0	73.0	100
	Not forced to leave	60.5	66.6	334

Note: A separation is classified as forced if the respondent mentioned any of “laid off,” “discharged,” “employer closed business,” and “employer sold business.”

Source: VRI Survey 4 as explained in text

It may seem puzzling that 30 percent of people who do not report being forced to leave their career job would, at the moment of separation, accept a job offer with similar characteristics to their career job and a fixed work schedule. It is possible that, even though they report not being forced to leave, they were experiencing negative changes in working conditions or anticipating such declines. To examine this possibility, we use a question from the first part of the survey that asks whether respondents experienced any change in working conditions around the moment of a job separation, regardless of whether they were the main reasons for retirement or not. The share of those who experienced any negative changes in working conditions is higher among those who would accept the job offer with a fixed schedule (21 percent) than those who would not (10 percent).¹⁸ In addition, 22 percent of those who would accept the job offer report that they had a special early retirement incentive offer (18 percent for those who would not). Taken together, this additional evidence provides potential reasons why many in this sample decided to leave their career jobs even if they remained willing to work under the same conditions.

E. Summary

The SSQs allow us to identify a strong and prevalent willingness to work among older Americans. One-third of current nonworkers in the VRI report being willing to work again at the time of the survey, even if they could not choose the number of hours worked, as long as they could find a job that has similar characteristics to the last job they had. Many of them also report being willing to take a significant wage reduction to have such a job opportunity. The estimated willingness to work is much stronger than that which can be inferred from the behavioral data only. In particular, of all the people who transitioned directly from working in a career job to not working at all, only 11 percent searched for work after quitting their career job, but one-third would be willing to work again in a job with similar characteristics to their

¹⁸ Individuals are defined to have experienced negative changes in working conditions if they report any of the following: “supervisor encouraged departure,” “coworker encouraged departure,” “waged reduced (or about to be reduced),” “would have been laid off,” “new job duties,” or “new job location.” Other options included in the question are “hours reduced,” “became eligible for a pension,” “employer changed health insurance,” and “special early retirement incentive offer.”

career job. This difference between labor market outcomes, labor search behavior, and reported desire to work demonstrates the importance of controlling for demand-side factors, or workers' perceptions of those factors, in measuring willingness to work late in life.

The SSQs suggest that older workers have a strong preference for flexibility in their work schedules. Allowing for flexibility not only increases the acceptance rate at the reference wage (by 20 percentage points at the time of the survey), it also increases the wage reduction workers are willing to accept. This suggests that the increase in the share of jobs with a flexible schedule among bridge jobs documented in the previous section is at least in part driven by workers' preferences.

Strong willingness to work is not confined to a specific age group. Indeed, we find that the acceptance rates in each scenario are fairly similar across all the age groups where we have dense observations (i.e., ages 60–80). This again suggests that demand-side factors play an important role in explaining the sudden withdrawal from the labor force of individuals in their mid to late 60s. We also find that acceptance rates do not significantly vary with wealth across the wide range of wealth in the VRI sample. This suggests that the strong willingness to work documented in this paper is not confined just to those with substantial financial savings in late life.

Though the SSQs are asked with hypothetical job opportunities, tests of the credibility of the responses suggest that such purposefully designed questions can elicit useful information about respondents' true preferences.

III. IES Estimation Using the SSQs

SSQ responses indicate a stronger preference for reduced hours and greater flexibility among older Americans than observed retirement patterns imply. Furthermore, as highlighted in Rogerson and Wallenius (2013)—henceforth, RW, the prevalence of abrupt retirements is puzzling in the context of standard models of labor supply in which individuals prefer to smooth leisure utility. In RW's model, strong enough production nonconvexities or a large enough intertemporal elasticity of substitution of labor supply (IES) are able to generate abrupt retirements. As emphasized by RW, patterns of abrupt retirement are not enough to separately identify the strength of production nonconvexities and the IES. In this section, we show how to identify the IES independent of production nonconvexities by combining SSQ responses with RW's model. We then estimate the IES for each respondent and calculate the strength of production nonconvexities needed to explain typical retirement patterns. Our estimates suggest IES values slightly toward the high end, but within the range, of previous estimates that use micro data. These values of the IES provide further evidence that demand side constraints or production nonconvexities are responsible for the prevalence of abrupt labor force exits.

We first document the relationship between production nonconvexities, the IES, and hour-profiles/labor force exit, as well as the challenge in identifying the IES in the presence of nonconvexities. We show that SSQ responses identify the IES independent of production nonconvexities and then present our estimated IES distribution. Finally, as a credibility check, we show that the IES estimates are negatively correlated with searching for flexible jobs, as expected.

A. The Identification Problem with Behavioral Data Alone

The IES is a key parameter in studying retirement behavior, as it determines how individuals want to allocate the hours they work over their lifetime. An individual with a low IES wants to smooth hours worked over time, while an individual with a high IES is comfortable with highly variable hours worked over the life cycle, including possibly periods of full-time work and full retirement.

