INCOME VOLATILITY INCREASES FINANCIAL IMPATIENCE

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Note: this is a working paper that has not yet been peer-reviewed

Abstract

We investigate whether income volatility is associated with financial impatience—the preference to receive a small sum of money immediately over a larger sum of money later. We find that experiencing more income volatility is associated with greater subsequent financial impatience across the wealth spectrum. Using 27-years of longitudinal data on biannual income, Study 1 (N = 5,106) demonstrates that this effect operates above and beyond individual differences in income-risk preferences and total wealth. Study 2 (N = 326) conceptually replicates these findings with recent month-to-month income volatility and identifies that this effect occurs primarily among people who have little control over their finances. In Study 3 (N = 841), we collected a representative sample of working Americans, stratified on income, to test the effects of recent monthly income volatility on a spending versus saving decision with real stakes. At all income levels, greater income volatility is associated with a preference for more immediate spending and less saving. We conclude by discussing the implications for employers and policymakers.

Keywords: income volatility, compensation, impatience, time preferences

(168 words)

Income Volatility Increases Financial Impatience

Around the world, households are facing increasingly volatile incomes as fewer jobs offer consistent working schedules and predictable salaries (Federal Reserve, 2018; OECD, 2019; Morduch & Schneider, 2017). For instance, the average American household now experiences 30% more variability in year-to-year income compared to 1970 (Dynan, Elmendorf, & Sichel, 2012; Gottschalk & Moffitt, 2009; Bradley & Ziliak, 2013). Income volatility is also rising in other countries where detailed household-level data is available, including Germany (Burkhauser et al., 1997), Great Britain (Dickens, 1996), Sweden (Gustavsson, 2004), and Canada (Baker & Solon, 2003; Beach et al., 2003; 2008; Beach, Finnie & Gray, 2010; Gracia-Medina & Wen, 2014; Peetz & Robson, 2019). In this research, we examine the relationship between income volatility and financial decision-making. Across three studies, we demonstrate that income volatility leads people to make more impatient decisions, irrespective of income level and overall wealth.

Past research has linked the experience of poverty to a pattern of impatient decision making, including over-borrowing, more impulsive spending, less saving, and poor planning (Lea, Webley, & Levine, 1993; Haushofer & Fehr, 2014; Zhao & Tomm, 2018; Ong, Theseira, & Ng, 2019; for reviews see: Banerjee & Mullainathan 2010; Pepper & Nettle, 2017). The evidence indicates that this pattern of myopic behaviors is not the result of individual failures or pathology, but rather a psychological consequence of experiencing chronic financial deprivation. However, the psychological effects of poverty and income volatility are often confounded because poor households typically experience the most volatile income streams. For instance, in developing countries, income uncertainty is a fundamental feature of poverty due to a variety of economic risks such harvest failure, health shocks, crime, precarious employment, and a lack of

adequate insurance or other risk-sharing arrangements (Morduch, 1999; Dercon, 2002; Baulch & Hoddinott, 2000). Similarly, data from the US Financial Diaries Project and JP Morgan Chase find that income volatility is highest for households below the poverty line, primarily due to within-job pay fluctuations (Hannagan and Morduch 2015; Morduch and Siwicki 2017; Morduch and Schneider 2017; Farrell and Greig 2016). We theorize that part of the relationship between poverty and impatience may actually be driven by income volatility, rather than an absolute lack of resources. Therefore, rising income volatility may help to explain patterns of impatient financial decision-making across the income spectrum. For instance, even high-income households are spending beyond their means and under-saving – a recent survey found that 18% of households making more than $100,000 annually are living paycheck to paycheck (Census Bureau, 2020; Willis Towers Watson, 2020).

Rising household income volatility represents a fundamental change in labor markets (Gottschalk & Moffitt, 2009; Hacker & Jacobs, 2008). It is critical to better understand how income volatility shapes financial decision-making and intertemporal trade-offs.

Psychological consequences of income volatility

In the United States and around the world, a growing percentage of people work in jobs that do not offer a stable salary. For instance, compared to 1980, more people work part-time, as contractors and freelancers, and in the gig economy doing crowdwork and work-on-demand (Federal Reserve, 2018; OECD, 2019; McKinsey Global Institute, 2016; De Stefano, 2016). Full-time workers are also facing increasing income volatility. Union membership has declined and companies are demanding more flexible labor, leading to more irregular working schedules and less predictable income streams (Bureau of Labor Statistics, 2019; McMenamin, 2007; Golden, 2015). In addition, compensation packages have shifted towards lower guaranteed

salaries and more incentive-based pay, leading to further volatility (e.g. tips, bonuses, commissions, profit-sharing, stock options, etc.; Federal Reserve 2018; Lemieux, MacLeod, & Parent, 2009; Lazear & Shaw, 2008; Lazear, 2018).

The effects of income volatility are most severe for people living paycheck-to-paycheck, since an unexpected negative income shock can lead to housing instability, utility disruptions, food insecurity, and cycles of increasing debt (Bania & Leete, 2009; Leete & Bania, 2010; Collins, Lienhardt, & Smeeding, 2014). However, wealthier households are also affected. Prior survey data suggests that, across the economic spectrum, households with more volatile incomes accumulate less savings, incur more debt, are more likely to default on their debts, and report greater overall financial strain compared to households with stable incomes (Diaz-Serrano, 2005; Schneider & Harknett, 2017; Pew Charitable Trusts, 2017; Fisher, 2010; TD Bank Group, 2017). These patterns of impatient behavior may be caused, in part, by the psychological experience of income volatility. Economic research has examined household strategies for managing income volatility and sharing risk (Morduch 1995; 1999; Fafchamps, 1999; 2003; Dercon, 2002), but there is currently little evidence on individuals' psychological responses to income volatility.

Economic models of life-cycle consumption predict that people will respond rationally to income volatility by making more patient economic choices such as increasing precautionary savings and reducing discretionary spending (Leland, 1978; Skinner, 1988; Kimball, 1990; Weil 1993; Carroll, 1997). When individuals have little control over the future incomes and incomplete knowledge about the distribution of their possible earnings, rational economic theory predicts that they will be motivated to engage in precautionary savings to protect against future income risk (Kimball, 1990). In contrast to these models, descriptive research from consumer psychology suggests that people are more likely to make short-sighted decisions in response to

income volatility. When people face a high degree of uncertainty about the future, prioritizing the present can be viewed as a 'contextually adaptive response' (Pepper & Nettle, 2017; Fawcett, McNamara, & Houston, 2012). That is, if people believe their future financial outcomes are mostly out of their control, they may invest less effort and attention towards this future state. Indeed, low perceived control over future outcomes has been associated with impatient consumer financial decisions, including over-spending and under-saving (Perry & Morris, 2005; Shapiro & Wu, 2011; Cobb-Clark, Kassenboehmer, & Sinnin, 2016). In the current work, we test these two alternative theories on how income volatility shapes intertemporal decision-making.

