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Consumption smoothing after an unanticipated negative shock in income: Evidence from the CERB program in Quebec
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Résumé

Les mesures prises par les gouvernements du monde entier en réponse à la pandémie de COVID-19 ont entraîné le chômage pour certaines personnes et une réduction des revenus pour d'autres. La prestation d'intervention d'urgence canadienne (PCU) a été créée pour apporter un soulagement économique aux individus touchés. Elle consistait en un transfert monétaire fixe de 2 000$ par mois. Dans cette étude, nous examinons les comportements de consommation en réaction au choc imprévu aux revenus, provoqué par la pandémie. À cette fin, nous analysons les données d'une enquête dans laquelle un sous-ensemble de répondants a demandé à bénéficier du programme de la PCU. Nous constatons qu'en moyenne, une réduction de 10% du taux de remplacement du revenu entraîne une baisse de 1,4% des dépenses des ménages. Toutefois, ce faible effet masque l'hétérogénéité d'un sous-groupe de personnes à court de liquidités, celles dont les revenus étaient inférieurs à 2 500 dollars avant la pandémie. Nos estimations suggèrent que le montant de la PCU était si généreux qu'il a non seulement permis à ce groupe de lisser sa consommation, mais qu'il aurait également pu être utilisé à d'autres fins, comme le remboursement de dettes et l'augmentation de l'épargne. Le groupe d'individus qui a le plus probablement trouvé la PCU utile pour lisser la consommation semble être celui qui gagnait plus de 2 500$ avant la pandémie. En outre, nous constatons que les décisions de consommation des personnes n'ont pas été affectées par leurs attentes en matière de revenus futurs du travail, de situation professionnelle ou de perspectives du marché. Nous constatons également une hétérogénéité dans nos résultats concernant le remboursement des dettes; ils suggèrent qu'une diminution du revenu remplacé entraîne une augmentation de la probabilité de manquer ou de reporter les paiements de carte de crédit pour les personnes sans patrimoine non-immobilier.

Mots clés : CERB, consommation, contraintes de liquidité, COVID-19, assurance chômage, anticipations futures, finances des ménages

Méthodes de recherche : MCO

Abstract

Measures taken by governments worldwide in response to the COVID-19 pandemic brought unemployment for some people and a reduction in earnings for others. The Canadian Emergency Response Benefit (CERB) was created to provide economic relief. It consisted of a fixed cash transfer of $2,000 per month. In this study, we investigate the consumption behavior in reaction to the unanticipated shock in income brought by the pandemic. To this end, we analyze survey data in which a sub-set of respondents applied for the CERB program. We find that, on average, a 10% reduction in the income replacement rate leads to a 1.4% fall in household spending. However, this small effect masks heterogeneity for a subgroup of liquidity-constrained individuals, those who had earnings below $2,500 before the pandemic. Our estimates suggest that the amount of CERB was so generous that it has not only allowed this group to smooth consumption, but it might also have been used for other ends such as debt repayment and increased saving. The group of individuals who most probably found CERB useful to smooth consumption seems to be those who earned more than $2,500. Moreover, we find that people's consumption decisions were not affected by their expectations of future labor income, job situation, or market outlook. We also found heterogeneity in our results for debt repayments; they suggest that a decrease in the replaced income leads to an increase in the probability of missing or deferring credit card repayments for individuals with no non-housing wealth.

Keywords: CERB, consumption smoothing, liquidity constraints, COVID-19, unemployment insurance, future expectations, household finance

Research methods: OLS

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Preface

This thesis presents my work on consumption smoothing after an unanticipated income shock due to the COVID-19 pandemic. Unemployed people and those whose income decreased considerably were the targets of the Canadian Emergency Response Benefit (CERB) program, which consisted of cash transfers. This study aims to determine if the CERB helped receivers to smooth consumption. In addition to estimating mean results, heterogeneity is investigated for liquidity-constrained individuals. The data used in this study comes from the Survey: “Covid-19: The State of Personal Finances in Quebec”, previously approved by the Research Ethics Committee (CER).

This study should be of interest to policymakers, especially those involved in unemployment insurance decisions. It should also be of interest to consumption theory researchers.

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1. Introduction

When the COVID-19 virus hit Canada in 2020, the government put in place measures aiming to contain the spread of the virus. Because these measures caused many people to lose their jobs unexpectedly, the Canadian government launched the Canadian Emergency Response Benefit (CERB). The program consisted of cash transfers for people whose income was reduced for reasons related to the pandemic. This study concentrates on the people that received CERB. For them, their usual monthly labor income[1] was replaced mainly by the cash transfer, with some interesting variation in the replacement rate. We investigate their consumption behavior in reaction to this unanticipated shock in income.

A well-known and perhaps the most important benefit of cash transfers for unemployed people is consumption smoothing, which is the focus of this thesis. To determine the smoothing benefit, this study examines changes in household expenditures after an income shock related to the pandemic and how those changes vary with the level of income replacement provided by CERB. We construct a benefit variable, which represents the replaced income from one period to another, and we show that changes in the replaced income lead to small changes in consumption.

Additionally, this research explores how these responses might vary for different subgroups in our sample. We investigate liquidity-constrained households using different liquidity constrained proxies found in the literature. For the group of people with the lowest labor income, we find heterogeneous effects suggesting that they were not the ones who had the most considerable consumption benefits from CERB. Results suggest that the group of individuals who most probably found CERB useful to smooth consumption seems to be those who earned more than $2,500. Also, we explore whether future expectations about the pandemic and economic recovery had a role in the consumption response documented. Moreover, we investigate whether there is a relationship between debt repayments and CERB.

In the literature, research on consumption behavior after a job loss falls in the category of unanticipated income change (Jappelli et Pistaferri, 2010). However, these types of studies have

[1] Labor income and earnings are used interchangeably

two main problems. The first corresponds to an anticipation component. Sometimes workers know in advance that they will be fired; thus, the change in consumption might happen at a different time than the ones that did not see it coming. The second problem is selection bias: the employer might tend to fire the worst employees first.

This study is interesting because the COVID-19 pandemic was hard to anticipate by workers, and workers of all types were laid off in response to governmental measures aiming to contain the spread of the virus. Given the plausibly exogenous nature of COVID-19, it can be argued that people lost their job in a quasi-random fashion if they were laid off because of the pandemic. Hence, households in which at least one member lost his job under that scenario have been exposed to a negative transitory shock, leading to a credibly unanticipated income change. Additionally, since many businesses were forced to close operations or drastically reduce staff with very short notice, some employees were laid off regardless of being good or bad workers. Thus, it can also be argued that selection bias might be less severe in our study.

In relation to the literature on the benefits of cash transfers after a job loss, this study is most similar to that of Browning and Crossley (2001). One of the main differences is the source of variation in benefits. Browning and Crossley (2001) use legislative changes to the Canadian UI system to obtain their replacement ratios. However, since the CERB cash transfer was the same amount for all applicants, there is a lot of heterogeneity in the CERB replacement ratio. Therefore, the data used in this study provides a greater range of replacement ratios. Another difference is that the data used by Browning and Crossley (2001) corresponds to people who lost their jobs, whereas the data for this study examines people that lost their job and people who did not lose their jobs but instead had their income reduced because of the pandemic[2]. According to Browning and Crossley (2001), household expenditures change because unemployment confounds three things – the cost of working, a response to the permanent income shock of job loss, and a response to transitory income. The data used for this study will provide rich controls for the cost of working, which is usually not taken into account in this type of study. Permanent effects will be controlled by a set of variables available. Moreover, our constructed benefit variable will capture the response to transitory income.

[2] CERB has certain limits for applicants' earnings.

The data used in this study comes from 2 sources. The first consists of the Survey "Covid-19: The State of Personal Finances in Quebec", which was fielded in May 2020 by Delvinia's AskingCanadians web panel on behalf of the Retirement and Savings Institute (RSI), of the Research Chair on Intergenerational Economics (CREEi) and of the Center for Interuniversity Research on Organizations (CIRANO). The second source is the 2016 Census; it was used to build weights, which allowed us to correct for under and oversampling certain groups in the Survey.

The remainder of this study is organized as follows. In the second part, we describe the CERB program. Part three gives information about the Survey we used to retrieve our data. In part four, we present the conceptual framework relevant to this study. In part five, we explain the process followed to obtain our sample. Part six contains our results; it is divided into four sub-sections. The first estimates mean results, the second investigates heterogeneity, the third explores future expectations, and the fourth explores debt repayments. We conclude in part seven.

2. The Canada Emergency Response Benefit (CERB)

This part presents relevant information related to the CERB program. On March 13th, 2020, a health emergency was declared throughout Quebec territory. By March 24th, the Quebec government ordered the closure of non-essential businesses for three weeks. The measures aiming to prevent the virus spread had a noticeable result – unemployment. In March 2020, the unemployment rate in Quebec was 8.2%, and in April 2020, it rose to 17.6%[3].

On April 1st, 2020, the Canadian government announced the creation of the Canada Emergency Response Benefit (CERB) as part of its COVID-19 Economic Response Plan. The CERB consists of a taxable cash transfer of $2,000 for a four-week period per person, equivalent to $500 per week. This program was initially intended to last sixteen weeks (four months). However, as the pandemic

[3] Taken from: https://statistique.quebec.ca/en/communique/employment-unemployment-rate-stable-march-2021

progressed, the benefit was extended, and applicants were able to receive the transfer for a maximum of 28 weeks[4].

On April 6th, the applications for CERB began to be accepted, and all eligible workers were encouraged to apply through a simplified online application process. This application process was designed not to have a waiting period, allowing workers to receive the cash transfer within a maximum of ten days after filling the application. For people eligible to receive the transfer in a bank account, the direct deposit was completed within three business days, and for those who received cheques, they were issued within ten days[5]. No eligibility verification was done before sending the CERB cash transfer. All verifications have been done ex-post, and applicants not eligible have been asked to repay the amounts they were not entitled to receive.

The CERB was paid every four weeks subject to filling a new application each month and was available from March 15 until October 3, 2020. Additionally, payments were retroactive to the date the applicant became eligible.

This program targeted people that lost their job or had their income reduced for reasons related to the COVID-19 pandemic, such as being sick, in quarantine, or having to stay at home to take care of someone infected with the virus. CERB was also available for parents with unpaid leave who had to stay home to take care of children because of school and daycare closures. More generally, applicants had to meet the following requirements to be eligible to receive the CERB [6]:

- Be at least 15 years old
- Reside in Canada
- Had employment or self-employment income of at least $5,000 in 2019 or the 12 months before the date of the application
- Did not quit their job voluntarily

[4] Taken from: https://www.canada.ca/en/services/benefits/ei/cerb-application/questions.html
[5] Taken from: https://www.canada.ca/en/employment-social-development/news/2020/04/canada-emergency-response-benefit-to-launch-on-april-6.html
[6] Taken from: https://www.canada.ca/en/services/benefits/ei/cerb-application.html

- Had stopped working because of reasons related to COVID-19, or were eligible for Employment Insurance regular or sickness benefits, or have exhausted their Employment Insurance regular benefits or Employment Insurance fishing benefits between December 29, 2019, and October 3, 2020

Additionally, when submitting the first claim, the applicant could not have earned more than $1,000 in employment or self-employment income for fourteen or more consecutive days within the four-week benefit period of the claim. Nevertheless, for subsequent claims, the income restriction of $1,000 was for the entire four-week benefit period of the new claim.

3. The Survey

This part provides information on the Survey that we have used to retrieve information to create the variables for this study. The Retirement and Savings Institute created a survey specifically designed to gather information on how COVID-19 affected household finances. The survey was conducted between 8 and 20 May 2020 through an online panel survey organization called AskingCanadians, and it had 3,009 respondents in the province of Quebec. Respondents had the option to answer the survey in English or French.