As noted in RW, there is an inconsistency between the low IES commonly estimated in micro studies and that typically needed in models to rationalize observed retirement behavior: generating an abrupt retirement requires an IES much larger than one, but most of the empirical studies (leveraging labor supply responses to tax changes) suggest an IES much smaller than one (see Keane 2011, for a survey). To reconcile this inconsistency, RW propose introducing a nonconvexity in production that limits workers' desire to choose to work part-time en route to labor force exit. Of course, this suggests that inferring the IES from behavioral data is contingent on the assumed strength of the production nonconvexity. In fact, any observed retirement behavior can be rationalized by any value of the IES for some freely chosen production nonconvexity.

The model used in RW is as follows. In their model with age-dependent preferences and wages, nonconvexity in production, and time and expenditure fixed costs of work, a household chooses c_t and h_t to solve

$$(1) \quad \max \int_{t=0}^T \left[U(c_t) + \alpha_t \frac{(1 - e\bar{h} - h_t)^{1-1/\gamma}}{1 - 1/\gamma} \right] dt$$

subject to

$$(2) \quad \int_{t=0}^T (c_t + e\bar{c}) dt = \int_{t=0}^T (w_{0,t} h_t^\theta) h_t dt + Y,$$

where t is the age subscript, h_t is the amount of labor supplied (normalized as a fraction of the total time endowment), γ parameterizes the intertemporal elasticity of substitution for leisure, α_t is the weight on utility from leisure, e is an indicator function for currently working, \bar{h} and \bar{c} are time and expenditure fixed costs of working, and Y is total lifetime resources other than labor earnings. Let $w_t = w_{0,t} h_t^\theta$ denote the hourly wage. The parameter θ is the elasticity of wage to hours and controls the strength of the nonconvexity in production, and $w_{0,t}$ is the scalar that anchors the age profile of wages. The hourly wage is an increasing function of the number of hours worked, which captures the disadvantage to part-time working. Given the amount of labor supplied, γ pins down the IES by

$$(3) \quad IES := \frac{dh_t/h_t}{dw_t/w_t} = \gamma \frac{1 - e\bar{h} - h_t}{h_t}.$$

For simplicity, it is assumed that there is no uncertainty, no time discounting, and that the interest rate is zero. This model abstracts from some factors that might be relevant to workers near normal retirement ages, including Social Security and pension benefit accrual, burnout, and human capital. In Section III E, we

discuss how inclusion of these factors would affect the main results of the current section.

Suppose that either α_t is increasing or $w_{0,t}$ is decreasing over age. Then households would want to work more when younger and less when older. More importantly, given the values of the fixed costs of working (\bar{c} and \bar{h}), if the IES is high or the nonconvexity in production (θ) is strong, then this incentive is sufficiently strong to generate a direct transition from working full-time to retirement.

To be more specific, suppose we want to generate the typical retirement pattern from this model that at certain age, say $t = r$, a worker who was working h_r number of hours, suddenly transitions into no work. For r to be the optimal retirement age, the following first-order condition needs to be satisfied at that age:

$$(4) \quad U'(c^*)(w_{0,r}h_r^{1+\theta} - \bar{c}) = \alpha_r \left(\frac{1}{1 - 1/\gamma} - \frac{(1 - e\bar{h} - h_r)^{1-1/\gamma}}{1 - 1/\gamma} \right),$$

where c^* is equal to lifetime labor earnings plus Y under the assumption that $U(\cdot)$ represents a preference for consumption smoothing and a normalization of $T = 1$. The left-hand side of equation (4) is the marginal benefit to working longer and the right-hand side is the marginal cost. In addition, for h_r to be the optimal number of working hours at r , the following first-order condition needs to be satisfied:

$$(5) \quad U'(c^*)(1 + \theta)w_{0,r}h_r^\theta = \alpha_r(1 - e\bar{h} - h_r)^{-1/\gamma}.$$

The left-hand side is the marginal benefit to increasing hours worked and the right-hand side is the marginal cost. By dividing both sides of these two first-order conditions, we obtain the exact value of θ that is just large enough to generate a direct transition from working h_r hours to no work:¹⁹

$$(6) \quad \theta = (1 - \hat{c})h_r(1 - 1/\gamma) \frac{1}{(1 - \bar{h} - h_r)^{1/\gamma}(1 - (1 - \bar{h} - h_r)^{1-1/\gamma})} - 1.$$

This equation relates the IES and θ . When the IES is higher, the household is more sensitive to the financial disincentives associated with part-time working (the fixed costs and nonconvexity in production), so it is more discouraged from working part-time and more likely to choose a direct transition to retirement. In addition, when θ is higher, the hourly wage reduction associated with part-time work is larger, so the household faces a larger disincentive to part-time working. Thus, for a higher θ , direct retirements can be rationalized with a lower value of the IES.