Measurement and Analytic Approach

Defining and measuring income volatility

Income volatility is defined as fluctuations in earnings away from a general trend (Gottschalk & Moffitt, 1994; Congressional Budget Office, 2008). Previous research has used a wide variety of methods to measure and model income volatility. For instance, several studies use parametric models of income dynamics, often with the aim of separating fixed and variable income components, or distinguishing income mobility from transitory shocks (Moffitt & Gottschalk, 2002; Haider, 2001; Baker & Solon, 2003; DeBacker, Heim, Panousi, Ramnath, & Vidangos, 2013; Moffitt & Zhang, 2018). For testing our hypotheses, we prefer statistics that reflect psychologically salient fluctuations in income. People tend to be insensitive to gradual changes in their income, rather, they are attentive to significant fluctuations from one year or one month to the next. For instance, Mitra and colleagues (Mitra, Gupta, & Douglas, 1997) found that people are largely insensitive to annual pay raises less than 7%. Given our aim of understanding psychological responses to income volatility, we use a measure that captures meaningful percentage changes in income. Specifically, following past research, we measure

income volatility as the standard deviation of percentage change in income from one period to the next (Dynarski & Gruber, 1997; Cameron & Tracy, 1998; Congressional Budget Office, 2008; Dynan et al., 2012; Latner, 2018). This measure can be calculated across any time horizon, but we focus on year-to-year fluctuations (in Study 1) and month-to-month fluctuations (in Studies 2 and 3) since these are common intervals at which people evaluate their income and make financial decisions.

Defining and measuring impatience

Aligning with past research, we define impatience as a preference to receive a small sum of money sooner over a larger sum of money later (Samuel, 1937; Frederick, Loewenstein, and O'Donoghue 2002). People are constantly faced with choices involving trade-offs between costs and benefits that are realized at different times. When making these intertemporal choices, people often succumb to temptations and undervalue future outcomes, choosing smaller-sooner rewards over larger delayed rewards (Ainslie & Haslam, 1992; Cohen, Ericson, Laibson, & White, 2020). This pattern of impatient decision-making, often described as 'delay discounting,' has a profound effect on many important life outcomes, particularly financial wellbeing.

Impatience has been conceptualized and measured in several of ways across different disciplines including psychology, public health, and economics. For instance, impatience is often viewed as a personality trait that can be captured using self-reported scales (Barratt 1965; Patton, Stanford and Barratt 1995; Dickman 1990; Eysenck and Eysenck 1978). However, we focus on 'choice-based' measures of impatience because they tend to be the most predictive of real-world financial behavior (Burks et al. 2012; Hamilton et al. 2015). Choice-based measures define impatience as a personal discount rate for outcomes realized in the future (Mazur 1985; 1987; Laibson 1997; Frederick et al. 2002; Andreoni, Kuhn, and Sprenger 2015). Discounts rates can

be calculated using a 'matching' elicitation method whereby people report an indifference point between money received today versus in the future (Thaler and Shefrin 1981; Hardisty et al. 2013). For example, in Studies 1 and 2, our key outcome of interest is a matching elicitation of impatience in which participants are asked to indicate an amount of money that would convince them to wait 1 month to receive a cash prize of $1000, rather than claiming it immediately. In Study 3, we use a related incentive compatible choice-based method in which people can choose to receive $1000 immediately or set aside a portion of this money to be received in 6 months, plus 10% interest.

Individual differences in discount rates, as measured through matching elicitation procedures, have been directly linked real-world behaviors. People with higher discount rates (indicating greater impatience), tend have less savings, higher credit card debt, and lower overall lifetime earnings (Angeletos et al. 2001; Chabris et al. 2008; Nyhus and Webley 2001; Meier and Sprenger 2010; Meier and Sprenger 2012 Golsteyn, Gronqvist, and Lindahl 2013; Sutter et al. 2013). Indeed, discount rates have been identified as one of the strongest predictors of household financial behavior, controlling for a wide range of demographic and household characteristics (Klawitter, Anderson, and Gugerty 2012).

However, delay discounting is not a fixed preference. Rather, it is both a state and trait variable, in that discount rates can be influenced by situational factors, yet people also have predisposed tendencies that they bring to each situation (Soman et al. 2005; O'Donoghue and Rabin 2015; Odum and Baumann 2010; Odum 2011). For instance, experiencing poverty, psychological stress, and associated stress hormones has been shown to increase discount rates (Haushofer and Fehr 2014; 2019; Bernheim, Ray, and Yeltekin 2015; Riis-Vestergaard et al.

2018). In the current research, we test whether discount rates can also be shaped by the experience of income volatility.

Testing the relationship between income volatility and impatience

Rational economic models predict that income volatility will lead more patient economic preferences, driven by a motivation to protect against future income uncertainty. Research in consumer behavior suggests the opposite prediction – income volatility will lead to greater impatience, as uncertainty about the future causes people to narrow their attention towards more near-term outcomes at the expense of long-term planning. These competing theories have not been directly tested. Past research has sought to measure the extent of precautionary saving in response to income uncertainty, however, these studies have not measured the effects on underlying time preferences (Leland, 1968; Sandmo, 1970; Carroll, 1997; Mody et al., 2012). Furthermore, much of this empirical analysis on precautionary savings has either focused on the role of risk aversion in precautionary savings behavior (Kimball, 1990; Bommier & Grand, 2019), or on the impact of discrete income risks in a two-period setting – such as income shocks, risk of an economic downturn, and unemployment risk (Eeckhoudt & Schlesinger, 2008; Storesletten et al., 2004; Parker & Preston, 2005). In the current research, we measure income volatility experienced over time: 27-years of income in Study 1; 6 months of income in Study 2; and 12 months of income in Study 3. Furthermore, we focus directly on the psychological construct of impatience as our outcome of interest. We predict that income volatility will shape discount rates for people at all income levels, even after accounting for risk aversion.

Overview of studies

In Study 1, we use data from the National Longitudinal Study of Youth to investigate the effects of individual historical experiences of income volatility on financial impatience. We

examine the effects of within-person biannual income volatility experienced over a 27-year period from 1980-2006 on a subsequent impatience, captured in the 2006 survey wave. In Study 2, we examine intra-year income volatility since most people experience more volatility within-years than across-years (Hannagan & Morduch, 2015; Farrell & Grieg, 2015). We test the effects of within-person monthly income volatility over the previous half-year on present-day financial impatience. In Study 3, we examine the effects of month-to-month income volatility over a full-year on an incentive compatible measure of impatience. In all of these studies, we control for risk aversion. All materials, data, and code are available on the Open Science Framework: https://osf.io/8thmv/?view_only=6aeab100ec7f43fea7eff79cc363b8a2

Study 1

Data and Measures

Study 1 uses data from the National Longitudinal Study of Youth (NLSY79), a cohort survey conducted by the Bureau of Labor Statistics. The NLSY79 followed 12,686 individuals beginning in 1979 through 2016. The original sample included Americans born between 1957-1964, therefore they completed the first survey when they were 14-22 years old. Surveys were conducted every year from 1979 to 1994, and then every other year thereafter. In each survey wave, participants reported their annual income, allowing for a longitudinal analysis of income volatility from early adulthood through middle age. The NLSY79 includes a measure of financial impatience in only one survey wave (2006). Therefore, our analysis focused on the biannual income fluctuations experienced between 1980-2006 as a predictor of impatience in 2006. To distinguish the effects of volatility from overall wealth accumulation, we used a detailed measure of net worth captured in the 2004 survey wave as a control variable. Accounting for attrition across the total study period, the resultant sample in 2006 includes 7,653 individuals (51%

women, ages 41-49, median net worth in 2004 was $65,000, median income in 2006 was $35,000).