Besides some background questions, the survey asked about income, assets, debts, spending, and employment situation for three different periods. Respondents answered questions for 2019, which we consider the benchmark; April 2020, which captures the impact of the pandemic; and the remainder of 2020, to gather information on expectations. After completing the survey, respondents were entitled to receive a loyalty reward from a list of major retailers, such as Walmart, Petro-Canada, Hudson's Bay, etc.

The data from this survey has been processed in previous work by Achou *et al.* (2020). They performed multiple imputation for questions where a significant proportion of missing information was obtained, such as those regarding income. Values were assigned conditional on basic socio-demographic variables – age and gender. Additionally, the data contained survey weights built based on age, gender, and education using the 2016 Census. We use these weights to produce

summary statistics since they allow us to correct for under and oversampling certain groups. They will not be used in the regressions since age, gender, and education controls will be introduced.

4. Conceptual Framework

The literature about the consumption response to income changes is vast. This part is divided into four sections. In the first section, we review the theories of consumption relevant to this research work. In the second section, we revise studies that focus their attention on UI benefits. In the third section, we revise literature related to liquidity constraints. In the fourth section, we explore the recent literature on the effects of the pandemic on consumption. Finally, in the fifth section, we introduce the theoretical model and the empirical strategy.

4.1 Consumption Theories

In this section, we present the most relevant consumption theories to our study; therefore, we will focus on what the theory predicts for consumption behavior when individuals face unanticipated changes in income.

The Permanent Income Hypothesis (PIH), developed by Friedman (1957), is one of the most important concepts in consumer behavior analysis. It builds on the idea that permanent income, which is built from the expected long-term average income of an individual, is the main driver of consumption. Friedman also acknowledges that the permanent income will probably not be the same throughout the individual lifetime; however, he finds it desirable to assume that it remains unchanged over a period of years for empirical work. His focus of study is the effect of random shocks to income that are additional to the permanent income, which he calls transitory income. Friedman defines transitory income as income the individual views as the result of chance. He also identifies that consumption can be decomposed into permanent and transitory. According to him, permanent consumption is a constant function of the level of permanent income with a constant connecting these two variables, which depends upon several variables (such as interest rate, the ratio of nonhuman wealth to total wealth, and the portmanteau taste variable). Friedman also

indicates that transitory income and transitory consumption are uncorrelated, implying that transitory income does not give rise to consumption (of either type) on a systematic basis.

Permanent Income determines how much a person spends and saves. Individuals save when they have income higher than what they consider their permanent income. Also, under this theory, individuals will prefer to smooth consumption when income changes instead of changing consumption proportionally, as Keynes proposed. Since this hypothesis states that consumption changes are based on individual expectations, it implies that consumption behavior is not predictable unless until we know the individual expectations.

Modigliani et Brumberg (1954) developed the Life Cycle Hypothesis (LCH), which added structure to the problem. They classify life as the succession of pre-working, working, and retired stages and state that income and consumption reflect random shocks and systematic variations resulting from the life cycle phases. This theory assumes that people plan their spending for their lifetime by considering their future income, which allows them to smooth consumption during their life, in the sense of maintaining marginal utility constant across life stages. Additionally, it predicts borrowing in the pre-working stage, wealth accumulation in the working stage, and dissaving in the retired stage.

The PIH and LCH have some critical implications in common. Both predict that people will use their savings to smooth income fluctuations and thus consumption. In the case of anticipated income changes, consumption should respond slightly or not at all at the time the change is realized. However, in the case of unanticipated income changes, the transitory shocks should have a small impact on consumption. In contrast, the permanent shocks should lead to more significant effects on consumption since individuals re-optimize their consumption paths.

Assuming a utility function that is state and time separable and that consumers can borrow and lend at the same interest rate, we have the Euler equation for consumption.

$$u'(c_{it-1}) = (1 + \delta)^{-1} E_{t-1}[(1 + r_t) u'(c_{it})] \qquad \textbf{(1)}$$

Where u represents the utility function, and c means consumption. The intertemporal discount rate is δ, and the real interest rate is r_t. E_{t-1} is the expectation operator based on information available at time t-1. From that equation, we have that in equilibrium, there is no reallocation of intertemporal consumption that can increase the marginal utility of consumption. Moreover, if the intertemporal discount rate is equal to the interest rate, we obtain the following equation, indicating that the marginal utility is a martingale.

$$E_{t-1}u'(c_{it}) = u'(c_{it-1}) \quad (2)$$

From this equation, we have that ex-ante, the best predictor of the next period marginal utility is the current marginal utility. Ex post, the marginal utility will only change if expectations are not realized. Hall (1978) was the first to note that property from the theoretical results; he writes, " No information available in period t-1 apart from the level of consumption helps predict future consumption, in the sense of affecting the expected value of marginal utility. In particular, income or wealth in periods t-1 or earlier are irrelevant, once c_{t-1} is known". Thus, an anticipated income change for an individual (e.g., someone that retired) should not have any impact on the marginal utility of consumption at the time it occurs since the person must have already incorporated the expectation of the income reduction in his optimal consumption plan (when the information first became known). The previous equation is rewritten as follows (Flavin, 1981).

$$c_{it} = c_{it-1} + \varepsilon_{it} \quad (3)$$

From the work of Friedman (1957), the scientific community has agreed that income shocks can be transitory (mean-reverting), which have an effect that does not last long, or highly persistent (no mean-reverting), which have an impact that accumulates over time. Moreover, the consumption response will be one-to-one to permanent income shocks, but the consumption response to transitory shocks will be minimal. If consumption is too sensitive to transitory income, in the sense that consumers cannot smooth consumption over transitory fluctuations in income, then this would not be congruent with LC-PIH theories.

The effect of credit markets has been incorporated into the study on consumption behavior. When credit markets are perfect, individuals can re-optimize consumption using their savings, borrowing, or both. However, markets are usually imperfect. In theory, when an individual is liquidity constrained, even if he can save but not borrow, then consumption will be strongly cut in the presence of a negative transitory shock but will not react much in the presence of a positive one.

Researchers have found evidence of excess sensitivity in consumption responses in the presence of liquidity constraints, meaning that they found a violation of the LC-PIH theory for groups of individuals characterized as liquidity constrained. Zeldes (1989) is the first to prove that the rejection of the theory results from the effect of credit constraints by using an asset sample separation rule. Posterior to Zeldes, many studies have found evidence of excess sensitivity using different liquidity constraints definitions (this will be explored deeper in section 4.3). Findings suggest that when credit and insurance markets are imperfect, the degree of the consumption response should depend on the persistence of the shock (Jappelli et Pistaferri, 2010).

Jappelli et Pistaferri (2010) review different empirical approaches used to estimate how consumption responds to income changes and classify consumption studies according to the type of income change happening and results found in empirical work. The first main classification depends on the income change being anticipated or unanticipated. Studies on anticipated income changes can be further classified depending on income reduction or increase. Anticipated income increase is further classified into small or large increases. On the other hand, unanticipated income change studies are cataloged in permanent or transitory shock. Transitory income shocks are further classified as positive or negative shocks.

Unanticipated Transitory Income Shocks

Now our focus will be on the empirical approaches found on unanticipated transitory income shocks, which is the type of shock of interest in our study. We found three approaches to study this type of income shock. One method consists of estimating the marginal propensity to consume.

Another approach estimates the impact of shocks by combining realizations and expectations of income or consumption.

The third method that aims to evaluate unanticipated income shocks on consumption, which we use in this study, consists of the quasi-experimental approach. For this method, it is required to identify events in which income has changed unexpectedly and then compare households' consumption behavior before and after the income shock (or compare the households exposed to the shock with the ones who were not). It is assumed that the income shock realization leads to the difference in consumption. This approach is convenient in the sense that it does not require estimating an income process.

The first consumption study to use this approach is Bodkin (1959). He studies the consumption behavior of World War II veterans after receiving unexpected dividend payments from the National Service Life Insurance. In November 1949, it was announced that veterans with military insurance would get the dividends in 1950, starting on January 16th. Because of the short time lag between the announcement and the payments, Bodkin assumes that this is an unanticipated transitory income change. He finds that the marginal propensity to consume nondurables out of the dividend transfer is 0.72 and that for consumption of nondurables and durables[7] is 0.97. Also, by postulating continuity in the data, Bodkin implies that if both consumption measures lead to the same conclusion, then an intermediate measure[8] of consumption will lead to the same conclusion. His findings constitute a strong violation of the PIH; he expected the range of those values to be around 0.3 to be consistent with the PIH.

Other studies, aiming to identify truly unanticipated events, explored the impact of weather shocks[9]. These shocks affect income directly through the production function in agricultural economies. Wolpin (1982) uses a survey[10] on Indian farm households conducted by the National

[7] Bodkin considers purchases of durable goods to be mainly savings, not consumption, since during the year it is consumed only a small part of the services obtained from a durable good during its lifetime.

[8] Considering durable and nondurable goods would result in a too high estimate for the individual consumption since elements of saving are included. On the other hand, considering only nondurables would be a measure of consumption too small.

[9] Weather shocks constitute any deviation from normal weather conditions, which is truly an unanticipated event.

[10] Conducted in three consecutive years, 1968-69, 1969-70, and 1970-71.

Council of Applied Economic Research along with regional time series data on rainfall to compute estimates of the permanent income elasticity of consumption. Depending on the measure of consumption[11], the estimated permanent income elasticity ranges from 0.96 to 1.06; therefore, this study strongly supports the PIH. Paxson (1992) uses data[12] on agricultural households from the Thai Socio-economic Surveys (SES) and data on regional rainfall to study if farmers use saving to smooth consumption in response to unexpected income shocks in Thailand. She finds mixed support for the PIH. On one hand, Paxson finds high marginal propensities to save out of transitory income (due to rainfall shocks), which provides evidence in favor of the PIH. On the other hand, after decomposing income (transitory and permanent), she cannot accept a strong version of the PIH since propensities to save out of permanent income shocks are above zero. Using the same data set, Paxson (1993) studies whether household consumption tracks income across seasons. She finds that even though household consumption varies through the seasons, the variation does not seem related to the timing of income receipts, suggesting that seasonal consumption patterns could result from seasonal variations in prices or preferences, not income.

Some studies have recognized illness as the most sizable and least predictable shock to income. By using the Panel Study of Income Dynamics (PSID), Stephens Jr (2001) investigates the effect in consumption of income changes arising from job displacement and disability. They find that household consumption is significantly reduced; however, this reduction has not the same magnitude as the displaced or disabled individual lost earnings. Gertler et Gruber (2002) study the effects of changes in income arising from major illnesses in Indonesia. They focus on the impact of significant exogenous changes in physical functioning. They find that households smooth 70% of the costs when the individual has a moderate limit in his ability to function physically (which can be seen as a transitory shock). But, only 27% of the costs when the individual suffers a severe limitation in physical functioning (which can be seen as a permanent shock).

The quasi-experimental approach has proven to be useful for investigating consumption behavior; however, it has some limitations. These studies can only capture one type of shock at a time.

[11] The direct consumption measure is calculated as the sum of individual consumption expenditures (food, clothing, etc.) and the indirect consumption measure consists of income minus savings (where savings is calculated as the change in household net worth). Both measures exclude durables.

[12] Uses cross-sectional information on household expenditures for periods 1975/76, 1981 and 1986.

Another limitation is that some income shocks cannot be considered a real exogenous event. In the case of disability, moral hazard is a possibility. Disability might be reported with the purpose of obtaining benefits. It can be a voluntary choice for unemployment, or they might know in advance that they will be fired. Thus, not all the variation in income is necessarily unanticipated.