Figure 5 presents this trade-off graphically by plotting equation (6), with the shaded region corresponding to the parameter space that can generate abrupt

¹⁹ Following RW, we assume the expenditure fixed cost of working (\bar{c}) to be proportional to labor earnings at h_r . Hence, the parameter \hat{c} in equation (6) is defined as $\hat{c} = \frac{\bar{c}}{w_{0,r}h_r^{1+\theta}}$.

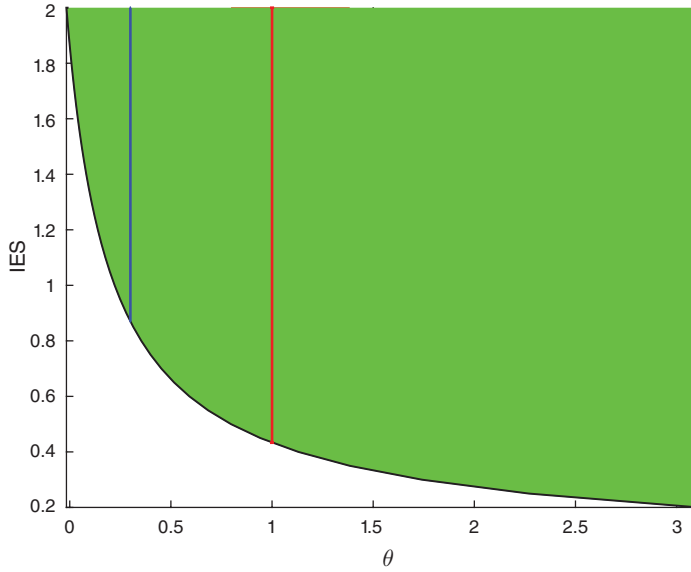


FIGURE 5. REQUIRED IES AND θ TO GENERATE RETIREMENT FROM FULL-TIME WORK

Notes: The green area contains the combinations of the IES and θ that are consistent with a direct transition from full-time work to retirement when full-time work is calibrated as $h_r = 0.385$ (2,000 hours per year). The boundary of the area corresponds to equation (6). The blue line represents values of the IES that are consistent with a direct transition if $\theta = 0.3$ while the red line represents those for $\theta = 1.0$.

Source: Authors' calculations as explained in text

retirement from full-time work.²⁰ Following RW, we assume that the fixed cost of working in terms of foregone leisure is 4 percent of the time endowment ($\bar{h} = 0.04$), and the fixed cost in terms of expenditure is 14 percent of full-time earnings ($\hat{c} = 0.14$). We use these values of fixed costs as our baseline calibration for all following exercises.²¹ In addition to highlighting the role of the IES and nonconvexity in production in generating retirement from full-time work, this figure also reveals the identification challenge associated with using behavioral data only (the direct transition to retirement in this case). While the observed behavior excludes certain combinations of these two factors—all of the parameter values outside of the shaded area can be ruled out—there remains a substantial area of the parameter space that can rationalize transitions from full-time work to retirement. Any value of the IES can be consistent with the observed behavior depending on the assumed value of θ . For example, if θ is 0.3, then the IES needs to be larger than 0.9 to rationalize abrupt retirement (blue line in Figure 5). But if θ is 1, then the IES can be as small as 0.4 (red line in Figure 5). The opposite is also true: any value of θ can rationalize sudden retirement depending on the value of the IES. If we can pin down one of the two parameters using an additional

²⁰ Full-time work is calibrated as 2,000 hours per year, or $h_r = 0.385$, which is common among career jobs of the VRI sample as well as the HRS sample.

²¹ In online Appendix D.2, we report results from alternative calibrations.

source of information, then the observed behavior places bounds on the values the other parameter can take. This motivates our estimation of the IES using the SSQs.

B. Identifying IES Using SSQ Responses

The SSQs collect two different wage and hour pairs (under a fixed and flexible schedule) that make an individual indifferent to working or exiting the labor market. In this section, we demonstrate that this is sufficient to identify an individual's IES, independent of the nonconvexity in production.²² Intuitively, a small IES corresponds to a steep increase in the marginal disutility of extra work. Thus, a respondent with a smaller IES would be willing to accept a larger wage reduction in order to work fewer hours. We formally derive this relationship below.

First, suppose that h_{fixed} is the number of hours respondents have to work in the fixed schedule scenario and w_{fixed} is the reservation hourly wage that makes respondents indifferent between accepting this job offer and not working for the considered moment. If the marginal value of resources, $U'(c^*)$, is not affected by this choice (which is a good approximation for the VRI sample because they have high financial wealth and relatively short remaining time to work), the extensive-margin indifference condition in equation (4) determines the reservation wage, w_{fixed} , as

$$(7) \quad U'(c^*)(h_{fixed}w_{fixed}(1 - \hat{c})) = \alpha_t \left(\frac{1}{1 - 1/\gamma} - \frac{(1 - \bar{h} - h_{fixed})^{1-1/\gamma}}{1 - 1/\gamma} \right),$$

where α_t may depend on the time the question concerns (i.e., the time of the survey or the time of retirement). The right-hand side is the foregone utility from giving up leisure to work the fixed number of hours, while the left-hand side is the value of income from this job.