Dependent variable. The key outcome of interest was financial patience measured in the 2006 survey wave using a matching elicitation method:

> *"Suppose you have won a prize of $1000, which you can claim immediately. However, you can choose to wait 1 month to claim the prize. If you do wait, you will receive more than $1000. What is the smallest amount of money in addition to the $1000 you would have to receive 1 month from now to convince you to wait rather than claim the prize now?"*

Following past research that has examined impatience in the NLSY79 (DeVoe, House, & Zhong 2013; Courtemanche, Heutet, & McAlvanah, 2015), we calculated a personal discount factor, k, for each individual such that k=V/A, where V is the immediate gain ($1000) and A is the total amount needed in order to wait one month. Therefore, a value of k=1 reflects total patience and values lower than 1 reflect successively greater impatience (method based on Mazur, 1987). We observed discount factors ranging from 0.001 to 1. Consistent with past research, we dropped participants who reported being perfectly patient (k = 1; n = 800), since this indicates a possible misunderstanding of the question, as well as observations lower than 3 standard deviations below the mean (n = 10). See Supplemental Materials (SM) for robustness checks using no exclusion criteria for the measure of impatience.

Independent variables

Income Volatility. The NLSY79 includes a measure of individual earnings from salary, wages, and incentive-pay in every survey wave from 1980-2006. In order to rule out periods of unemployment as a source of income stability, we marked any year with $0 in reported income

as missing data. We did not need to exclude high outliers with respect to income because the Bureau of Labor Statistics uses a top-code of $216,200 for annual income data in order to ensure respondents' anonymity. We calculated income volatility as the standard deviation of percentage change in year-to-year income based on methods used in Dynan et al. (2012) and Shin & Solon (2011). Biannual percentage change is calculated as follows: Percent Change $_{t\text{-}2 \text{ to } t}$ = $100*(Y_t - Y_{t-2}) / [(Y_t + Y_{t+2})/2]$, where Y indicates a respondents' annual income in a given year. This method is useful because it naturally bounds the range from -200% to 200%. We then calculated the standard deviation of biannual percentage changes as a summary measure of the income volatility an individual experienced between 1980-2006. By analyzing percentage changes, rather than absolute income levels, we did not need to use any transformations (such as adjustments for yearly Consumer Price Index) to maintain comparability over time. In order to be included in the analyses, a respondent must have reported income data in two consecutive biannual surveys at least five times between 1980-2006 (i.e. must report at least ten years of income data within the 27-year study period in order to calculate a meaningful measure of variation).

***Control variables*.** We included two primary control variables: total net worth and risk-seeking for income. The NLSY79 captures highly detailed information on participants' assets and debts. This includes respondents' estimates of their home value, details on their mortgage, the market value and debt for all vehicles owned, the total value of investments (including stocks, bonds, mutual funds, and certificates of deposit), the value of IRAs and 401k accounts, the value of any cash savings and other assets (i.e. jewelry, art), and all other outstanding debts, such as credit cards and student loans. NLSY79 uses all of this information to compute a variable depicting total net worth. Since this information on assets and debts is not captured in the 2006

survey wave, we used the total net worth variable from the nearest preceding survey wave (2004). Total net worth includes respondents who are in debt and therefore have a negative net worth (9.3% of respondents) as well as those with $0 in net worth (7% of respondents).

We also included a measure of 'risk-seeking for income' as a control variable. It is possible that especially risk-seeking individuals self-select into jobs with more volatile incomes. Furthermore, rational economic models predict that income volatility will motivate people to engage in precautionary financial behaviors in proportion to their risk aversion (Kimball, 1990; Bommier & Grand, 2019). Therefore, we included risk-seeking for income as a control variable to examine whether the link between income volatility and impatience is explained by individual differences in risk-seeking. The NLSY79 includes a useful measure of risk-seeking that is specific to job choices and income. In the 2006 survey wave, respondents answered "yes" or "no" to two of the following three questions:

1. "Suppose you are the only income earner in the family, and you have a good job guaranteed to give you your current income every year for life. You are given the opportunity to take a new and equally good job, with a 50-50 chance that it will double your income and a 50-50 chance it will cut your income by a third. Would you take the new job?"
2. If the answer was "yes" to question 1, respondents are asked: "would you take a new job with a 50-50 chance that it would double your income and a 50-50 chance it would cut your income in half?"
3. If the answer was "no" to question 1, respondents are asked: "would you take a new job with a 50-50 chance that it would double your income and a 50-50 chance it would cut your income by 20%?"

These three questions can be used to create a 1-4 score for risk-seeking. Individuals are defined as *1=very risk averse* if they answer "no" to questions 1 and 3 (question 2 not asked); *2=somewhat risk averse* if they answer "no" to question 1 and "yes" to question 3 (question 2 not asked); *3=somewhat risk-seeking* if they answer "yes" to question 1 and "no" to question 2 (question 3 not asked); and *4=very risk-seeking* if they answer "yes" to questions 1 and 2 (question 3 not asked).

Study 1: Results and Discussion

Table 1 reports the means, standard deviations and intercorrelations between variables. The raw correlations show that patience is significantly negatively correlated with income volatility (r = -.06, $p < .01$). Controlling for total net worth and risk-seeking for income, greater income volatility experienced from 1980-2006 was associated with less patience in 2006, β = -.052, $t(4846)$ = -3.546 $p < .001$, CI(β) = [-.080, -.023]. The regression models are reported in Table 2.

We also found a significant effect of total net worth on patience, such that wealthier individuals tend to be more patient, β = .136, $t(5014)$ = 10.078 $p < .001$, CI(β) = [.109, .162]. This aligns with previous research demonstrating a link between poverty and impatience (Shah et al., 2012; Haushofer & Fehr, 2014; Falk et al., 2018). However, we found no interaction between income volatility and total net worth, β = .008, $t(5013)$ = .255 p = .726, CI(β) = [-.056, .072]. That is, income volatility is associated with greater impatience across the wealth spectrum—even people who have accumulated significant wealth tend to be more impatient in response to income volatility. Figure 1 plots the relationship between income volatility and subsequent impatience in each wealth decile, from households at the 5th percentile of wealth (net worth of -$6,325) to households at the 95th percentile of wealth (net worth of $722,125).

Table 1. Study 1: descriptive statistics and correlations

Variable	*N*	*M*	*SD*	1	2	3	4
1. Patience (2006)	6,392	.71	.21	--			
2. Income volatility (1980-2006)	7,670	59%	29%	-.06**	--		
3. Total net worth (2004)	7,536	$190k	$400k	.16**	-.05**	--	
4. Risk-seeking for income (2006)	7,292	1.96	1.20	-.04**	.09**	-.03**	--