4.2 Literature on unemployment insurance benefits

While studies on anticipated consumption changes are vast, much less research is available for unanticipated income changes because of the challenges in finding such events. As seen before, most of them explore tax rebates. Data availability has been a major impediment in analyzing UI effects. Most studies have relied on surveys; however, a recent study relies on account data. In this section, we focus on pertinent findings concerning unemployment insurance benefits.

The quasi-experimental framework has also been used to study the effect of unemployment on consumption and the smoothing benefits obtained from unemployment insurance (UI) systems. Gruber (1997) was one of the first studies to explore the welfare effects of UI in the United States. He writes that "the primary benefit of UI is the ability of the government to smooth consumption during unemployment spells." Using data from the Panel Study of Income Dynamics (PSID), he obtains information about food spending and state-time variations in UI benefits for the periods 1968-1987 for people that lost their jobs. Gruber discovers a large smoothing effect of UI; more precisely, he finds that a 10% reduction in UI replacement rate leads to a fall of 2.65% in food expenditures. For those with a replacement rate of zero, he finds that the fall in food consumption is 22.2%, suggesting that consumers face liquidity constraints. Additionally, for those with a replacement rate above 84%, he finds that UI serves its role of smoothing consumption across the unemployment spell.

Browning et Crossley (2001) extend Gruber's idea by using total household consumption instead of food consumption. They use data from the Canadian Out of Employment Panel (COEP) for 1993 and 1994, which captures legislative changes to the Canadian UI system. To complete their data set sample, they obtain additional information for each respondent and their spouse for up to five years prior to the COEP survey year by matching several kinds of administrative data. This

rich data set allowed them to identify presumably liquidity-constrained households. They find that in a household where the respondent's earnings are the only source of income, a 10% point cut in the benefits results in an average fall of 0.8% in total expenditure, leading to a small elasticity of expenditures with respect to UI benefit of about 5%. Also, they find heterogeneity in their results for two subgroups. The first subgroup consists of respondents with no assets at job loss. The second subgroup consists of respondents who were not eligible for social assistance and whose spouses were not employed. They found the largest predicted benefit effect for households in the intersection of these two groups. They estimate that for a household where the respondent's earnings are the only source of income, a 10% drop in benefit levels predicts a fall in total expenditures equal to 2.9%, with an associated elasticity of 17%; thus, their results are consistent with the presence of liquidity constraints.

Using monthly de-identified financial information from bank account data, Ganong et Noel (2019) study UI benefits effects on consumption from January 2014 to June 2016. They find a drop of 6% in spending at the beginning of unemployment and a decline of less than 1% per month while receiving the UI cash transfer. Additionally, they estimate that after UI benefits exhaustion, the reduction in consumption is around 12%. They find consumption behavior inconsistent with rational models of liquidity-constrained households since liquidity constraints cannot explain why households fail to save when they know that an income decline is coming (benefit exhaustion). Also, they conclude that consumption smoothing gains from a period extension of the UI benefits is four times larger than increasing the UI benefit levels.

Using statutory replacement rates in the U.S, East et Kuka (2015) explore the consumption smoothing benefit of the UI program in the last 40 years[13]. They find heterogeneity in the consumption benefit effect over time, resulting from the fact that effects of the benefit levels were smaller in the 90s[14] when compared with the 70s. Their results suggest that effects are more prominent in the presence of a high state unemployment rate and high average generosity.

4.3 Literature on liquidity constraints

[13] Data from 1968 to 2011
[14] That decade was characterized by low unemployment rates and low UI benefit levels.

In theory, when an individual is liquidity constrained, meaning that he can save but not borrow, then consumption will be strongly cut in the presence of a negative transitory shock but will not react much in the presence of a positive one. When exploring the consumption behavior of individuals, research has shown that liquidity constraints play an important role. In this section, we revise some traditional proxies used to identify liquidity constrained individuals and related findings in the context of unanticipated income changes.

Probably the most influential research on this matter was developed by Zeldes (1989). Using data from PSID, he investigates the effects of liquidity constraints on consumption using an innovative methodology. He uses wealth as a predictor of liquidity constraints and divides his sample into low- and high-wealth groups (he tests for non-housing wealth[15] and total wealth[16]). The former represents possible liquidity-constrained individuals and the latter those who are not, with potential access to credit markets or no need to borrow. He hypothesized that excess sensitivity should happen only in the low-asset group. He indeed finds a violation of the theory in the low-asset group, proving that the empirical rejection of the PIH comes from the existence of liquidity constraints.

Souleles (1999) uses a ratio of liquid wealth to earnings as a liquidity constrained proxy. He divides the sample in different ways. First, he compares the bottom 25% with the top 50%; then, he compares the bottom 15% to the top 25%. He finds that wealthy households can smooth their income tax refunds better than less wealthy households and concludes that liquidity constraints are the reason for the consumption excess sensitivity to income shocks.

Hsieh (2003) tests the PIH by analyzing the consumption change effect from a large, anticipated payment from the State of Alaska's Permanent Fund. He finds support for the PIH since he discovers that households in Alaska smooth consumption. Hsieh uses current income as a proxy for being liquidity constrained and divides the sample in two following this criterion (above and

[15] More than 2 months of income in savings
[16] Including real estate assets

below current income). However, he does not find excess sensitivity when testing for lower-income households.

Stephens Jr (2008) explores the consumption response to predictable changes in discretionary income that arise from the repayment of vehicle loans. They find that an increase of 10% in discretionary income (due to a loan repayment) leads to a 2% to 3% increase in nondurable consumption. Additionally, he discovers that the consumption increase following the loan repayment is permanent rather than temporary. He also explored the impact of liquidity constraints by using age (above and below the median), liquid wealth[17]- to- income ratio (low quartile and high quartile), and loan maturity (36 months or less and above 36 months) as proxies, finding excess sensitivity for age and wealth. Gourinchas et Parker (2002) also use age to investigate heterogeneous effects in consumption, finding different consumption behavior based on this criterion. Younger households, compared to older households, have steeper earnings profiles, which increase the probability of facing borrowing constraints.

Jappelli et Pistaferri (2011) explore financial integration and consumption smoothing. They explore the effects in subgroups of households, such as specific cohorts (five-year intervals) or education groups (the sample is divided into individuals that completed college and those who did not). He finds a more substantial increase in inequality for households where the family head has low education. He concludes that the rise in income inequality has not been matched by an increase in consumption inequality. His finding suggests heterogeneous effects depending on education.

More proxies for liquidity constraints have been used in the literature. For instance, Browning et Crossley (2001) use housing wealth as a proxy; more precisely, they classify their sample based on whether they are homeowners or not. Feldman et Heffetz (2022) categorize as liquidity-constrained individuals those who fall behind on mortgage, rent, or other payments due to the coronavirus crisis[18].

[17] Calculated as the sum of the balances in savings and checking accounts.
[18] They use a survey for the study, with one question directly asking the respondent if this was his situation.

In this study, we have used all the proxies mentioned so far. However, depending on the data available, other research has used different ways to identify liquidity constrained individuals. Using survey data, Jappelli, Pischke et Souleles (1998) test for liquidity constraints using Euler equations and find excess sensitivity for those individuals. Due to the data available, they can use three different definitions of liquidity constraints to classify individuals, going from a lax one to a stricter one. The first definition is for the individuals who got turned down any borrowing request in the past few years or did not get as much as they requested. The second definition includes the conditions of the first definition but excludes individuals with a credit card or line of credit. The third definition consists of individuals that do not have a credit card or a line of credit.

Liquidity constraints in the unanticipated income shock context

In the context of unanticipated income shocks, liquidity constraints have been investigated to reveal if they hide heterogeneous effects. One set of studies has explored the impact of unanticipated income shocks on consumption by studying tax rebates or tax refunds.

Johnson, Parker et Souleles (2006) studied the effects of a tax rebate between July and September 2001 in the U.S; they found that households spend around 20% to 40% of the rebate on non-durable goods, finding larger effects for possible liquidity constrained individuals. They use age, income[19] , and liquid assets[20] as liquidity constraint identifiers. They find that households with low levels of income and liquid assets spent significantly more of the tax rebate received, which is consistent with them facing liquidity constraints.

Using data on credit card accounts, Agarwal, Liu et Souleles (2007) studied the effects of the tax rebate in 2001. They find that individuals initially saved the tax rebates, but later spending increased, violating PIH. They document that spending rose the most for individuals most likely to be liquidity constrained, while savings rose (credit card debt decreased) the most for unconstrained individuals. To identify the possible liquidity-constrained individuals, they divided

[19] Family income before taxes
[20] The sum of balances in checking and savings accounts

the sample into three depending on their credit limit. The low limit accounts are those with a limit equal to or less than 7,000USD, representing the possible liquidity-constrained individuals, which are two-fifths of the sample. The most unconstrained individuals are those with credit limits beyond 10,500USD and represent the upper one-fifth of the sample.

Using the Survey of Consumer Finances (SCF), Kaplan et Violante (2014) also studied the 2001 tax rebates. They develop a model that considers liquid[21] and illiquid[22] assets and document that the impact of rebates on consumption is driven by liquid wealth. Also, they find that households characterized by large amounts of illiquid assets but low liquidity assets are an essential driver of the magnitude of the consumption response. Misra et Surico (2014) investigated consumption for tax rebates in 2001 and 2008. They find that the results are highly heterogeneous, with around 50% of the sample spending an amount not significantly different from zero. Another 20% is in the other extreme, consuming significantly more than half of the rebate. The latter group is characterized by individuals that have a mortgage and higher income. For lower-income renters, their estimates show they spend between 10% and 40% of the rebate.

Other studies have explored the effects of economic stimulus payments on consumption; they mostly find heterogeneity in the results in the presence of liquidity constraints.

Using added questions to the Consumer Expenditure Survey, Parker *et al.* (2013) investigated the household consumption response to the economic stimulus payments (ESPs) in 2008 in the U.S. Their estimated mean effects show that 12% to 30% of the cash transfer is spent in nondurables during the three-month period in which the cash transfers were received, but from 50% to 90% of the transfer corresponds to total spending. They use age, income, and homeowner as liquidity constrained identifiers. Their findings suggest heterogeneous effects for liquidity-constrained individuals.

Broda et Parker (2014) used a Survey from the households in the Nielsen Consumer Panel to evaluate the consumption response to the ESP in 2008. They find that, on average, household

[21] Cash, checking account, etc.
[22] Housing

consumption increased by 10% the week the respondent received the cash transfer and remained high over the next three months, accumulating an increase from 1.5% to 3.8%. However, they find heterogeneity in the results. They discover that spending responses are concentrated among liquidity constrained households. For them, liquidity-constrained individuals are the ones who do not have at least two months of income available in cash, bank accounts, or easily accessible funds at the moment of the survey. These individuals spend around 9% of the cash transfer, which represents approximately four times the amount spent by those who are not liquidity constrained. For the following three months, they spent more than twice as much of their ESPs as individuals who are not liquidity constrained.

Agarwal et Qian (2014) use a panel data set of financial transactions to study a natural experiment in Singapore. In February 2011, the government announced the Growth Dividend Program, which consisted of a one-time cash transfer[23]. The dividends were distributed in April of the same year. They find that consumption increases significantly after the policy announcement; their estimations suggest that 80% of the cash transfer is spent during the ten months following the announcement. Additionally, they find evidence that the announcement effect is powerful since almost 20% of the consumption response occurs during the first two months after the announcement (before individuals received the cash transfer) via credit cards. They identify possible liquidity-constrained individuals by the levels of savings (lower 25% of the sample) or credit access (lower 25% of the sample). They found heterogeneous effects for individuals with low liquid assets and those with low credit card limits since they experienced stronger consumption responses.