Second, let h_{flex} be the number of hours chosen under the flexible schedule scenario and w_{flex} be the reservation hourly wage that makes respondents indifferent between accepting this offer and not working at the considered moment. At the reservation wages, utility is the same whether working a fixed or a flexible schedule, yielding the following relationship:

$$(8) \quad U'(c^*)(h_{fixed}w_{fixed} - h_{flex}w_{flex}) \\ = \alpha_t \left(\frac{(1 - \bar{h} - h_{flex})^{1-1/\gamma}}{1 - 1/\gamma} - \frac{(1 - \bar{h} - h_{fixed})^{1-1/\gamma}}{1 - 1/\gamma} \right),$$

where the right-hand side is the leisure cost of working longer and the left-hand side is the value of additional income from working longer. This equality holds at the reservation wages because the outside option of not accepting the offer is equal across scenarios.

²²See Pistaferri (2003) for an alternative identification strategy based on subjective expectations of wage growth.

By dividing equation (7) by equation (8) and rearranging terms, we get

$$(9) \quad \frac{w_{flex}}{w_{fixed}} = \frac{h_{fixed}}{h_{flex}} \times \left(1 - \frac{(1 - \hat{c}) \left((1 - \bar{h} - h_{flex})^{1-1/\gamma} - (1 - \bar{h} - h_{fixed})^{1-1/\gamma} \right)}{1 - (1 - \bar{h} - h_{fixed})^{1-1/\gamma}} \right).$$

Since we are using two questions that place the individual at the same point in time, the time-varying weight on leisure-utility (α_t) and the marginal utility of income ($U'(c^*)$) cancel out. Given the calibrated values of the fixed costs of working (\bar{h} and \hat{c}), the only unknown variable in equation (9) is γ , so we can estimate the IES that is consistent with this condition and observed responses h_{flex} , w_{fixed} , and w_{flex} .

Equation (9) is basically an indifference curve. For a given value of the IES (or γ), it determines the pairs of $\{h_{flex}/h_{fixed}, w_{flex}/w_{fixed}\}$ that make the individual indifferent between working under the fixed schedule and the flexible schedule (where the level of w_{fixed} satisfies equation (7)). Figure 6 plots the indifference curves for various values of the IES. The lower is the IES, the steeper is the indifference curve. The marginal disutility of work increases faster with a lower IES, hence a worker with a lower IES would accept a larger wage reduction for a given reduction in hours. As the IES increases, the curve becomes flatter.²³ This demonstrates why the IES is a key parameter in explaining retirement behavior in RW's model: those with a small IES highly value the option to work part-time, so unless the nonconvexity in production is strong, they will choose a part-time bridge job over abrupt retirement. However, for those with a high IES, a small penalty for part-time work is enough to discourage them from working part-time and hence to induce a transition from full-time work to complete retirement.

An observed pair of $\{h_{flex}/h_{fixed}, w_{flex}/w_{fixed}\}$ from the SSQ allows us to pick which indifference curve the respondent is on. This, in turn, allows us to estimate the IES value for this respondent as the one that corresponds to the chosen indifference curve.

Some responses ($\{h_{flex}/h_{fixed}, w_{flex}/w_{fixed}\}$) cannot be rationalized with any value of the IES. For some of these responses, we can assign them either top- or bottom-coded values of the IES, by extending the logic of the RW model and allowing the fixed costs to be heterogeneous. Some respondents (4 percent) choose a number of hours under a flexible schedule that is too small to be justified under the baseline fixed costs. But such responses can be rationalized with lower fixed costs and a low IES. Thus, we assign a low value of IES (0.05) to these responses. However, some respondents (10 percent) demand an hourly wage increase for working fewer hours that is too large to be justified under the baseline fixed costs. Such responses can be rationalized with larger fixed costs and a high IES. We assign a high value of the IES (10) to such responses. However, those responses where total earnings from working fewer hours is greater than or equal to that from working full time

²³ In the absence of fixed costs of working, the curves are always upward-sloping and they converge to the horizontal curve as the IES goes to infinity. Fixed costs of working create negative slopes to compensate for the increase in the average cost of working when the number of hours is reduced, either when the IES is very high or the reduction of the number of hours is large.