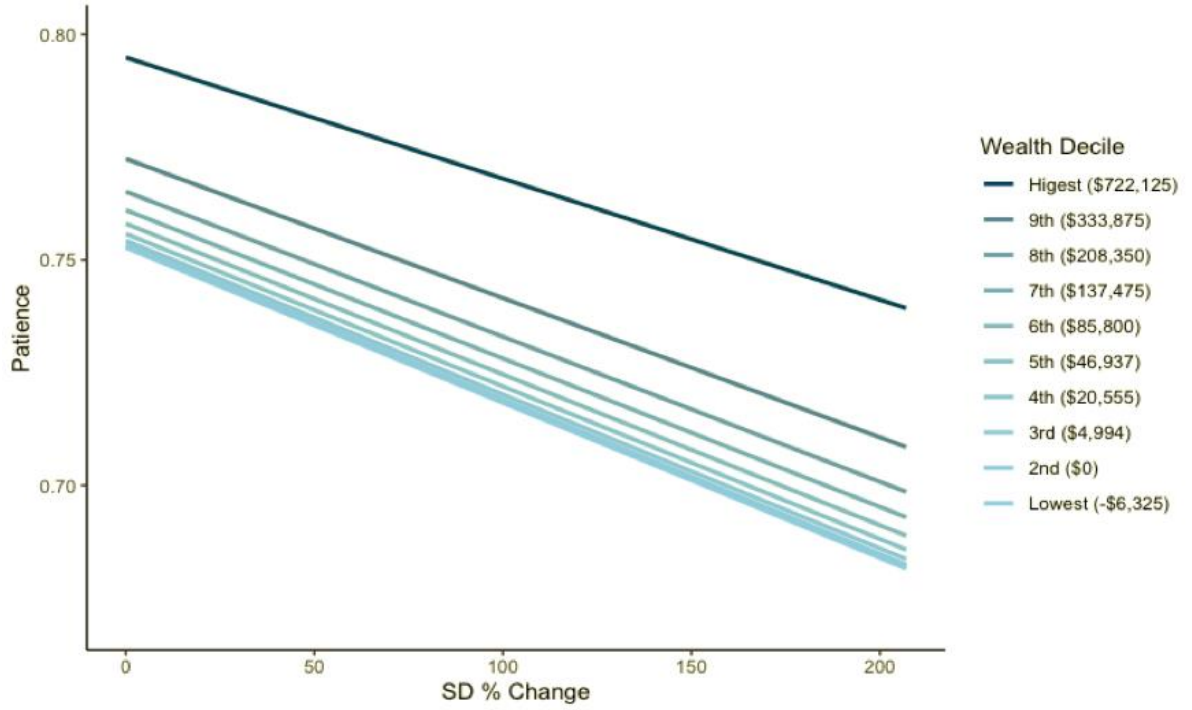
Notes. Reporting means, standard deviations, and correlations. Patience is measured in the 2006 survey and calculated as a monthly discount factor (k=V/A). Income volatility is measured using annual income data from each survey wave between 1980-2006. An overall measure of income volatility is calculated as the standard deviation of percentage change in bi-yearly income between 1980-2006. Total net worth is measured in the 2004 based on a detailed assessment all assets and debts. Risk-seeking for income is calculated based on responses to three questions in the 2006 survey wave.
Valid *N* (listwise) = 4,831. * $p < .05$, ** $p < .01$

Table 2. Study 1: effects of biannual income volatility on patience

DV: monthly discount factors (higher values reflect greater patience)	β	*t*	*p*	95% CI (β) Lower bound	95% CI (β) Upper bound
Model 1:					
Income volatility 1980-2006	-.052	-3.673	< .001	-.080	-.024
Net worth 2004	.136	10.078	< .001	.109	.162
Model 2:					
Income volatility 1980-2006	-.052	-3.546	< .001	-.080	-.023
Net worth 2004	.139	10.114	< .001	.112	.166
Risk-seeking for income 2006	-.028	-1.940	.052	-.057	.000
Model 3:					
Income volatility 1980-2006	-.054	-3.417	.001	-.085	-.023
Net worth 2004	.128	3.974	< .001	.065	.192
SD % change × Net worth	.008	.255	.799	-.056	.072

Note. Three OLS regression models predicting monthly discount factors (calculated based on responses in the 2006 survey wave). Income volatility is measured using annual income data from each survey wave between 1980-2006. An overall measure of income volatility is calculated as the standard deviation of percentage change in bi-yearly income between 1980-2006. Total net worth is measured in the 2004 based on a detailed assessment all assets and debts. Risk-seeking for income is calculated based on responses to three questions in the 2006 survey wave. Reporting standardized regression coefficients, *t*-statistics, *p*-values, 95% confidence intervals. Model 1 (N = 5,016), Model 2 (N = 4,848), Model 3 (N = 5,016).

Figure 1. Study 1: Relationship between income volatility and patience in each wealth decile



Note. Interaction plot for the association between income volatility experienced between 1980-2006 and patience measured in the 2006 survey wave. Plotting simple slopes at the following wealth percentiles (within this sample): 5th, 10th, 15th, 25th, 35th, 45th, 55th, 65th, 75th, 85th, and 95th percentiles. *N* = 5,016.

These findings show that income volatility experienced over a 27-year period can shape current financial impatience, controlling for both risk-seeking and a highly detailed assessment of household assets and debts. The effects hold across the wealth spectrum, indicating that the psychological consequences of income volatility extend to households that are not living paycheck-to-paycheck. Although the results are correlational, the ordering and temporal separation of measurement in this study support our theory for a causal link between experienced income volatility and subsequent impatience. While this design minimizes concerns of a 'same source' bias (Richardson et al., 2009; Burton-Jones, 2009; Podsakoff et al., 2003), it cannot rule out reverse causality. It could be that static preferences for impatience lead respondents to choose income-earning activities that produce more volatile income streams. The ability to

control for risk-seeking income preferences is an important step in addressing such an alternative explanation, but it cannot rule it out definitively.

Overall, this study provides evidence that long-run histories with income volatility are an important factor in predicting current intertemporal financial decision-making. However, shorter-term income fluctuations may be even more impactful. Many recurring expenses are paid on monthly cycles (e.g. credit card debts, phone bills, cable bills, rent, mortgages, car leasing payment, utilities, etc.) and therefore, even small deviations in monthly earnings could have significant consequences. As a result, people may be especially attuned to monthly income fluctuations. Therefore, in Study 2 we examine the effects of income volatility on a month-to-month time scale and explore the moderating role of perceived control over one's financial circumstances.

Study 2

Many workers' incomes may *appear* stable when observed on a yearly basis, but when viewed on a more granular time-scale it becomes apparent that they experience substantial volatility (Morduch & Siwicki, 2018; Morduch & Schneider, 2017). Indeed, within-year income volatility is rising in the United States and households now experience more variability within-year than across-years (Bania & Leete, 2009; Farrell & Greig, 2015; 2016; Hannagan & Morduch, 2016). Most of this monthly volatility is due to fluctuations in within-job earned income, including upswings like bonuses and commissions as well as downswings like cuts to shift work and seasonal cuts (Farrell and Greig 2016; Federal Reserve Survey 2013). Therefore, in this study we examine the effects of month-to-month income volatility on financial impatience, controlling for overall earnings across the study period and risk preferences. We used a sample of fully-employed workers in the United States in order to rule out the possibility

that the consequences of income volatility are driven by changes to employment status. This sample, recruited via Amazon's Mechanical Turk, is slightly lower-income compared to the overall population of the United States, which is beneficial for our purposes[1]. We are particularly interested in the experience of low-income individuals because they are the most exposed to the harms of income volatility.

In addition, we explore perceived control over financial outcomes as a moderator. The effect of income volatility on impatience may depend on how much personal control people feel over their financial circumstances. That is, income volatility may have a greater influence on impatience when fluctuations are caused by factors outside of one's control. This likely involves both *real* and *perceived* control over income fluctuations. For instance, some income fluctuations are mostly controllable (e.g. many workers in the 'gig' economy treat this work as a secondary source of income that can be increased or decreased at their discretion; see Irwin, 2019 and Collins et al., 2019). Other sources of income volatility involve a lesser degree of control, such as earnings from causal labor, shift work, and incentive-pay. Moreover, psychological predispositions and childhood experiences can lead people to feel a greater or lesser degree of control in uncertain environments, irrespective of actual control. For example, growing up in stressful, low-SES environments can lead people to feel less control when faced with economic uncertainty in adulthood, leading to more impatient decision-making (Griskevicius et al., 2013; Mittal & Griskevicius, 2014; Compas et al., 1991; Frankenhuis, Panchanathan, & Nettle 2016).