4.4 Literature on the impact of COVID-19 on consumption

The spread of COVID-19 around the globe caused the shutdown of entire industries and cities in mid-March 2020. Aiming to provide some financial help during the pandemic, some governments released benefit programs consisting of direct cash transfers to their citizens, more generous conditions for UI benefits, or both. This natural event has allowed researchers to study how

[23] Ranging from 78USD to 702USD.

individuals change their consumption behavior. Moreover, the fact that each benefit program has different characteristics among countries gives the opportunity to explore the impact of the various measures on consumption. This section explores the literature on consumption behavior in the context of the pandemic.

Regarding the early stages of the pandemic

We have found vast literature on consumption responses to the early stages of the pandemic in different countries; they document significant falls in consumption as an initial response.

Achou *et al.* (2020) use survey data to document the initial effects of the pandemic on households in Quebec, which is the Canadian province that has experienced the highest number of cases of COVID-19. They found that 22% of the respondents lost their jobs, and 6.3% reduced working hours, substantially reducing labor income. They also show that the impact of the pandemic is more severe in industries such as construction, accommodation, and the arts. Regarding the CERB program, their findings indicate that recipients were mainly from low-income households and those who lost their job. Also, they find that the difference between average spending among CERB applicants and non-applicants is not significant, suggesting that CERB might have helped maintain their standard of living. Additionally, they indicate that half of these recipients had enough savings so that they could smooth their consumption by making withdrawals. Our study uses the same survey data that they used. However, we analyze only a subset of CERB applicants relevant for our study period. While their research mainly reports effects for a sample of CERB recipients and no recipients, our study focuses on CERB recipients. We complement some of their findings and investigate the relationship of CERB on consumption behavior and debt repayment.

Using transaction-level individual financial data[24] for the United States, Baker *et al.* (2020a) find that in the first half of March 2020, spending increased around 40%, followed by a 30% decrease in overall spending in the second half except for food delivery and grocery spending. They also find the most significant spending decrease for the subgroup of households with children and the

[24] From SaverLife, which has linked bank accounts.

subgroup with low levels of liquidity[25]. Using daily card transaction data, Dunn, Hood et Driessen (2020) estimate a spending reduction of 13.7% for March 2020 in the U.S, with a reduction of 28% as a result of the mitigation measures[26]. Using data from a fintech institution, Hacioglu Hoke, Känzig et Surico (2020) document declines in spending of 40% to 50% in the U.K. This reduction is concentrated in retail, restaurants, and transportation. From data provided by Money Dashboard[27], Chronopoulos, Lukas et Wilson (2020) find that declines in discretionary spending started in the "fever" period (Feb 22 to March 22nd) and continued to decline through the "lockdown" period (March 23rd to May 10th) for Great Britain.

Using transaction-level data from Danske Bank accounts, Andersen *et al.* (2020) estimate that spending falls 27% after the shutdown in Denmark, concentrating on travel, restaurants, and personal services in closed sectors. Bounie, Camara et Galbraith (2020) used card transaction level information in France and found that consumption reduced 30% on the day containment officially began, followed by 60% the following day. For Portugal, Bruno Carvalho, Peralta et Pereira dos Santos (2020) estimate an initial decrease in consumption of 45% from data on electronic payments from SIBS. García-Montalvo et Reynal-Querol (2020) use data from Fintonic[28] and find significant reductions in spending since mid-March in Spain. Vasco M Carvalho *et al.* (2020) also find evidence of strong consumption declines in Spain, with steeper declines in affluent neighborhoods

Some studies documenting the pandemic's initial effects agree that the perception of the future is the primary driver in the observed considerable reduction in spending. Sheridan *et al.* (2020) use transaction level data from a bank in Denmark and compares it with results for Sweden, which did not have a shutdown. They find that spending in Sweden dropped around 25% and 29% in Denmark; they attribute the impact of COVID-19 to the small 4% difference. They conclude that only a small proportion of the drop in spending happens because of the pandemic restrictions, suggesting that the main responsible for most of the economic damage is the virus itself, regardless of social distancing laws.

[25] Liquidity seen as positive net savings prior to February 2020.
[26] They call it the "pandemic effect" and measure it from March 21st,2020.
[27] A personal financial technology company.
[28] The first Spanich personal finance app

Christelis *et al.* (2020) explore the impact of the pandemic in six EU countries by using a survey that covers the six largest euro area economies[29]. They show that concerns about finances due to COVID-19 cause a significant reduction in consumption of non-durables, concluding that consumption operates mainly through the perception of financial repercussions and not via health concerns related to COVID-19. They write, "raising concern from 0 (the least concerned) to 6 (the median concern), reduces consumption by 8.2% percent in regressions with fixed effects". The survey also allows him to explore the potential impact of positive and negative income shocks due to the pandemic. He finds that negative consumption responses are amplified, and positive consumption responses are attenuated in the context of the pandemic. He also finds heterogeneity in his results, suggesting that there is room for targeted government support measures for the subgroups of relatively younger, liquidity[30] constrained, and those with less stable employment conditions. These findings are consistent with models of precautionary saving and liquidity constraints.

Chen, Qian et Wen (2021) measure the immediate impact of COVID-19 in China by using financial information from accounts linked to e-wallets in Alipay and WeChat pay. They find that consumption responded immediately to lockdown[31], with an average decline of 32%, being dining, entertainment, and travel categories the most affected. They write about the consumption decline driver, "the pandemic-induced uncertainty has a significant negative impact on the population's willingness to consume, which is independent of the effect of supply disruptions or negative income shocks." Additionally, Cox *et al.* (2020) found evidence that labor market disruptions were unlikely to be the factor driving spending declines in the initial months of the pandemic[32] in the U.S; instead, direct effects of the pandemic were the primary cause.

Hanspal, Weber et Wohlfart (2021) uses the pandemic shock to analyze its effects on future expectations in the U.S. He finds that financial wealth shocks, measured as investment portfolios,

[29] Belgium, Germany, Italy, France, Spain, and the Netherlands.
[30] Liquidity seen as "the ability to have access to enough liquid resources to make an unexpected payment equal to one month's income"
[31] January 23, 2020.
[32] Liquid wealth inequality falls between February and May.

are associated with adjustments in expectations about debt, retirement age, and desired working hours, but have no substantial effect on expected spending. Additionally, they find evidence that beliefs about the duration of the market recovery are essential for households' expectations about their own wealth and investment decisions.

Regarding benefit programs

As mentioned before, benefit programs were quickly developed by governments aiming to reduce the negative impact of the pandemic. We now explore some of these programs and the literature that studies the effects of these different intervention measures on consumption behavior. Studies show significant heterogeneity in consumption, mainly for low-income households.

In the United States, The CARES Act was approved on March 27th, 2020, to alleviate the economic impact of the pandemic. Some of the benefits included the Economic Impact Payments (EIP), which consisted of a cash transfer of 1,200USD for each individual[33]; however, this amount was reduced depending on the gross income of the individual. Additionally, the UI eligibility was expanded to jobless workers who were ineligible before (including self-employed workers, independent contractors, and gig workers). The UI period was extended to thirteen additional weeks. Also, the Federal Pandemic Unemployment Compensation (FPUC) was established, which consisted of an additional weekly cash transfer of 600USD to the usual UI benefits regardless of the pre-job loss earnings. Adding the Paycheck Protection Program to these measures, Karger et Rajan (2020) write that they "comprise some of the largest-scale federal policy responses to COVID-19".

We found vast literature focused on understanding the impact of government cash transfers on consumption. Using anonymized data from private companies in the U.S, Chetty *et al.* (2020) analyze heterogeneity in the effects of the pandemic across income groups, finding that stimulus payments[34] increased spending sharply for low-income households. They show that these payments, which began in mid-April 2020, nearly restored spending levels by late April for this

[33] Who had filed taxes in 2019, or 2018 (if 2019 had not been filed yet).
[34] EIP

subgroup and that it was driven by spending in sectors that require limited physical interaction, leading to little increase in consumption in businesses most affected by the pandemic. This result is in line with the findings of Alexander et Karger (2020); they conclude that stay-at-home orders caused large spending reductions in sectors associated with mobility[35].

Hacıoğlu-Hoke, Känzig et Surico (2021) arrive at a similar conclusion to Chetty's by using high-frequency transaction data from a fintech in the U.K. They find that individuals in the top quartile of the income distribution account for around half of the decline in aggregate consumption and that their spending falls more than income. On the other hand, the individuals in the bottom quartile are characterized by smaller spending drops and larger labor income falls; the government benefits received made their total income fall a lot less. García-Montalvo et Reynal-Querol (2020) find a large reduction in spending in mid-March in Spain, with a recovery beginning at the end of April. However, spending recovery is not more intense for the group of low-income families than for the high-income families in Spain, which is opposite to what has been found in other countries.

Chetty *et al.* (2020) also explored some macro implications, finding a limiting capacity of the stimulus program to increase economic activity and employment. This result is congruent with Karger et Rajan (2020). Using anonymized transaction-level bank account data, they study heterogeneity in the marginal propensity to consume (MPC). They find that people living paycheck-to-paycheck show higher MPC and that a stimulus bill of the same size targeted to low-income individuals[36] could have increased consumer spending and debt payments by the same amount at a lower cost for the government[37].

Using household-level bank account data, Cox *et al.* (2020) investigate heterogeneous effects on spending and savings in the U.S. They find a cut in spending from March to early April 2020. Since mid-April, spending begins to recover but with a substantial difference by income level. They find that low-income households recover more rapidly, which coincides closely with the timing of the EIP stimulus and the expanded UI benefits. This finding is interesting considering

[35] Small businesses, restaurants and retail.
[36] Individuals earning less than 10,000 USD annually
[37] They estimated 50 billion USD less.

that low-income households are the ones who lost more earnings during the pandemic (Cajner *et al.*, 2020). Cox *et al.* (2020) conclude that the stimulus and UI benefit were essential contributors to limiting the effects of labor market disruptions on spending. Regarding savings, they find that aggregate savings increased substantially, with lower-income households contributing disproportionately to the increase. This is consistent with Coibion, Gorodnichenko et Weber (2020); their study suggests that most people have primarily saved or paid debts with their EIP.

Baker *et al.* (2020b) use high-frequency transaction data and survey data to explore heterogeneity in consumption responses to CARES Act cash payments. They find a rapid household response to the stimulus, with estimated spending increasing by 0.25 to 0.4USD per dollar of stimulus during the first week. They insist on the importance of targeting since the stronger responses were obtained for the subgroup of households with lower income[38], greater income drops, and lower levels of liquidity[39]. Coibion, Gorodnichenko et Weber (2020) find that individuals report spending 40% of the cash transfer by using a large-scale survey of consumers, with only 15% indicating to have mostly spent it.

For Japan, Kubota, Onishi et Toyama (2021) found that individuals spent 49% of the cash received from the Special Cash Payment[40] (SCP) program within six weeks using transaction-level data from Mizuho Bank. They find an immediate increase in spending during the week of payments and find heterogeneity in liquidity-constrained[41] individuals, who spent 59% of the SCP. Drescher, Fessler et Lindner (2020) uses data across 17 European countries from the Eurosystem Household Finance and Consumption Survey (HFCS) to study how much government monetary transfer would be spent. They find considerable differences across countries; their estimated MPC varies from 33% to 57%, finding the lowest MPC in the Netherlands and Portugal and the highest in Greece and Lithuania. Using a survey, Feldman et Heffetz (2022) studied one time grant in Israel that was announced in mid-July 2020. They find that paying down debt (42%-52%) was the primary reported short-term use of the cash, followed by spending (25%-31%) and saving (15-18%). They estimate a MPC range of 42% to 52%.