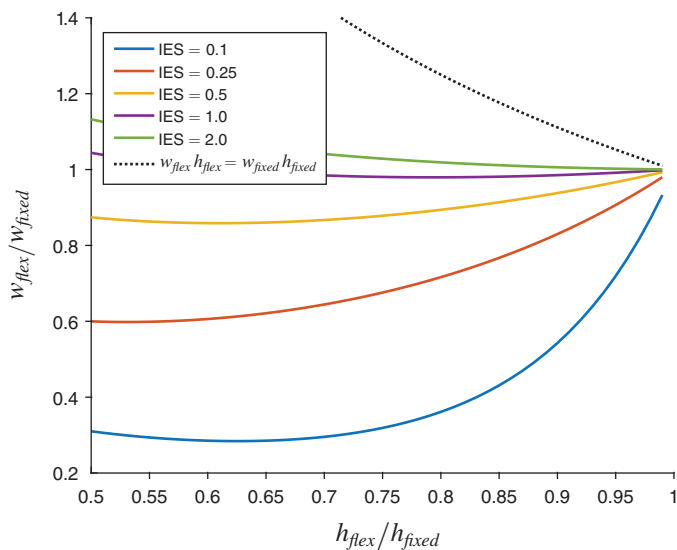


FIGURE 6. SSQ RESPONSES AND IES: INDIFFERENCE CURVES

Notes: Each curve connects the pairs of $\{h_{flex}/h_{fixed}, w_{flex}/w_{fixed}\}$ that make the worker with the considered value of IES indifferent between working under the fixed schedule and flexible schedule scenario, under $h_{fixed} = 0.385$, $\bar{h} = 0.04$, and $\hat{c} = 0.14$. The figure zooms in the range $[0.5, 1.0]$ for h_{flex}/h_{fixed} where most of the responses fall.

Source: Authors' calculations as explained in text

($w_{flex}h_{flex} \geq w_{fixed}h_{fixed}$, the area above the dotted curve in Figure 6) cannot be justified under any labor supply model with a positive utility value of leisure regardless of the values of the fixed costs, so they are dropped from the analysis (10 percent of the sample).

Furthermore, some responses do not reveal relevant information for the IES estimation so they are not included in the estimation. Those who choose to reject both offers at any reasonable wage do not provide relevant information for the estimation (37 percent of the sample).²⁴ These individuals may indeed have high IES since allowing flexibility does not change their decision to retire, though it is not operational because they also have low preference for work later in life (high α_t). Respondents who report the same number of hours and reservation wages in both scenarios provide only one effective observation, which is not enough to construct the indifference curve needed for estimation (10 percent of the sample).

C. IES Estimates

Figure 7 shows the cumulative distribution of the estimated IES under the baseline calibration of the fixed costs.²⁵ The median IES estimates are 0.45 when using SSQs with job offers at the time of the survey and 0.83 when using SSQs

²⁴ If the reservation wage is given in one scenario but not in the other, we assume a high reservation wage for the latter (twice of the reference wage).

²⁵ See online Appendix Figure D.3 for the results from alternative calibrations.

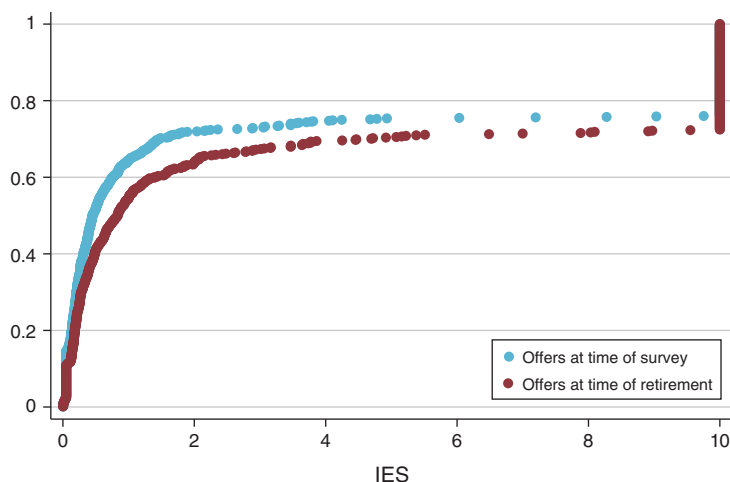


FIGURE 7. DISTRIBUTION OF IES ESTIMATES

Notes: The curves represent CDFs of the estimated IES. Each point corresponds to a respondent. The horizontal axis shows the estimated IES and the vertical axis shows the share of estimates that are smaller than or equal to that value of the IES. Observations = 796 for offers at the time of the survey and 668 for offers at the time of retirement.

Source: VRI Survey 4 as explained in text

with job offers at the time of retirement. These are well in line with findings from the microeconomic literature: the average among the estimates from the studies examined in Keane (2011) is 0.31. Recent works including Domeij and Flodén (2006) and Chetty (2012) show that accounting for frictions such as credit constraints and adjustment costs can lead to a larger estimate: Chetty (2012) suggests 0.5 as a reasonable estimate. RW argues that under the values of the nonconvexity in production that are often used in the literature, the IES needs to be at least 0.75 to explain the observed retirement behavior.