[1] Recent research has shown that studies examining preferences and behaviors conducted via Amazon's Mechanical Turk (Mturk) tend yield similar results to studies conducted in in-person lab settings (Casler, Bickel, & Hacket, 2013). Furthermore, the sample on Mturk tends to be more representative of the US population relative to student samples and other online platforms (Paolacci & Chandler, 2014; Horton, Rand, & Zeckhauser, 2011)

Data and Measures

We collected monthly income data from a sample of 326 fully-employed workers via Amazon's Mechanical Turk (ages 18-72, M_{age} = 37.046, *SD* = 11.884; 44% women; 43% single, 42% married, 14% living with someone as a couple; 46% have at least one child; median income = $40,000-$49,000 per year). Participants reported their income for each of the past six months using any records they have available (e.g. online banking, pay stubs, etc.), and then their monthly incomes were displayed in a line graph. We tested two different line graph formats to investigate whether the display method influenced participants' perceptions of their own income volatility. The graphical display method did not influence participants' perceptions of income volatility, $F(1, 324) = 1.40$, $p = .238$, and had no effect on financial impatience, $F(1, 285) = .002$, $p = .967$. Therefore, we report the effects of income volatility on financial impatience collapsing across display method (see SM for robustness checks).

After viewing the graph of their monthly incomes, participants completed the same measure of patience as in Study 1, followed by an assessment of risk preferences (Benjamin et al., 2010). Lastly, participants responded to a scale measuring perceived financial control. To capture perceived financial control, we adapted the general locus of control scale developed by Pearlin & Schooler (1978). The general locus of control scale has been validated across a large number of studies (see Cobb-Clark & Schurer, 2013; Cobb-Clark et al., 2016) and it has been adapted to the domain of personal health (Wallston & Wallston, 1981). In this study, we adapted the items so that they were specific to personal finances.[2] Participants rated their agreement with

[2] In early work on locus of control, Rotter (1960; 1966) advocated for domain-specific measures. Locus of control scales have been adapted to be specific to the domain of health (health-related locus of control scale, HLC scale; Wallston & Wallston 1981; multi-dimensional health locus of control scales, MHLC scale; Wallston, Wallston, & DeVellis, 1978). These scales measure the extent to which people feel that their health outcomes are under their personal control versus determined by factors outside their control. Health locus of control has been shown to predict a range of health-related behaviors including smoking, alcohol consumption, exercise, diet, and adherence to

the following 6 items on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale: "I have little control over my financial circumstances," "There is really no way I can solve some of the financial problems that I have," "There is little I can do to change my financial circumstances," "I often feel helpless in dealing with problems related to money," "Sometimes I feel that I am pushed around in life by my financial circumstances," and "My financial future mostly depends on me" ($\alpha = .81$). All but the last item on this scale are reverse-coded so that higher scores indicate more perceived control over one's financial situation ($M = 3.306$, $SD = .931$).

As in the previous study, we measured experienced income volatility as the standard deviation of percentage change in income. We calculated the standard deviation of percentage change on a month-to-month time-scale across the 6-month period captured in this study. We also calculated monthly discount factors using the same method as in Study 1 (k=V/A), dropping respondents who indicated perfect patience ($n = 36$) and observations lower than 3 standard deviations below the mean ($n = 2$). We calculated an ordinal measure of risk-seeing (0-10 scale) using the elicitation procedure in Benjamin et al. (2010), and for financial control we calculated the average score (1-5 scale) across the 6 items that were adapted from Pearlin & Schooler (1978) for this study. See SM for further details on these measures and for robustness checks using no exclusion criteria for the measure of impatience.

Study 2: Results and Discussion

Table 3 reports the means, standard deviations and intercorrelations between variables. The raw correlation shows income volatility is negatively correlated with patience ($r = -.15$, $p < .01$). We note the associate between monthly income volatility and patience is stronger than the

medical regimens (Waller & Bates, 1992; Weiss & Larson, 1990; Norman et al., 1998; Grotz et al., 2011; O'Hea et al., 2005). To our knowledge, no previous research has used a locus of control scale adapted to be specific to personal finance.

association observed in the previous study using biannual income volatility. When we controlled for total 6-month earnings and risk preferences, we found a significant negative association between monthly income volatility and patience, β = -.189, t(282) = -3.538 p < .001, CI(β) = [-.295, -.084] (Table 4). Furthermore, as in Study 1, we found no significant interaction between income volatility and total 6-month earnings with respect to effects on patience, β = -.035, t(285) = -.561 p = .575, CI(β) = [-.158, .088]. We did not analyze the effects at each income level, as in Study 1, due to the smaller sample and narrower range of income levels within this sample.

In order to investigate the role of perceived control over financial circumstances, we first tested the interaction between monthly income volatility and perceived financial control with respect to effects on patience. We observed a significant interaction, β = -.515, t(281) = -2.974 p = .003, CI(β) = [-.856, -.174]. To further probe the role of perceived financial control, we conducted a bootstrapped moderation analysis. The results indicate that income volatility had a greater effect on patience when people felt like they had little control over their financial circumstances. Adjusting for total 6-month earnings, income volatility was a significant negative predictor of patience when perceived financial control was low (conditional effect, β = -.314, p < .001, 95% CI(β) = [-.457, -.169]) and at the mean (conditional effect, β = -.157 p = .005, 95% CI(β) = [-.267, -.047]), but there was no association when perceived financial control was high (conditional effect, β = .001, p = .993, 95% CI(β) = [-.159, .157]. See Figure 2 for a simple slopes plot of the association between income volatility and patience at these three levels of financial control.

We also conducted a Johnson-Neyman floodlight analysis to estimate the effects of income volatility on patience across the entire range of perceive financial control. We found that, at a 95% confidence level, income volatility was associated with significantly greater impatience

when perceived financial control was less than 3.59 on a 1-5 scale, which included 56% of our sample (see SM).

Table 3. Study 2: descriptive statistics and correlations

Variable	*N*	*M*	*SD*	1	2	3	4	5
1. Patience	290	.72	.23	--				
2. Income volatility (Nov – May)	325	27%	31%	-.15*	--			
3. Total 6-month earnings	325	$20k	$40k	-.34**	-.11	--		
4. Risk preferences (0-10)	323	4.19	3.24	.00	.04	.17**	--	
5. Financial control (1-5)	326	3.31	.93	.17**	.05	-.02	.05	--