[38] Lower than 2,000USD per month
[39] Bank account balance below 100USD (first quartile)
[40] One time universal amount of 100,000 JPY (950USD)
[41] Liquidity constrained is defined as individuals who had an end of month balance below their monthly income.

In Australia, where early withdrawals of retirement savings are usually not allowed, the COVID-19 Early Release Scheme (ERS) was implemented, which allowed individuals to take up to $A20,000 from their retirement funds between April to December 2020, depending on their self-assessed eligibility. Bateman *et al.* (2022) find a higher probability of withdrawal for individuals who were more concerned about future circumstances and those who did not lose their job but were uncertain about future job prospects. They prove that many ERC withdrawers used the funds to smooth consumption or kept them for precautionary purposes. However, they note that many of these withdrawers did not understand the future consequences of their choice.

Regarding UI benefits

Other research explores the effects of UI and related measures during the pandemic. Ganong, Noel et Vavra (2020) estimate that the FPUC lead two-thirds of unemployed workers to be eligible for UI benefits that exceed their lost labor income, meaning that they find statutory replacement rates over 100% arising from the 600USD additional UI. However, they state that those transfers were large enough to reverse sectoral income changes, which would have risen from the observed large increases in unemployment. Additionally, they acknowledge that those replacement rates over 100% may hamper an efficient labor reallocation in the recovery phase, resulting in trade-offs between moral hazard and consumption smoothing.

Mitman et Rabinovich (2020) computes the optimal UI response to the pandemic. They find that raising the UI is optimal first and then lowering it as the economy reopens, regardless of the unemployment level. They also conclude that the 600USD increment in UI under the FPUC is close to their estimated optimal policy and that extending this measure beyond the initial intended period would hamper recovery.

We found limited literature on UI effects on consumption in the context of the pandemic. Farrell *et al.* (2020) find that while spending was reduced by 10% for the employed, the spending for UI recipients increased by 10%, likely explained by the additional weekly 600USD from the FPUC.

Moreover, they find that individuals whose benefits were delayed[42] show a fall in spending of 20%. Casado *et al.* (2020) use detailed individual and country-level data to explore variation in the size of the FPUC[43] between March and September 2020. They conclude that individuals with higher earning replacement rates experience significantly more spending and that the effects on spending of large benefit reductions are substantial. More specifically, they find that the FPUC reduction from $600 to $300, which represents a reduction in replacement rate of about 30%, leads to a reduction in spending of 5%.

4.5 Theory and Empirical Strategy

In this section, we present the construction of our variable of interest and the structural model we use to study the impact of CERB on consumption. Also, we discuss how the characteristics of the pandemic might reduce some of the most common biases for studies on unanticipated income changes.

Jappelli et Pistaferri (2011), "The lesson of the literature is that identifying episodes of genuine exogenous and unanticipated income changes is difficult." Given the characteristics of the COVID-19 pandemic, we can partially control for these issues. Even though the nature of the pandemic is exogenous, layoffs might not have been entirely random. Evidence suggests that some industries were more affected than others (Baker *et al.* (2020a), Hacioglu Hoke, Känzig et Surico (2020)). Thus, we can argue that people lost their job (or had a decreased labor income) in a quasi-random fashion if the motive was the pandemic. Households in which at least one member lost his job[44] under that scenario have been exposed to a negative transitory shock, leading to an unanticipated income change.

Another issue that is partially taken care of by the characteristics of this event is selection bias. Employers tend to fire the worst employees first; thus, previous studies on UI could be prone to this bias. Given the government measures to limit infections, it can also be argued that some people

[42] Received last paycheck in late March or early April and received UI benefits from May24th.
[43] From 0 to 600USD to 300USD
[44] Or had a decrease in work income.

were laid off without selection. Some employees were laid off regardless of being good or bad workers since many businesses were forced to close operations or drastically reduce staff with very short notice. For instance, this could be the case for waiters since one measure in Quebec was to close restaurant dining-room service. Thus, selection bias might be less severe in our study.

For this study, a two-period model is considered. Period t+1 corresponds to when the effects of the income shock happened, meaning that the person lost his job or had his usual labor income reduced because of the pandemic. In our sample, around 80% lost their job in t+1. Period t corresponds to the normal situation where the individual was working before covid-19. Information from the Survey for 2019 and April 2020 is used as a proxy for periods t and t+1, respectively.

The Importance adjusted Replacement Rate variable

In this section, we present the variable of interest in this study. As Browning, the variable we use for the benefit level in the model is the importance adjusted replacement rate. However, when constructing this variable, we need to adjust it to consider the CERB characteristics.

A first step to build our variable of interest is to define what we mean by replacement rate for this study. It is essential to notice that during period t+1, we have three situations that could happen to our respondents. Some respondents had already lost their jobs in t+1 because of the pandemic, meaning they had no labor income for t+1. Some others lost their jobs during April, which means they received some labor income during t+1. And some respondents did not lose their jobs, but their labor income was reduced, meaning they also received some labor income in t+1. Around one-quarter of the sample lost all their labor income in period t+1. For this reason, our definition of replacement rate will diverge from those in traditional consumption smoothing benefits studies such as Browning et Crossley (2001) and Gruber (1997). For them, all the respondents had no labor income in period t+1; hence it would not be appropriate for us to use the traditional definition.

We denote the pre-dismissal labor income as Y_t, the labor income received in April as Y_{t+1}, and the CERB cash transfer benefit received in April as B_{t+1}, then we define our replacement rate as $RR_{t+1} = (Y_{t+1} + B_{t+1})/ Y_t$. This ratio indicates the proportion of usual labor income that is

replaced by the cash transfer received and any labor income received in April. For Browning et Crossley (2001) and other authors, Y_{t+1} equals zero. Since most individuals have Y_{t+1} greater than zero in our sample, it would not be appropriate to ignore the effects of these earnings in t+1. So, our estimated replacement rates will mostly reflect not only the statutory replacement rate, but also the labor income replacement. This brings some implications for our results. While other authors' benefit levels refer to statutory replacement rates only, for us, benefit levels refer to replaced income, reflecting the statutory replacement rate and labor income replacement. Even though our replacement rate and that of other authors have been estimated differently, both aim to measure the same: the income variation from one period to another. Thus, our variable and corresponding results are comparable to those of other studies of UI.

As in Browning et Crossley (2001), the relationship between total spending and the replacement rate, conditional on permanent variables, is what we call the "benefit effect". This relationship reflects the impact of transitory changes in income on spending. More precisely, they write that "if households respond to marginal changes in transitory income then they are not on their optimal path, and marginal actuarially fair increases in UI replacement income raise household welfare, moving the household towards that optimal path."

One problem with this ratio is that 60% of the sample is married or living in common-law. For them, the impact of the job loss on household spending depends on how important the pre-dismissal labor income is with regard to the pre-dismissal household income. If the lost labor income represents a small percentage of the household income, then not much of an impact should be expected regardless of the replacement rate. For this reason, we adjust the replacement rate and build the variable importance as the ratio of pre-dismissal labor income to pre-dismissal household income (H_t). We then define the importance adjusted replacement rate (IaRR) as follows.

$$\rho = (RR_{t+1} - 1) * (importance) = \frac{(Y_{t+1} + B_{t+1}) - Y_t}{H_t} \qquad (4)$$

This variable indicates how much percent of the household income has varied because of the job loss and the benefit received. The lower the replacement rate and the higher the importance of the

respondent labor income will approximate this variable to minus one. Given that everyone that applied for CERB received the cash transfer, this variable is never reaching minus one since that would be the case where the respondent's labor income is the only source of income with the benefit not replacing any of his lost income (RR=0, meaning that no benefit is received).

The variable will be close to zero if the replacement rate is close to one or if the respondent's labor income is unimportant for the household income. This variable could also take positive values; that is the case when the benefit received is superior to the labor income lost. In our study, this will happen for respondents with labor income in t less than $2,000, or when the respondent still had some labor income in t+1 in addition to the benefit received, which allowed them to have more income in t+1 than they used to have in t.

To build our variable of interest, the importance adjusted replacement rate, we use the survey information relating to income. The survey collects yearly information on labor income and other income for the respondent and the spouse for 2019. It also asks for each source of income if there was a change in April 2020 because of COVID-19 relative to the 2019 average and, if so, by how much. The respondent could indicate the dollar amount change or the percentage change. From the data, we can estimate the approximate amount of income for period t+1 for each source of income and the household income for t and t+1. Variables Y_t and Y_{t+1} consider only the labor income for the respondent.

The variable B_{t+1} represents the CERB, a fixed amount of $2,000 for each respondent. Since the cash transfer was a fixed amount for all applicants regardless of their lost labor income, a wide range is expected for the replacement rate across our sample. This is another important departure from the literature on unemployment insurance benefits. Previous research uses statutory replacement rates, and the variations in the variable in the periods studied are driven entirely by legislative reforms. The median for our replacement rate is 1.15, and the interquartile range is 0.77 to 1.51. Values greater than one are not surprising since some respondents had labor income in period t lower than $2,000, and others had a positive value for labor income in period t+1. Cox *et al.* (2020) note that even though lower-income households show greater falls in labor income, the estimated total income after the COVID-19 shock, including cash transfer benefits, increased the

most for those at the bottom of the income distribution. Ganong, Noel et Vavra (2020) find a median statutory replacement rate equal to 1.45 arising from the FPUC[45] and that 76% of workers eligible for UI have a statutory replacement rate above 100%. For our sample, the importance variable has a median of 0.62 and an interquartile range of 0.4 to 1.

The Model

In this section, we present the structural model that allows us to interpret our results in terms of the welfare gains or losses from the CERB cash transfer. Our starting point is the model in Browning et Crossley (2001), which has been adapted to suit the characteristics of the CERB program. One of the differences is that while they used statutory UI benefits in their study, we are investigating a fixed cash transfer for all applicants, regardless of their previous labor income. Additionally, the source of variation in benefits is different across the sample: whereas they use legislative changes to the Canadian UI system across time, we can obtain variation in benefits directly from our sample for the same period[46]. At a sample level, their data consists of individuals who lost their jobs and had no labor income when receiving the UI benefit; however, our data consists of individuals who lost their labor income entirely and some who did not[47].