Our estimates do not depend on the strength of the nonconvexity in production. In fact, given the RW model, our estimates provide a range of the nonconvexity in production that are in line with a transition from full-time work to retirement. According to Figure 5, the median IES estimate from the offers at the time of the survey (0.45) suggests that θ needs to be larger than 0.85 to generate such a retirement pattern while that from the offers at the time of retirement (0.83) suggests a range above 0.35. Any value below this threshold is not consistent with a retirement from full-time work for more than half of the sample. For example, a worker whose IES is 0.45 and works full time immediately before retirement would be willing to accept an 8 percent wage reduction to work 10 percent fewer hours. However, with $\theta = 0.85$, the wage a firm is willing to pay to such a part-time worker is slightly less than that, resulting in a direct transition from full time to no work.²⁶

²⁶ Given the fixed costs and increasing marginal disutility of work, the marginal decrease in the reservation wage associated with fewer hours is larger when the number of hours is closer to full-time work. Therefore, if the

Though this is an indirect inference of which validity may be affected by elements not explicitly considered in the baseline model (see Section III E), the estimates obtained from the SSQs, in particular those from the offers at the time of retirement, are in line with findings from the empirical literature that uses exogenous variations in the number of hours. This literature either uses variations in hours induced by Social Security rules (Aaronson and French 2004) or from the number of children of female workers (e.g., Rosen 1976, Moffitt 1984, and Ermisch and Wright 1993). Aaronson and French (2004) finds that reducing hours per week from 40 to 20 between ages 62 and 65 results in a 25 percent wage penalty, which implies $\theta = 0.42$.

We also estimate significant heterogeneity in the IES. For about a quarter of respondents, the IES is less than 0.2 while for another quarter it is larger than 5. The former group will find part-time working attractive even when θ is as high as 3. The latter group will choose retirement over part-time work even in the absence of the nonconvexity ($\theta = 0$) since the fixed costs are enough to discourage them from working part-time.

D. IES Estimates and Measured Search Behavior

The RW model we build upon predicts that individuals with a smaller IES value part-time options more. Relying on this relationship, we provide evidence supporting the validity of our IES estimates by examining whether the IES estimates predict searching for flexibility, conditional on searching for a job opportunity, after a career job exit.²⁷ To avoid confounding the analysis due to differences in reference job type (bridge versus career), we study those who had a bridge job.²⁸ We use Tobit to account for the top- and bottom-coding of the IES. Because the IES is right skewed, we consider a log specification.

Table 9 reports the association between the log of the IES estimates and searching for a flexible schedule controlling for key demographic variables including gender, marital status, and age, last job characteristics such as whether they had a flexible schedule or not and the number of hours, and a dummy variable for the SSQ from which the IES is estimated. The point estimate suggests that, as predicted by the model, those who searched for flexibility indeed have a smaller IES. They have on average a 50 percent smaller IES than those who did not look for flexibility. Notwithstanding the small sample size, the estimate is statistically significant at the 10 percent level. This result provides evidence that the estimated IES distribution captures true heterogeneity in preferences that affect behavior. The other coefficients, though some with large estimated effects, are statistically insignificant. Since the IES estimates are based on SSQs that are designed to extract preferences, the insignificance of these coefficients is a desired outcome.

only part-time option allowed is a much larger reduction in hours, say 50 percent fewer hours, then the value of θ needed to rationalize an abrupt retirement is only 0.25 if the $IES = 0.45$ (see also RW 2013).

²⁷We focus on jobs they searched for instead of jobs they worked, since jobs worked are more affected by the available jobs offered in the market.

²⁸The vast majority of those who did not have a bridge job did not search.

TABLE 9—IES ESTIMATES AND SEARCH BEHAVIOR

Variable	Coefficient	Standard error
Searched for flexibility	-0.566	(0.309)
Single male	0.565	(0.538)
Coupled male	0.349	(0.407)
Coupled female	-0.692	(0.552)
Age	0.017	(0.023)
Number of hours in the last job	-0.000	(0.000)
Having a flexible schedule in the last job	-0.066	(0.348)
Social capital occupation	-0.097	(0.317)
Physical capital occupation	0.399	(0.585)
SSQ at the time of retirement	0.963	(0.289)

Notes: Observations = 363. The dependent variable is the log of IES estimates. Tobit is used to account for top- and bottom-coding of the IES. Only those who had a bridge job are included.

Source: VRI Survey 4 as explained in text

E. Robustness with Respect to Modeling Assumptions

In this paper, we demonstrate that by using the SSQ responses and the RW model one can estimate the IES, a key supply side parameter in explaining retirement behavior. We also show that the IES estimates provide an indirect estimate of a key demand-side parameter in the RW model, the nonconvexity in production. One might be concerned that overly restrictive modeling choices are driving the results. Note that the RW model used for both the IES estimation and indirect inference on the nonconvexity parameter abstracts from some factors that might be relevant to workers near normal retirement ages, including Social Security and pension benefit accrual, burnout, and the accumulation and loss in human capital. In this subsection, we discuss how our main findings would be affected by inclusion of these elements in the model.