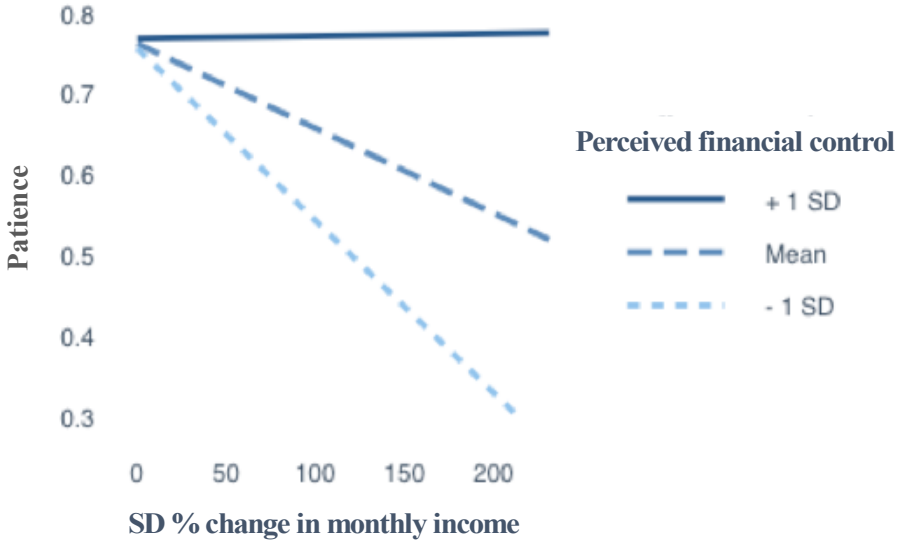
Note. Reporting means, standard deviations, and correlations. Patience is measured in June as a monthly discount factor (k=V/A). Income volatility is measured using monthly income data for each month between from November 2017 through May 2018. An overall measure of income volatility is calculated as the standard deviation of percentage change in month-to-month income from November 2017 through May 2018. Total 6-month earnings is the sum of monthly incomes over this period. Risk preferences is measured as an ordinal scale (0-10) with higher values reflecting greater risk-seeking. Financial control is measured using the 6-item scale adapted from Pearlin & Schooler (1978). Valid *N* (listwise), $N = 283$. * $p < .05$, ** $p < .01$

Table 4. Study 2: effects of monthly income volatility on patience

DV: monthly discount factors	β	*t*	*p*	95% CI (β) Lower bound	95% CI (β) Upper bound
Model 1:					
Income volatility (Nov – May)	-.178	-3.277	.001	-.285	-.071
Total 6-month earnings	-.353	-6.537	< .001	-.459	-.246
Model 2:					
Income volatility (Nov – May)	-.189	-3.538	< .001	-.295	-.084
Total 6-month earnings	-.362	-6.737	< .001	-.468	-.256
Risk preferences	.067	1.180	.239	-.045	.179
Model 3:					
Income volatility (Nov – May)	-.164	-2.734	.007	-.2282	-.046
Total 6-month earnings	-.336	-5.482	< .001	-.457	-.215
Income volatility × earnings	-.035	-.561	.575	-.158	.088

Note. Three OLS regression models predicting monthly discount factors. Reporting standardized regression coefficients, *t*-statistics, *p*-values, 95% confidence intervals. Patience is measured in June as a monthly discount factor (k=V/A). Income volatility is measured using monthly income data for each month from November 2017 through May 2018. An overall measure of income volatility is calculated as the standard deviation of percentage change in month-to-month income from November 2017 through May 2018. Total 6-month earnings is the sum of monthly incomes over this period. Risk preferences is measured as an ordinal scale (0-10) with higher values reflecting greater risk-seeking. Model 1 ($N = 289$), Model 2 ($N = 286$), Model 3 ($N = 289$).

Figure 2. Study 2: relationship between income volatility and patience at three levels of perceived financial control



Note. Simple slopes plot for the association between income volatility and discount factors at three levels of perceived financial control (-1 *SD* = 2.38, *Mean* = 3.31, and +1 *SD* = 4.24).

This study shows that monthly income volatility predicts subsequent impatience. Comparing these results with the previous study, we observe that monthly income volatility is a much stronger predictor of impatience than biannual income volatility. This may be because month-to-month income fluctuations are more difficult to manage from a practical budgeting standpoint and therefore deviations from the mean are more psychologically impactful. Cross-sectionally, overall income does not appear to buffer against the effects of income volatility. Rather, these findings indicate that people are affected by income volatility to the extent that they feel in control of their financial circumstances. For those who report a high degree of control over their financial lives, income volatility is unrelated to financial impatience. These findings align with past research showing that a sense of personal control is critical in self-regulation, cognitive control, and goal achievement (Bandura & Wood, 1989; Karniol & Ross, 1996; Schmid et al., 2015).

In Study 3, we sought to conceptually replicate the effects of monthly income volatility and perceived financial control on impatience. In order to conduct a rigorous test of our theory, we preregistered our predictions (see OSF), we collected a representative sample of American adults, stratified on income level (N = 841), and we used an incentive compatible measure of impatience.

Study 3

Data and Measures

We collected a full-year of monthly income data from a sample of 930 participants in the United States recruited via Qualtrics Panels (M_{age} = 43.82, SD = 15.85; 56% women; median annual income = $50,000; 60% employed full-time). We used stratified sampling on annual income to recruit participants from across the income distribution and we over-sampled low-income individuals (<$40,000 in annual income in 2019) such that this group comprised at least one third of the overall sample. This sampling approach ensured that we could conduct a highly-powered moderation analysis to examine the effects of income volatility on impatience across the economic distribution.

This study was conducted in December 2020. Participants reported their income for each of the past 11 months (January 2020 through November 2020) using any records they had available (e.g. online banking, pay stubs, etc.). As in the previous study, we measured income volatility as the standard deviation of percentage change in income from month-to-month. As our measure of impatience, we offered participants the chance to receive a real $1,000 cash prize via a check in the mail. They could choose to receive the full sum immediately by allocating the money to a ‘spending’ account (to be sent in a check in 2 days) or set aside a portion of this money in a study-specific ‘savings’ account. Participants were informed that any money

allocated towards savings would be sent by mail in a separate check in 6 months, plus 10% interest. We explained that one person from this study would be randomly selected to receive this money for real: *"If you are selected, you will be asked to provide your mailing address so that we can send you two checks in the mail. The 1st check will be for the amount you allocate to spending, and it will be mailed within 2 days. The 2nd check will be for the amount you allocate to savings (plus 10% interest), and it will be mailed in 6 months."* We also provided three examples to ensure that participants understood the choice they were making: *"If you allocate all of the money to spending, you will receive $1000 in 2 days and nothing in 6 months; If you allocate half of the money to spending and half to savings, you will receive $500 in 2 days and also $550 in 6 months; If you allocate all of the money to savings, you will receive nothing in 2 days and $1100 in 6 months)."* The interest rate of 10% was chosen based on the results of a pilot experiment with participants recruited from the same population (see SM for pilot experiment results and screenshots of the allocation task).

In our preregistration, we defined our measure of impatience as the amount of money participants allocated to savings (money received in a check sent in 6 months, plus 10% interest) versus spending (money received in a check sent in 2 days). This allocation decision between a sooner-smaller and larger-later cash prize captures a similar measure of intertemporal preferences as in the matching elicitation method used in the previous two studies.

Lastly, we administered the 6-item measure of perceived financial control as in the previous study ($\alpha = .83$) and collected basic information on demographics, employment, and financial literacy.

Preregistered Analysis Plan

We preregistered two predictions for this study. First, we predicted that income volatility would be significantly negatively associated with the amount of money participants chose to save in the financial allocation task, controlling for total 11-month earnings. In our analysis plan, we preregistered that we would regress the amount saved (portion of the $1000 cash prize) onto the variable for income volatility (standard deviation of percentage change in month-to-month income over the 11-month study period), controlling for total 11-month earnings. A significant negative coefficient on income volatility would indicate support for our first prediction.

Second, aligning with the results of Study 2, we predicted that the relationship between income volatility and impatience would be moderated by perceived financial control such that the effect of income volatility would be stronger when people feel little control over income fluctuations. We preregistered that we would test the interaction term between income volatility and perceived financial control. A significant negative coefficient would indicate support for our second prediction.