Browning considers a two-period model in which period t represents the period before the negative income shock and t+1 represents the period after the income shock. The condition for optimal intertemporal allocation between t and t+1 is the following.

$$u'(c_{t+1}) = u'(c_t) - \omega_{t+1} \qquad (5)$$

ω_{t+1} is a surprise error term that includes the shock from the job loss, which is likely to be negative. The negative sign in front of it assure that negative shocks result in a rise in the marginal utility of consumption. Also, the surprise term is orthogonal to the information set in time t. If I_t represents the information available at time t, then:

[45] Cash transfer additional to the usual UI that an individual would receive.
[46] Some individuals lost their jobs and had no income when they received CERB, while others had some labor income when they received CERB.
[47] CERB was also for people that got their work income reduced, but with some limits.

$$E\ (\omega_{t+1}\mid I_t) = 0 \qquad (6)$$

Considering two scenarios, the first where the agent loses his job, then the realized shock would be equal to $\Delta_L + \epsilon_{t+1}$ and if the agent does not lose his job, we have $\Delta_E + \epsilon_{t+1}$. Δ_L captures the permanent shock from the job loss and the residual term ϵ_{t+1} captures the impact of all news except for the job loss. Then $E\ (\epsilon_{t+1}\mid I_t) = 0$. If we assign π_t to the probability of a job loss, and we introduce our two scenarios in Equation 6, we obtain the following.

$$\pi_t\ \Delta_L + (1-\pi_t)\ \Delta_E = 0 \qquad (7)$$

As one of the implications of this result, Browning writes, "the less expected the job separation is, the greater the negative shock associated with a job loss with respect to the shock of keeping the job." Then, the following is obtained.

$$E\ (\omega_{t+1}\mid I_t, job\ loss) = \Delta_L \qquad (8)$$

From this equation, we learn that the Euler equation shock might not be uncorrelated with past information. Like Browning, two sets of correlates for Δ_L are introduced. One set of correlates consists of variables on the characteristics of the individual in period t that would reflect the permanent shock, such as demographics, Z_t. The second set of correlates corresponds to variables indicating possible liquidity constraints. μ(.) represents the non-negative constraint function[48]. As Browning, we introduce the UI benefit level[49] (a_{t+1}) directly into the determination of Δ_L, and thus into the determination of consumption for t+1. Additionally, the level of assets, A_{t+1}, will also affect the level of liquidity constraints.

$$\Delta_L = f(Z_t, \mu\ (A_{t+1}, a_{t+1})) \qquad (9)$$

[48] Non-increasing in A_{t+1} and a_{t+1}
[49] The replacement ratio

This job loss function is decreasing in μ, reflecting that bad shocks will worsen in the presence of liquidity constraints; therefore, the job loss shock will be less negative as the benefit level is increased. From Equations 6, 9 and $\omega_{t+1} = \Delta_L + \epsilon_{t+1}$, a revised Euler equation is obtained.

$$u'(c_{t+1}) = -f\big(Z_t, \mu(A_{t+1}, a_{t+1})\big) - \epsilon_{t+1} \quad \textbf{(10)}$$

Using the same specification of consumption and utility function assumption as Browning et Crossley (2001), we have that $\ln c_t = \Lambda + \beta_t - u'(c_t)$, where Λ is a constant, β_t captures the effects of demographics and discount factors. The utility function is $u(c) = -c * (\ln c - 1 - \beta - \Lambda)$. Thus, we have the following equation.

$$ln\, c_{t+1} - ln\, c_t = (\beta_{t+1} - \beta_t) + f\big(Z_t, \mu(A_{t+1}, a_{t+1})\big) + \epsilon_{t+1} \quad \textbf{(11)}$$

Adopting a linear form of the functions, we have the following.

$$ln\, c_{t+1} - ln\, c_t = \beta Z_t' + \gamma \rho * X' + \epsilon_{t+1} \quad \textbf{(12)}$$

Similar to Browning, we use an approximation to estimate the left-hand side of the equation. We use the following approximation.

$$ln\, c_{t+1} - ln\, c_t \cong \frac{C_{t+1} - C_t}{C_t} \quad \textbf{(13)}$$

Note that this approximation differs from the one used by Browning et Crossley (2001). They divide by the current level of consumption (t+1), rather than the lagged level (t). We believe that using the usual construction of proportional change instead will produce more conservative results. A 33% change of the lagged level is equivalent to a 50% change of the current level. Therefore, we have the following specification to estimate the effects of the CERB on household spending.

$$\frac{C_{t+1} - C_t}{C_t} \cong \beta Z_t' + \gamma \rho * X' + \epsilon_{t+1} \quad \textbf{(14)}$$

The first set of variables Z contains controls for demographics, wealth, and employment. The second set of variables X is a subset of the controls Z; in that way, we ensure that the specification contains levels of these variables and their interaction with the benefit variable in every case. The parameter γ is the coefficient of interest in this study since it captures the effects of the importance adjusted replacement rate on spending changes for the different groups in X. Also, the data available allows us to include in the model strong controls for the permanent income shock.

As noted by Browning et Crossley (2001), three things are confounded when household spending changes because of unemployment. A response to the permanent income shock of job loss, a response to the transitory income shock of a job loss, and the cost of working. The responses to transitory income are the ones related to the consumption smoothing benefit of the CERB. It is, therefore, necessary to introduce a variable that controls for the cost of work since there is variation in work status across our sample. The survey asked questions related to the workplace and identified if respondents worked at home, at a fixed location outside the home, or at no fixed location outside the home for both periods. This allowed us to categorize the data into three groups: respondents who worked less than 15 days or nothing at all, those who worked from home, and those who worked outside home. We classify respondents in these categories for both periods.

From there, we created a measure that takes the value of zero if the place of work is the same for both periods, meaning that the cost of work was somewhat similar. It takes a value of one otherwise, capturing the cases where the cost of work mostly got reduced. The cost of work decreases for two reasons. Because the person changed work conditions and works from home in t+1 or the person lost his job in t+1. For both reasons, a similar reduction in spending caused by the cost of work is assumed. Evidently, people that lost their job might have an additional effect on spending because of the decrease in income. This variable is included in set Z in the employment indicators block.

Concerning our consumption variable, the survey contains two sets of questions relating to spending that will allow us to build our dependent variable. First, it asks for the total average monthly spending for 2019. Later it asks if the monthly household spending changed in April 2020

because of covid-19 relative to its 2019 average and, if so, by how much. The respondent could indicate the dollar amount change or the percentage change. From the data on the levels and change in average monthly spending, we construct a variable that gives the proportional change in total household spending from before the job loss to when they lost their job. This variable refers to total household spending, including durables and non-durables.

5. The Data

In this section, we describe the sample used in our main results. The original survey consists of 3,009 respondents, out of which 440 respondents are CERB applicants. We focus on this latter group and make the following additional sample restrictions. Since retired people were not the target of the program and most likely kept receiving a monthly retirement income, the first restriction drops people who were retired in 2019 (17 observations are dropped).

The remaining 423 respondents confirm to have applied for CERB for at least one of the following periods: from March 15th, 2020, to April 11th, 2020 (Period 1), from April 12th, 2020, to May 9th, 2020 (Period 2) and from May 10th, 2020 to June 6th, 2020 (Period 3). Since the measurement of most of the variables in this study is for April 2020, only people that applied for CERB for Periods 1 and/or 2 are relevant (16 observations of people that only applied for Period 3 are dropped).

The Survey provides information on variables such as monthly household spending, yearly labor income for the respondent, yearly other income for the respondent, yearly labor income for the spouse, and yearly other income for the spouse in 2019 and the changes in those characteristics in April 2020 (percentual change or amount change). If the total household income (including social benefits) for 2019 is reported to be less than $10,000 for a single person or less than $15,000 for a couple, then the observation is dropped (23 observations are dropped). It is unlikely that a person has a total income lower than that, given the benefit programs available in Quebec. These observations are also associated with outliers in other variables measured in the Survey.

From the Survey, it is possible to calculate the percentage change in monthly spending in April 2020 with regard to the average monthly spending in 2019. When this variable is -100% or less (meaning that consumption in April 2020 is reduced to 0 or less), the observation is dropped (1 observation is dropped). Also, observations showing this variable as 100% or more have been revised for consistency in the survey answers (1 observation is dropped). The Survey allows calculating income variables in dollars for April 2020, which have been checked not to have negative values. Some observations show negative income because of a rounding problem, those values have been replaced by 0 (5 values are replaced), and the ones that cannot be explained by a rounding problem are dropped (1 observation is dropped).

Because there is missing information relating to changes in monthly labor income for respondents and monthly spending in April 2020, 45 additional observations are dropped. The final sample consists of 336 observations. Table 1 reports the demographics of the sample.

Our sample consists of 56% male, and the average individual has 43 years old. More than half of the sample is married, with a spouse with income. Single respondents represent around 29%, followed by respondents that are separated, divorced, or widows representing 11%. Respondents that are married but with a spouse that has no income represent around 6% of our sample. The education characteristics are concentrated in people that completed high school (or, equivalently, a trade certificate or diploma) and those who studied more than high school (CEGEP, college, bachelor's degree or above), representing 41% and 54%, respectively. Only 5.2% indicated having less than a high school diploma.

Regarding employment, we find that 30% of the respondents indicated that in their job, it was feasible to work from home in 2019. Also, the industries of work most representative in our sample are manufacturing and other services (except public administration), representing 12.9% each. It is followed by Retail trade and Professional, scientific, and technical services, which represent 9.4% and 9.3%, respectively. Among industries with the lowest representation, we find Agriculture, forestry, and hunting; Management of companies and enterprises; and Administrative and support, and waste management with around 1% each.

Table 1: Demographics

Characteristics	Mean	Std. dev.	N
Age, yr	43.2	10.9	336
Male	55.6%		336
Marital status			
Single	28.8%		336
Separated/Divorced	11.1%		336
Married, spouse with no income at job loss	5.9%		336
Married, spouse w/income at job loss	54.2%		336
Education			
Less than high school	5.2%		336
High school	40.8%		336
More than high school	54.0%		336
Employment			
Laid off or looking for work in April 2020	83%		336
Feasibility to work from home in 2019	30.0%		336
Reduced the cost of work	82.6%		336
Industry of work			
Utilities	5.9%		336
Construction	3.8%		336
Manufacturing	12.9%		336
Retail trade	9.4%		336
Transportation and warehousing	7.5%		336
Professional, scientific and technical services	9.3%		336
Educational services	4.6%		336
Health care and social assistance	6.1%		336
Arts, entertainment and recreation	4.1%		336
Accommodation and food services	8.5%		336
Other services (except public administration)	12.9%		336
Other Industries	15.0%		336

Notes: This table presents summary statistics of variables collected through the Survey. Statistical weights built based on the 2016 Census were applied to the raw data. For continuous variables, the mean and standard deviation are shown, and for binary variables, the share is shown.
Source: Retirement and Savings Institute – Research Chair in Intergenerational Economics – Centre Interuniversitaire de Recherche en Analyse des Organisations Web survey conducted from 8 to 20 May 2020 using the AskingCanadians panel.

About 83% of our sample indicated to have been looking for a job or had been permanently or temporarily laid off in April 2020. This suggests that 17% of our sample was able to keep their job, but they have most probably reduced their monthly labor income. The CERB program allowed

people who had not lost their jobs but had a significant reduction in their labor income to be eligible for the benefit under certain restrictions. Having labor income no greater than $1,000 in the application period was one of the restrictions. However, the way the CERB was implemented, through a simplified online application, assured that every person who applied for it received the cash transfer in a maximum of ten days, regardless of being genuinely eligible[51]. Therefore, even if in that 17% of our sample some individuals were not truly eligible, we assume that they received the CERB cash transfer. Thus, their corresponding consumption behavior is relevant for our study.

We find that around 82.6% of our sample reduced the work cost. The identification of individuals with this characteristic was made by exploring their change in work location (outside home or home) and change in work situation (lost their job or not) from period t to t+1. Most of them were working outside home (at a fixed or no fixed location) in t and became unemployed, and some others were working outside home and started working from home. The other 17.4% mainly corresponds to individuals who kept working outside home and those already working from home in 2019 that kept working from home in April 2020.

Table 2 presents the financial situation in 2019 and the corresponding changes in April 2020 for the sample. The average monthly household income in 2019 is $7,687 (around $92,200 yearly). The average monthly labor income in 2019 for the respondent is $4,066 ($48,792 annually), and for the spouses (who have labor income) is $3,751 ($45,012 yearly). The survey allows us to compute the change in monthly labor income in April 2020 with regard to the monthly average in 2019. We observe that for the respondent, the labor income decreased on average by $1,890 in April 2020 and that the spouses' labor income decreased on average by $828.

We have 43% of the respondents indicating that they have other income besides labor income (e.g., investment income, gross rental income, etc.). The average monthly other income for the respondents in 2019 is $972, and the average monthly other income for the spouses is $659. Using the survey data, we estimated an average decrease in other labor income for the respondent in April 2020 at around $273; for the spouse, the decline is about $116.