By the design of the SSQs, the IES estimates are not affected by inclusion of these elements. Recall that the IES estimates are obtained from comparing responses to two hypothetical new job offers available at the same point of time, which are identical except for the number of hours. Choices in the SSQs do not affect the pension benefits from previous jobs. Also, for workers at or above the full retirement age (66)—i.e., most of the nonworker sample—additional earnings do not affect Social Security benefits. If burnout is represented by α_t increasing in the number of hours worked during some time period, then burnout does not affect estimation of the IES. Burnout does not enter equation (9), the key equation for the IES estimation, because α_t drops out, regardless of its value at any point in time, when comparing two offers available at the same point in time. Regarding human capital, it is unlikely that at older ages human capital accumulation provides additional incentive to work (Heckmann, Lochner, and Taber 1998; Huggett, Ventura, and Yaron 2011). At these ages, what is more likely to be relevant in workers' search for a bridge job is a potential loss of firm-specific human capital. But loss of firm-specific human

capital does not enter the estimation equation either because the equation is based on the reservation wages demanded by workers, not the wages that firms are willing to offer.

Indirect inference concerning the nonconvexity parameter based on the IES estimates and the RW model may be affected by inclusion of these elements to a certain extent. RW argue that the mapping between the IES and nonconvexity parameters that are consistent with observed retirement behaviors is not significantly affected by Social Security and pensions. For those who are close to or over the full retirement age, the effect of current income on the total amount of Social Security benefits is limited, because on the one hand, additional earnings do not affect the average indexed monthly earnings much at that stage, and on the other hand, workers face limited negative incentive to work even before the full retirement age under the current rule. So it plays a role similar to non-labor income (Y) that is already incorporated in the model (see equation (2)). Private pensions may provide an incentive for an early retirement, as we observed in Section IID. As RW argue, however, what matters in this context is not just a return to work at the previous employer but that to work in general, where the latter is not affected by an early retirement incentive generated by private pensions from previous jobs. Burnout provides another reason for a sudden transition to no work at all, but, if workers recover from burnout after taking some time off, burnout must be accompanied by a loss of human capital while not working to explain why retirees do not return to work. A loss of job-specific human capital may have a direct impact on the inference of the nonconvexity parameter. When searching for a part-time bridge job, workers may experience not only a wage penalty due to reduced hours but also a reduction in the wage level ($w_{0,t}$) due to a loss of job-specific human capital. Omitting this factor may overestimate the size of the nonconvexity parameter. Our results from the offers at the time of the survey suggest a fairly large value of the nonconvexity parameter (θ needs to be at least 1 to explain abrupt retirement for half of the sample). This finding may speak for the importance of job-specific human capital.

A different modeling issue is that we use a utility function that is separable between consumption and leisure to simplify derivations of the key equations. Neither the IES estimation from the SSQ responses nor the mapping between the nonconvexity parameter and the IES in the RW model is affected by allowing nonseparability between consumption and leisure in the utility function as in Trabandt and Uhlig (2009) and Shimer (2010). We can use exactly the same equations for the IES estimation (equation (9)) and for the indirect inference on the nonconvexity parameter (equation (6)) even when the utility function is nonseparable. See online Appendix D.3 for details.

IV. Related Literature

This paper relates to a number of literatures. First, we contribute to an empirical literature that examines employment patterns late in life, both by documenting the post-career-job work history and search behavior of the VRI sample and by eliciting their willingness to work using hypothetical questions. Beginning with Ruhm (1990) and more recently documented by Maestas (2010) and Rupert and

Zanella (2015), it has long been established that following a typical retirement path (i.e., direct transition from full-time career job to full retirement) is becoming less common, with Cahill, Giandrea, and Quinn (2006) noting that post-career employment resembles initial labor market engagement decades earlier, in terms of involving experimentation. Many of these jobs are part-time or lower paid, with the classical hump-shaped wage profile reflecting workers' willingness to take lower wages for less work (Cassanova 2013). Furthermore, many workers return to employment to gain access to employer sponsored health plans, in particular before becoming eligible for Medicare at age 65 (Madrian 1994, Blau and Gilleski 2008). Self-employment associated with fewer hours and lower earnings is also used as a transition path to full retirement (Ramnath, Shoven, and Slavov 2017). Of course, some returns to work do not reflect workers' preferences, with Chan and Stevens (2001) noting the volatile employment of workers that are fired after age 50 and a number of studies noting the labor demand side constraints that hinder post-career employment (e.g., Hurd 1996, Scott 2004, Kantarci and Van Soest 2008). Our paper documents that either having a bridge job before full-retirement or searching for such an opportunity is not rare, but also that using behavioral data alone leads to underestimation of older individuals' willingness to work.