Results and discussion

Table 5 reports the means, standard deviations, and intercorrelations between variables. Table 6 reports the full regression results. The results indicate support for our first prediction that greater monthly income volatility would predict a lower allocation to savings in the intertemporal decision task, controlling for overall earnings, β = -.083, $t(839)$ = -2.737 p = .018, CI(β) = [-.151, -.014]. Similar to the results of Study 1, the effects of income volatility on savings allocation persist across the income distribution. We find no interaction effect between income volatility and total 11-month earnings, β = .029, $t(838)$ = .703 p = .482, CI(β) = [-.052, .111]. Figure 3 plots the relationship between income volatility and saving allocation in each

income decile, from households at the 5th percentile of income (11-month earnings of $701) to households at the 95th percentile of income (11-month earnings of $160,000). However, we do not find support for our second prediction for an interaction effect between income volatility and perceived financial control.

Table 5. Study 3: descriptive statistics and correlations

Variable	*N*	*M*	*SD*	1	2	3	4	5
1. Amount allocated to saving	930	$636	$298	--				
2. Income volatility (Jan – Nov)	841	25%	37%	-.09**	--			
3. Total 11-month earnings	882	$53k	$104k	.05	-.12**	--		
4. Risk preferences (0-10)	795	3.41	2.57	.05	.04	-.03	--	
5. Financial control (1-5)	930	2.32	.88	-.19**	.15**	-.17**	.03	--

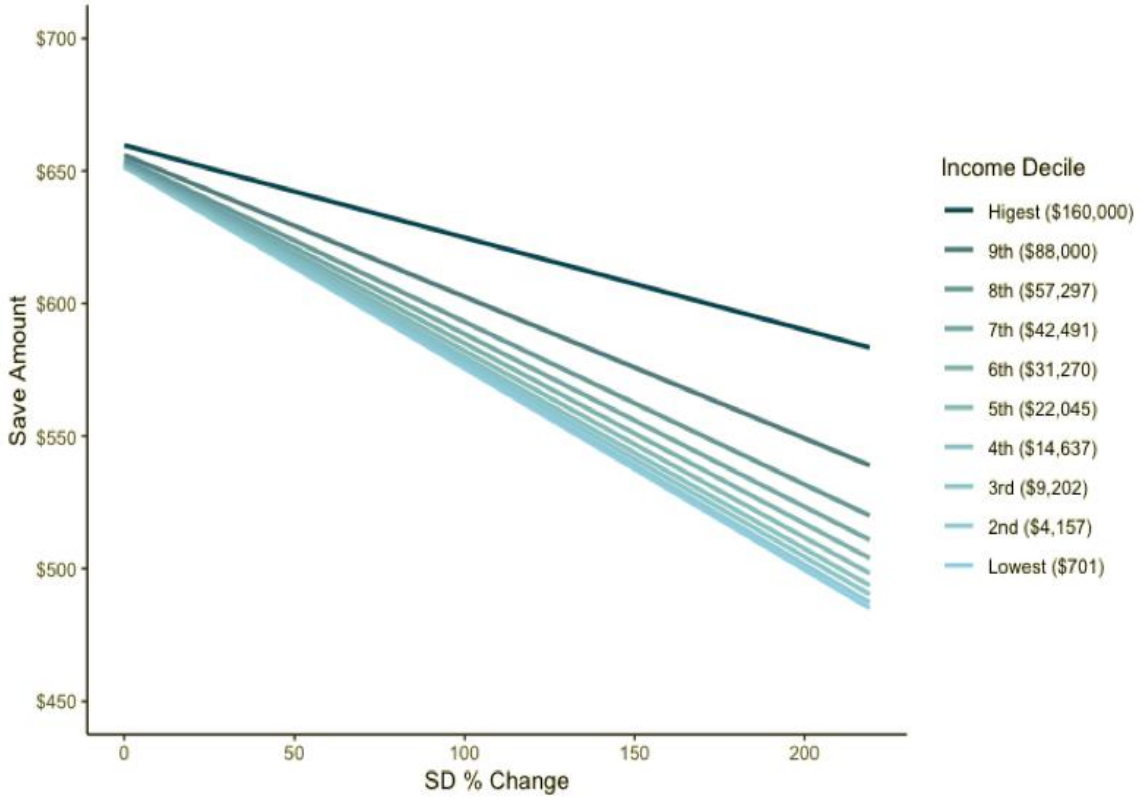
Note. Reporting means, standard deviations, and correlations. Amount allocated to savings was measured on December 3-8. Monthly income volatility is measured as the standard deviation of percentage change in month-to-month income from January to November. Total 11-month earnings is the sum of monthly incomes over this period. Risk preferences is measured as an ordinal scale (0-10) with higher values reflecting greater risk-seeking. Financial control is measured using the 6-item scale adapted from Pearlin & Schooler (1978). Valid *N* (listwise), *N* = 795. * $p < .05$, ** $p < .01$

Table 6. Study 3: effects of monthly income volatility on savings allocation

DV: amount allocated to savings	β	*t*	*p*	95% CI (β) Lower bound	95% CI (β) Upper bound
Model 1:					
Income volatility (Jan – Nov)	-.083	-2.373	.018	-.151	-.014
Total 11-month earnings	.031	.906	.365	-.036	.098
Model 2:					
Income volatility (Jan – Nov)	-.100	-2.580	.010	-.176	-.024
Total 11-month earnings	.044	.960	.337	-.046	.135
Risk preferences	.067	1.428	.154	-.025	.159
Model 3:					
Income volatility (Jan – Nov)	-.095	-2.442	.015	-.171	-.019
Total 11-month earnings	.018	.459	.646	-.059	.096
Income volatility × earnings	.029	.703	.482	-.053	.111

Note. Three OLS regression models predicting amount allocate to saving. Reporting standardized regression coefficients, *t*-statistics, *p*-values, 95% confidence intervals. Monthly income volatility is measured as the standard deviation of percentage change in month-to-month income from January to November. Total 11-month earnings is the sum of monthly incomes over this period. Risk preferences is measured as an ordinal scale (0-10) with higher values reflecting greater risk-seeking. Model 1 (*N* = 841), Model 2 (*N* = 726), and Model 3 (*N* = 841).

Figure 3. Study 3: Relationship between income volatility and patience in each income decile



Note. Interaction plot for the association between month-to-month income volatility and savings allocation at each income decile). Plotting simple slopes at the following 11-month income percentiles (within this sample): 5th, 10th, 15th, 25th, 35th, 45th, 55th, 65th, 75th, 85th, and 95th percentiles. N = 841.

This study conceptually replicates the central result showing that income volatility is an important predictor of impatience, controlling for overall earnings. This association holds across the income spectrum, demonstrating that both rich and poor households' intertemporal decisions can be affected by the experience of recent income volatility. However, we did not find support for our second prediction regarding the role of perceived financial control. Further research is needed to understand how controllable and uncontrollable income fluctuations affect financial decision-making.

General Discussion

This research examines the consequences of income volatility for financial decision-making. In Study 1, we use individual-level longitudinal income data collected over a period of

27 years, spanning from late adolescence through middle age. Experiencing greater income volatility over this period predicts increased subsequent financial impatience, controlling for total net worth and a measure of risk-seeking for income. A limitation of this study is that the National Longitudinal Study of Youth only included the measure of impatience in the 2006 survey wave, and therefore we are unable to observe within-person changes in impatience over time.