[51] The verification of compliance was done months later.

Table 2: Financial Situation

Characteristics	Mean	Std. dev.	N
Income Indicators			
Monthly household income in 2019, $	7,686.5	4,919.5	336
Monthly labor income in 2019, $	4,065.9	2,522.0	336
Change in monthly labor income in April 2020, $	-1,889.8	2,437.4	336
Respondent had other income in 2019	43.4%		336
Monthly other income in 2019, $	972.0	1,752.1	336
Change in monthly other income in April 2020, $	-272.6	1,150.7	327
Monthly labor income for spouse in 2019, $	3,751.4	2,948.7	202
Change in monthly labor income for spouse in April 2020, $	-828.4	1,840.0	173
Monthly other income for spouse in 2019, $	658.8	1,461.2	202
Change in monthly other income for spouse in April 2020, $	-115.8	730.5	200
Importance	0.63	0.30	336
Importance adjusted Replacement Rate	0.13	0.43	336
Consumption Indicators			
Monthly spending in 2019, $	4,099.5	7,154.4	336
Change in monthly spending in April 2020, $	-733.9	2,268.4	336
Percentual change in monthly spending in April 2020	-14.2%	22.0%	336
Wealth Indicators			
Homeowner	63.1%		336
Had more than 1mo of labor income in non-housing wealth	68.3%		336
Received Social Assistance in 2018	32.1%		336

Notes: This table presents summary statistics of variables collected through the Survey. Statistical weights built based on the 2016 Census were applied to the raw data. For continuous variables, the mean and standard deviation are shown, and for binary variables, the share is shown.
Source: Retirement and Savings Institute – Research Chair in Intergenerational Economics – Centre Interuniversitaire de Recherche en Analyse des Organisations Web survey conducted from 8 to 20 May 2020 using the AskingCanadians panel.

Regarding expenditures, the mean monthly household spending in 2019 was around $4,100, with an estimated average reduction in April 2020 close to $734. On average, the percentual change in household spending from one period to the other was a reduction of around 14%. We observe that the reduction in the respondent's average labor income is more than twice the reduction in the average household spending. This spending reduction seems smaller than what we found in the literature about the spending reaction in the early stages of the pandemic (between 28% to 50%). However, our result is way above spending reduction after a job loss in a normal context (without the pandemic). Ganong et Noel (2019) discover that the typical individual receiving UI only cuts spending by around 6% in normal contexts.

Regarding wealth, we find that close to 63% of the respondents are homeowners. Also, in 2019 around 68% of our sample had more than one month of labor income in non-housing wealth, which refers to the total balance in the following accounts: RRSP, TFSA, other registered savings plans (such as RSP, RDSP, LIRA, RRIF, and LIF) and other savings/investments (cash, bank accounts, investment accounts that are not registered, etc.). This indicates individuals who are most likely not liquidity constrained. Additionally, we determined that around 32% of our sample indicates receiving GST at least in 2018[52], which suggests low income.

In Appendix Table A1, we show summary statistics for all the available data, divided into CERB applicants and non-CERB applicants. One of the main differences is the percentage of respondents who are laid off or looking for work in April 2020; it is around 80% for CERB applicants (and our sample) and approximately 24% for non-CERB applicants. Another critical difference seems to be the cost of work. Around 82% of CERB applicants reduced their work costs, while 51% of non-CERB applicants reduced it.

We explored whether consumption differences arise for CERB applicants and non-CERB applicants by regressing consumption on an indicator[53] of applicants and other relevant variables. Even though we found a negative sign for the indicator coefficient, there are no significant differences in consumption for both groups. This result agrees with Achou *et al.* (2020). Their descriptive paper evaluates average spending differences for these groups and finds no significant difference.

Evaluating whether receiving CERB or not affects consumption behavior might seem a reasonable path; however, CERB applicants and non-CERB applicants have experienced different situations, which lead them to have somewhat different characteristics. To apply for CERB, applicants must have lost their job or had a significant decrease in labor income. This brings up more differences than just labor income between these two groups. Non-CERB applicants most likely are still

[52] The question asks if the respondent received any extra payment from GST in April 2020, which was automatically done for the ones who received GST benefit in 2018.
[53] Dummy variable that takes the value of one if the respondent is a CERB applicant and 0 if he is a non-CERB applicant.

working and busy 40 hours per week, while CERB applicants that lost their jobs might have more free time, or others might be working some hours. Among other differences, the cost of work is likely dissimilar for these two groups. Our approach avoids some difficulties that might arise because of the differences between these groups. We explore variation in the replacement rates among people who applied for CERB to find if the generosity of CERB affected consumption outcomes.

6. Estimation Results

This part is divided into three sections. In the first part, we try to identify the mean effect of CERB on household spending. In the second section, we investigate heterogeneity in the results for households that are liquidity constrained. In the third section, we explore whether future expectations affect consumption levels. In the fourth and last section, we investigate the relationship between debt repayments and the benefit levels.

6.1 Consumption Smoothing

In this section, we investigate the role of the CERB in consumption smoothing. For that, we explore the relationship between the different importance adjusted replacement rates across the sample of households experiencing unemployment[54] because of covid-19 and the changes in consumption it incites.

In Table 3, we present OLS estimates from the regression of the percentage change in spending on the importance adjusted replacement rate and the permanent controls. We present the simplest model in the first column and add blocks of controls in the following columns to show the stability of the results. The controls are taken from period t and include age, sex, the importance of the respondent's labor income relative to household income, education indicators, polynomials in the logarithm of monthly labor income in the lost job, and the log of monthly household income. Measures of the household wealth are also included, such as homeowner, savings equal to or more

[54] Or reduction in work income

than one month of labor income, and GST credit beneficiary. Additionally, employment indicators are incorporated, such as the feasibility of working from home, control for the cost of work, and the industry of work of the respondent. We obtain stable results for our variable of interest along the different specifications, which are all significant at 1%.

Table 3: Baseline Results

Importance adjusted Replacement Rate	11.69***	10.62***	10.35***	12.50***	12.76***	13.93***
	(2.78)	(2.93)	(2.98)	(3.94)	(3.99)	(4.24)
Importance		-12.59**	-11.80**	-14.91	-15.45	-11.17
		(5.73)	(5.81)	(16.34)	(16.42)	(17.45)
Married, spouse w/income at job loss omitted						
Single		6.48*	6.08	8.97**	9.77**	8.39*
		(3.77)	(3.79)	(4.16)	(4.29)	(4.44)
Separated/Divorced		3.8	3.47	7.98	8.27	6.08
		(4.69)	(4.71)	(5.25)	(5.33)	(5.51)
Married, spouse with no income at job loss		9.47*	9.47*	11.98**	12.24**	12.12*
		(5.65)	(5.66)	(6.06)	(6.09)	(6.26)
Constant	-16.11***	-11.23***	-0.19	-1.75	0.72	-4.71
	(1.23)	(3.26)	(8.22)	(19.66)	(19.85)	(22.31)
Age?	NO	YES	YES	YES	YES	YES
Male?	NO	YES	YES	YES	YES	YES
Education Indicators?	NO	NO	YES	YES	YES	YES
Income Indicators?	NO	NO	NO	YES	YES	YES
Wealth Indicators?	NO	NO	NO	NO	YES	YES
Employment Indicators?	NO	NO	NO	NO	NO	YES
Industry of work?	NO	NO	NO	NO	NO	YES
R-squared	0.05	0.067	0.073	0.084	0.092	0.136
Observations	336	336	336	334	334	334

Note: This table presents results using equation 14, for which the dependent variable is the percentual change in monthly spending for the household. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

From the Survey, we have estimated that the mean labor income for CERB applicants is $3,792 in 2019 (see Table A1), meaning that the replacement rate was 53% for the average person in our survey that lost all his labor income and applied for CERB. The first coefficient estimate in column 6 of Table 3 indicates that for a household in which the labor income of the respondent is the only source of income (importance = 1), a 10 percentage point cut in benefit levels (from the sample average of 53% to 43%) would lead to a 1.4% fall in household spending. Moreover, since a cut in the replacement rate from 53% to 43% represents a cut in the benefit paid of 18.9%, the elasticity of expenditure with respect to the benefit is (1.4 / 18.9) = 0.07.

Browning et Crossley (2001) explores the impact of unemployment insurance benefit levels on total household expenditures in Canada. Their estimates imply that for a household in which the respondent's earnings was the only source of income, a 10% point cut in the benefit result in an average fall of 0.8% in total expenditure, which yields an elasticity of expenditure to the benefit of 0.05. Another study performed by Gruber (1997) indicates that a 10% reduction in the unemployment insurance replacement rate leads to an average fall of 2.65% in food expenditures in the U.S. According to Gruber, the response of food expenditures and total household expenditure should be the same; however, this assumption is unlikely to be true. Browning estimates an implied change of 4% for total expenditure for Gruber's results (by using elasticity 0.6 for food) to make results comparable. Our results suggest a small mean impact of benefit levels on total household consumption, which is more in line with the results found by Browning.

In the context of the pandemic, Casado *et al.* (2020) use statutory replacement rates and determinants of county spending levels to estimate effects on consumption in the U.S. Their study event is like ours in that most of their sample show replacement rates above 100%; however, all their observations correspond to individuals who have no labor income. They find that a 1% increase (decrease) in the replacement rate will lead to an increase (decrease) in spending by 0.167% in the U.S; their results are not too far from ours. Even though we find small effects, we expect them to be heterogeneous, which will be investigated in the next section.

Compared to the literature, people that received CERB were allowed to keep working a bit[55]. Thus, when studying the effects of CERB, it would not be appropriate for us to ignore the labor income in period t+1 since it contributes to the income replacement. Given the characteristics of CERB, the Replacement Rate estimated in our study, therefore, incorporates labor income in period t+1 for respondents who worked in April 2020 (see equation 4). Thus, our replacement rate could partly reflect a labor income replacement (with regards to t), not only a statutory replacement rate, as is normally used in the literature about UI. Usually, in the period where an individual receives UI, he does not receive labor income, which is why a statutory replacement rate represents the replaced income for other studies. Our replacement rate and the statutory replacement rates (used

[55] There are limits on the amount of income received for CERB applicants; however, every person that applied for CERB received the cash transfer without restriction. The compliance verification was made after the cash transfer.

in other research) aim to measure the same – the labor income variation of one period with regards to the period before the shock. Therefore, our replacement rate variable built and its corresponding results are comparable to other studies of UI.

It is also possible to calculate the implied cut in total spending from a 1 dollar decrease in replaced income. Considering that the mean monthly labor income for CERB applicants in t is $3,792, a reduction of 10% in the replacement ratio means a drop of $379 (i.e., a payment of CERB going from $2,000 to $1,621). And considering the mean spending for the sample in t+1 of $3,365.6, the reduction in spending would be (1.4% * $3,365.6) = $47.12. Then, for a household in which the respondent's labor income is the only source of income, the implied cut in total spending from a 1 dollar cut in replaced income is $0.12=47.12/379.

In Appendix Table A2, we investigate different definitions of the income adjusted replacement rate, which allow us to make some robustness checks. The CERB program targeted people who lost their jobs because of the pandemic and aimed to replace some of the labor income lost. However, some people had other income (including investment income, rental income, etc.), which were also affected by the pandemic. It is possible to build a replacement rate variable for the total income of the respondent (including other income). In that case, our definition of replacement rate and importance would change; following that logic, we create variables RR2, importance2, and IaRR2.