This paper contributes to a literature that empirically examines the effect of institutional incentives on late-in-life labor supply by proposing an approach to disentangle the roles played by supply and demand-side factors in generating the observed changes in labor market activity. Many studies in this literature rely on aggregate data leveraging cross-country differences or historical changes within countries in public pension benefit systems (see, for example, Blöndal and Scarpetta 1999, Gruber and Wise 1999, Johnson 2000, and Duval 2003). Others use variation in retirement incentives across households that arise from public or private pension systems and public medical insurance (see, for example, Blundell, Meghir, and Smith 2002; Gruber and Wise 2000; Euwals, van Vuuren, and Wolthoff 2012; and Gustman, Steinmeier, and Tabatabai 2019). While informative, reactions to such policy incentives still combine the older individuals' willingness to work and job availability. The results in this paper show that for a policy to be effective in encouraging working longer it should address demand-side factors.

This paper also relates to a literature that matches structural models to observed retirement patterns in order to estimate the importance of various institutions and policies in determining retirement behavior. Beginning with Berkovec and Stern (1991), a number of papers have highlighted the importance of minimum hours constraints (Gustman and Steinmeier 1986), Social Security (Rust and Phelan 1997, French 2005, van der Klaauw and Wolpin 2008), and public and private health insurance (Blau and Gilleskie 2006, French and Jones 2011). These papers also suggest ways to overcome the identification issue associated with using only behavioral data. For example, French (2005) addresses the selection bias in estimating a wage profile for older workers by generating the same selection process in the model. Identifying all the key supply and demand-side parameters relying only on behavioral data is still challenging and these studies have to make assumptions either on the level or distribution of certain key parameters. A prime example is the assumption on nonconvexity parameters in French (2005). Our paper contributes to this literature by providing an alternative

method to separately identify supply and demand-side structural parameters, so that a life-cycle model can provide better informed predictions on the effectiveness of considered policies.

Finally, this paper relates to two branches of the survey literature. First, the SSQ survey instruments we use in this paper reflect a methodological approach to surveys that attempt to structure survey questions to quantitatively inform preferences and model parameters in meaningful ways (Barsky et al. 1997; Ameriks et al. 2011; Brown, Goda, and McGarry 2016; Fuster and Zafar 2016; Ameriks et al. 2018, forthcoming; and Wiswall and Zafar 2018, among others). Second, we relate to a number of studies that attempt to use surveys to measure retirement plans (Hurd 2009) or factors that affect late-in-life labor supply decisions, including but not limited to the age composition of coworkers (Blau and Shvydko 2011), career attachment and job satisfaction (Gobeski and Beehr 2009), pension and hours arrangements (van Soest, Kapteyn, and Zissimopoulos 2007; Van Soest and Vonkova 2014; Kantarci and van Soest 2015), and disability (Kapteyn, Smith, and van Soest 2008). Our study differs, however, due to the level of detail we include in our hypothetical scenarios and the resulting quantitative measures that this approach delivers, which can be directly used to estimate parameters in retirement models. The survey approach used in this paper also complements the literature on revealed preference for work arrangements from experiments (Bloom et al. 2015, Mas and Pallais 2017, forthcoming, among others) and behavioral data on workers' choices (Chen et al. forthcoming, Sorkin 2018, among others).

V. Conclusion

By combining new behavioral data on late-in-life employment and job-search activity with hypothetical SSQs, we find a strong and prevalent willingness to work among older Americans. At the time of the survey, many individuals, even those years removed from their last job, would like to return to work if they found a job similar to the last job they held. Individuals also expressed a willingness to continue working at the time of retirement. The willingness to work is stronger when jobs offer a flexible choice of hours worked. Individuals are willing to take substantial earnings reductions to gain hour flexibility. From these findings we conclude that labor force participation near and after normal retirement ages is limited more by a lack of acceptable job opportunities or low expectations about finding them—in particular, jobs with part-time or flexible schedules—than by unwillingness to work longer. Given that the sample used in this paper tend to be healthier, wealthier, and more educated than the population of older Americans, and also that they had occupations that do not require much physical strength, limits from the demand side might be more prevalent for the general older population. Thus, demand-side factors (e.g., a nonconvexity in production that discourages part-time hires) are likely to be important in explaining current late-in-life labor market behavior and need to be considered in designing policies aiming to promote working longer. Our results suggest that any policies that induce firms to provide jobs with a flexible schedule to older Americans, even at a wage lower than what they used to have, will bring many back to the labor market. However, what

policies would induce firms to do so and whether those policies would be welfare improving depend on whether and why firms are less willing to hire older workers, in particular on a part-time basis. Hence, the findings from this paper call for further research on these demand-side issues (see Goldin and Katz 2011; Neumark, Burn, and Button 2016; and Burtless 2017 as examples of recent work).

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