In Study 2, we zoom-in to examine the relationship between month-to-month income volatility and impatience. Monthly income volatility, which has also been increasingly precipitously in the United States (Bania & Leete, 2009), may be especially psychologically impactful due to the ways in which people budget. For instance, a recent nationally-representative survey examining household budgeting practices found that over 85% of respondents adjust their budget on a weekly or monthly time horizon (Zhang, Sussman, Way-Ly, & Lyu, 2020). Consistent with this notion, we find a stronger association between income volatility and impatience when analyzed on this more granular time scale. Furthermore, we find that intertemporal decisions are only shaped by income volatility when people feel like their financial circumstances are largely outside of their control.

In Study 3, we conducted a preregistered, highly-powered conceptual replication of the previous study. We tested the relationship between monthly income volatility on impatience using a representative sample of Americans and an incentive compatible measure of impatience. We found that monthly income volatility predicted impatient intertemporal decision-making for individuals from across the economic distribution. However, we did not replicate the findings with respect to perceived financial control.

Taken together, these studies highlight an important psychological consequence of income volatility. The increase in impatience caused by income volatility undermines the

compensatory response likely needed to effectively manage a volatile income over time. While these consequences are no doubt experienced most severely by poor households, our findings show that income volatility is related to increased impatience regardless of income level, which suggests that many of the harmful consequences associated with poverty may extend to households who are not poor but face increasingly volatile income streams. Therefore, these results have important practical implications for the study of labor markets, compensation structures in organizations, and the design of economic aid programs.

Practical Implications

This research provides potentially useful insights for policymakers and companies. Indeed, a direct implication of this research for policymakers and employers is that they should focus both on reducing the amount of income volatility workers experience as well as increasing workers' control over income fluctuations.

Implications for policymakers. Many policy programs designed to support low-income households inadvertently increase income volatility. For instance, many income assistance programs—unemployment benefits, Supplemental Security Income, Temporary Assistance for Needy Families, and food stamps—are frequently interrupted because recipients are required to re-certify their eligibility. For instance, food stamps recipients are typically required to re-apply every 6 or 12 months (Center on Budget and Policy Priorities, 2018). While verifying eligibility (e.g. income-testing) is important for ensuring that the program reaches the target recipients, lengthy renewal processes often exacerbate income volatility as people wait for payments to resume. In addition, benefit amounts often change from one eligibility period to the next based on reported income level. These programs focus on *absolute* levels of poverty and, in doing so, often neglect 'episodic poverty'—periodic dips in monthly income that cause people to

temporarily fall below the poverty line (Morduch & Siwicki, 2017). Individuals may lose benefits if they experience income spikes in the months leading up to re-certification and find themselves facing an income dip without the safety net of benefits in the subsequent months. Our results suggest that income assistance programs should be designed to account for episodic poverty by lengthening eligibility periods and providing greater predictability to recipients. In addition, these programs should consider the fact that people with volatile incomes may be especially impatient. As a result, they may drop out of lengthy benefit application and renewal processes, and they may spend benefits more impulsively if they feel like they could lose these benefits in the next re-certification process.

In the United States, some recent state and municipal legislation has been introduced to address irregular working hours, which has the effect of reducing income volatility. Irregular working hours is the largest cause of income volatility, especially for low-income workers in the food services and retail industries (Federal Reserve, 2018). Together, these industries account for 28 million US jobs—19% of the total US workforce (Bureau of Labor Statistics, 2019). Aside from managerial roles, most people are paid hourly and they typically receive just 3-7 days' notice on their working schedule for the following week (Williams et al., 2018). Schedule volatility has been shown to harm employee wellbeing and increase financial strain (Henly & Lambert, 2014). To address these concerns, 'fair workweek' legislation was passed in Oregon in 2017, followed by municipal ordinances in Seattle, San Francisco, Philadelphia, Chicago, and New York City (Wolfe, Jones, & Cooper 2018). This legislation requires food service and retail companies employing >700 people to post schedules at least 2 weeks in advance and compensate workers for any last-minute changes. On a federal level, fair workweek legislation has been introduced, but not passed. The Schedules That Work Act (S.1772, 2015) would require

companies in the food service, cleaning, hospitality, warehouse, and retail industries to provide at least 2 weeks' notice on schedules for all employees. A recent study found that fair workweek legislation can improve family wellbeing (Gassman-Pines & Ananat, 2018). Our findings suggest that more advance notice and predictability in work schedules—and therefore earnings—may also bolster feelings of financial control and help workers make more patient financial decisions.

***Implications for employers and financial institutions*.** Companies can also benefit from stabilizing workers' schedules. In the food service and retail industries, irregular working hours are typically a result of companies seeking to match labor to predicted customer traffic in order to increase profitability (Perdikaki et al., 2012). However, the evidence indicates that irregular scheduling does not increase profits, and it may have downstream consequences on workers' wellbeing, productivity, and retention (Williams et al., 2018; Schneider & Harknett, 2019; Choper, Schneider, & Harknett, 2019). An experiment with Gap stores in San Francisco and Chicago found that stabilizing sales associates' working hours led to an increase in workers' productivity as well as store-level sales (7% increase in sales in the treatment stores relative to control stores during the 10-month intervention period; Williams et al., 2018).

Companies should also consider restructuring their employees' compensation packages so that incentive-pay represents a smaller proportion of overall compensation or disburse incentive-pay more evenly throughout the year. Furthermore, companies should ensure that workers feel a high degree of control over their incentive-pay outcomes. Incentive-pay tends to increase workers' psychological focus on the incentives themselves (Hur & Nordgren, 2016), and can often be effective in increasing workers' productivity (Weibel, Rost, & Osterloh, 2007). However, there may be deleterious downstream effects on financial wellbeing. Our results

suggest that, holding total compensation constant and to the extent that incentive-pay schemes feel uncontrollable, workers with a higher proportion of incentive-pay may be more financially impatient.

Companies can also reduce workers' income volatility through income-smoothing initiatives such as subsidized employee loans and early access to paychecks. For instance, Walmart allows their 1.4 million workers to access a portion of their pay between bi-weekly paychecks for hours they have already worked (Corkery, 2017). Walmart's intention was to help their hourly employees—who earn an average of $14.26/hour—avoid payday loans. Our findings indicate that this initiative could increase their employees' financial patience and help them stick to longer-term financial plans. Additionally, employers could help their employees manage income volatility via short-term savings programs. Many employers already offer matched-contribution 401(k) savings programs for retirement. Short-term savings programs with similar employer-matched contributions may be even more beneficial for overall financial wellbeing.

Given rising income volatility, there is a growing need for new financial products and innovations that can help workers from across the socioeconomic spectrum smooth their income and feel a greater sense of control over their financial life. Financial literacy initiatives are largely ineffective (Fernandes, Lynch, & Netemeyer, 2014) and short-term credit products ('short-term, small-dollar credit' such as payday loans, auto loans, and bank overdraft protection) tend to worsen long-term financial stability (CFPB, 2014). Banks and fintech companies need to develop new financial products tailored to the primary source of income volatility: within-job earnings fluctuations. Existing products tend to focus exclusively on bridging temporary shortfalls, rather than helping consumers smooth their income.

People who experience income volatility should have a strong incentive to be patient, resisting impulse spending and increasing precautionary savings to protect against future income shocks. Our research shows that, despite these incentives, the psychological experience of income volatility—especially when it is outside of one's control—can lead people to be more impatient. Policymakers and companies need to consider not only the absolute level of financial constraints facing workers, but the practical and psychological consequences of income volatility.

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