Additionally, we built a replacement rate for the total household income under the name RRH; in this case, the importance would be one since we are accounting for the total change in household income. Finally, since the CERB application was personal, it is possible that in some households, two people received it. If the respondent indicated in the survey that his spouse lost her job because of covid-19, then we can assume that they applied for the CERB and received it. The variable RRH2 is created under this premise (see Table A4 in the appendix for all the definitions). In Table A2 in the appendix, we present the regressions of the variables created. The coefficients for all the alternative measures of the benefit are significant at 1%. Therefore, our main results happen to be stable.

6.2 Liquidity Constraints and Income

In this section, we investigate subsets of households that are likely to be liquidity constrained, meaning that we are studying heterogeneity in benefit responses. Under the premise that transitory income effects should only be observed among the liquidity-constrained respondents, we have higher chances of finding indications of large consumption smoothing benefits by studying subsets with this characteristic.

To investigate the role of liquidity constraints, we add the liquidity constraint variable and the corresponding interaction with the importance adjusted replacement rate to our preferred specification (column 6 of Table 3). In theory, we expect to find a positive sign for the interaction term because liquidity-constrained individuals will be more affected by the replacement rate. A decrease in replacement rate will generate a higher drop in consumption for our liquidity constrained group with regards to the no liquidity constrained group. That way, our liquidity constrained group would be forced to decrease consumption more. If the replacement rate increases, the liquidity constrained group would be avoiding a larger fall in consumption than the no liquidity constrained group. Thus, our liquidity constrained group would have larger smoothing benefit effects.

As predictors of liquidity constraints, we considered different measures found in the literature, such as labor income in t (Hsieh, 2003), non-housing wealth[57] (Zeldes, 1989), the ratio of liquid wealth[58] to labor income in t (Souleles (1999), Stephens Jr (2008)), not a homeowner (Browning et Crossley, 2001), had missed or deferred loan payments (Feldman et Heffetz, 2022), age (Gourinchas et Parker (2002), Stephens Jr (2008)), and level of education (Jappelli et Pistaferri, 2011). We created an indicator for being in the lowest quartile for some variables and an indicator of having the characteristic for others. Table 4 presents the results of evaluating liquidity constraints in the preferred specification. Except when defined on the basis of labor income, we find that individuals did not respond differently for most definitions of liquidity constraints.

[57] The sum of RRSP, TFSA, other registered savings plans (such as, RSP,RDSP,LIRA,RRIF,LIF) and other savings/investments (cash, bank accounts, investment accounts that are not registered, etc).
[58] Measured as non-housing wealth.

Table 4: Liquidity Constraints

Labor income is in the lowest quartile x IaRR	-20.76***						
	(7.62)						
Labor income is in the lowest quartile	1.44						
	(4.72)						
Non-housing wealth in the lower quartile x IaRR		-0.25					
		(6.64)					
Non-housing wealth in the lower quartile		-9.05					
		(8.15)					
Ratio of liquid wealth to work inc in the lower quartile x IaRR			-1.37				
			(6.65)				
Ratio of liquid wealth to work inc in the lower quartile			-15.36				
			(9.75)				
No homeowner x IaRR				-2.09			
				(6.50)			
No homeowner				1.63			
				(3.13)			
Missed or deferred payments x IaRR					2.83		
					(6.59)		
Missed or deferred payments					-2.69		
					(2.94)		
Age of respondent in lower quartile x IaRR						2.35	
						(6.53)	
Age of respondent in lower quartile						0.75	
						(4.87)	
High school or less x IaRR							0.66
							(6.31)
Importance adjusted Replacement Rate	23.78***	14.01***	14.50***	15.04***	13.03***	12.89**	13.71***
	(5.59)	(5.01)	(4.86)	(5.48)	(4.64)	(5.09)	(4.75)
Less than high school omitted							
High school	-11.82	-10.95	-11.32	-10.98	-11.39	-11.21	-10.83
	(8.97)	(9.06)	(9.04)	(9.06)	(9.11)	(9.10)	(9.09)
More than high school	-11.49	-11.21	-11.52	-10.97	-11.34	-11.21	-10.7
	(8.95)	(9.04)	(9.03)	(9.05)	(9.08)	(9.09)	(9.20)
Constant	14.21	5.16	11.6	-5.07	-3.56	-3.3	-4.92
	(23.89)	(23.89)	(24.41)	(22.70)	(22.44)	(22.73)	(22.44)
Age?	YES	YES	YES	YES	YES	YES	YES
Male?	YES	YES	YES	YES	YES	YES	YES
Marital Status?	YES	YES	YES	YES	YES	YES	YES
Income Indicators?	YES	YES	YES	YES	YES	YES	YES
Wealth Indicators?	YES	YES	YES	YES	YES	YES	YES
Employment Indicators?	YES	YES	YES	YES	YES	YES	YES
Industry of work?	YES	YES	YES	YES	YES	YES	YES
R-squared	0.158	0.14	0.144	0.137	0.139	0.137	0.136
Observations	334	334	334	334	334	334	334

Note: This table presents results using equation 14, for which the dependent variable is the percentual change in monthly spending for the household. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

The CERB program was designed not only to replace the total labor income, but also to complement it. In our sample, we found that CERB mainly complements earnings – only 26% of the sample experienced a total loss in labor income in t+1. For individuals with a pre-pandemic monthly labor income below $2,000, CERB represents an increase in income. For those with monthly labor income well above $2,000, CERB would not totally replace the income loss. This

suggests that labor income might be an important driver for liquidity constraints in our study. Thus, finding different effects depending on the labor income in t is expected.

In column one in Table 4, we found evidence of heterogeneous effects for respondents with monthly labor income in t in the lower quartile of the sample ($2,500 or less); the interaction coefficient is significant at 1% and has a negative value. Once again, we consider the case where the labor income of the respondent is the only source of income for the household (importance = 1); for individuals with labor income in t equal to $2,500 or below, a 10 percentage point cut in benefit levels would lead to a 0.3% fall in household spending, with an associated elasticity of (0.3 / 18.9) = 0.016. We find a significantly less effect for this group when compared to our initial results in Table 3, which indicate effects from 1.04% to 1.4% reduction in spending. Evaluated at the means, our result represents a reduction in CERB of $379 (i.e., the payment of CERB going from $2,000 to $1,621) and a reduction in expenditures of $10.1. Hence, the implied cut in total spending from a 1 dollar cut in replaced income is $0.03=10.1/379, much smaller than in the previous section.

As mentioned before, with liquidity constraints, we expected the interaction term to be positive for the respondent who earns $2,500 or below; however, given the characteristics of CERB, this negative result is not surprising. This group of people has a mean labor income in period t equal to $1,709, which means that by receiving the CERB fixed cash transfer of $2,000, they had their income increased at least[59] by 17% on average in period t+1 (i.e., a benefit level of 1.17 on average[60]). So, even if the benefit level reduces 10%, on average, they will have higher replaced labor income in period t+1 with respect to labor income in period t. Thus, it is reasonable to find significant results suggesting that this group has fewer consumption benefits from the cash transfer than the rest of the sample, in the sense that if the replacement rate decreases, they will not be forced to decrease consumption more. This finding suggests that individuals with a labor income in t above $2,500 might have larger consumption smoothing benefits than those with a labor income of less than $2,500 (i.e., a positive sign for the interaction). We investigated the group with

[59] Some observations received some work income in period t+1.
[60] Only 22% of the observations in this group show a RR lower than 1, with a range 0.8 to 0.98. Even though 59% of the observations in the group had income equal to $2,000 or lower.

labor income between the first and second quartile, meaning between $2,500 and $3,750. As expected, the sign for the interaction is positive; however, the result is not significant (Table A3 in the appendix).

The fact that a 10 percentage point cut in the benefit levels leads to a much smaller fall in household spending for individuals with labor income in t lower than $2,500 implies that the CERB did not really play its intended role, which was stimulating consumption. For this group of CERB recipients, it is possible that they could have used the cash transfer to save or pay debts instead of using it only for consumption. Cox *et al.* (2020) found evidence that lower-income households increased savings after receiving government cash transfers in the U.S, and Coibion, Gorodnichenko et Weber (2020) found that recipients mostly saved or paid debts in the U.S.

Our results suggest that for respondents who earned $2,500 or less in t, the CERB enabled them to meet their spending needs, meaning they could smooth consumption. However, they were not the ones who had the greater consumption smoothing benefit. It seems that those are among the group of individuals who earned more than $2,500 in t. This finding supports Ganong, Noel et Vavra (2020); they note that the presence of generous UI reverses income patterns that would have arisen across income levels during the pandemic.

Our results support the finding of Achou *et al.* (2020). They use a bigger sample from the same data source used in this study. By exploring average consumption changes among groups, they find evidence suggesting that CERB might have helped recipients maintain their standard of living (i.e., smooth consumption). In the context of the pandemic, Bateman *et al.* (2022) also found evidence of consumption smoothing from a government program in Australia that allowed individuals to withdraw money from retirement accounts; however, they found that a primary driver of the withdrawals was precautionary savings.

6.3 Future expectations

In this section, we investigate whether future expectations affect consumption levels. Some literature on consumption behavior during the pandemic has highlighted the importance of future

expectations; some even argue that this might be one of the main drivers of consumption during the initial phase of the pandemic (Christelis *et al.* (2020), Chen, Qian et Wen (2021)).

To explore future expectations, we first identified the respondents who were pessimists. The survey allowed us to label respondents as pessimists depending on their expected labor income change, their future ability to work, and their outlook on the future evolution of stock markets. Regarding their expectations of labor income change in 2020, the survey asked the respondents to assign a probability to five scenarios (one corresponding to their labor income increasing in 2020 and the other four consisting of their labor income decreasing by different percentages[61]). An individual is classified as Pessimist A if he assigns a lower probability to the income increase scenario and a higher probability to any of the other four scenarios (i.e., labor income decrease). Pessimist A, therefore, characterizes individuals who believe their labor income will most likely decrease in 2020 regarding the previous year.

A respondent is labeled as Pessimist B if he thinks he will not be able to work as much as he would like for the rest of the year (2020) because of COVID-19[62] and if he assigns a higher probability to the scenario where his work situation will be back to what it was before the pandemic in more than six months than to the scenario where his work situation goes back to normal in the next six months. Pessimist B indicates the expectations that the respondent has regarding his work situation.

Our third category of pessimists corresponds to the evolution of the stock market after the pandemic started. A respondent is classified as Pessimist C if he assigns a probability of 0 to the scenario where the stock market recovers in less than six months and a probability greater than 0 to the scenario[63] where the market recovers after six months. Thus, a respondent classified as Pessimist C is completely convinced that the stock market will not recover in less than six months.

[61] Work income decrease by more than 10%, 20%, 40% and 50%.
[62] The question is: How will COVID-19 impact your ability to work for the rest of this year?
[63] The other scenarios are: 1 year or longer, 2 years or longer, 5 years or longer.

Baker *et al.* (2020a) also used six months as a cut point for pessimists and optimists for survey data[64].

To investigate the impact of future expectations, we add each pessimist variable and the corresponding interaction with the importance adjusted replacement rate to our preferred specification (column 6 of Table 3). Table 5 shows the results of evaluating future expectations on our preferred specification. We did not find significant results for our pessimist indicators or the interactions with the importance adjusted replacement rate.

Table 5: Future Expectations

Pessimist A x IaRR		8.06				
		(6.67)				
Pessimist A	-0.67	-1.71				
	(2.81)	(2.94)				
Pessimist B x IaRR				0.33		
				(7.86)		
Pessimist B			-1.21	-1.23		
			(3.11)	(3.13)		
Pessimist C x IaRR						1.5
						(6.49)
Pessimist C					-2.12	-2.19
					(2.73)	(2.75)
Importance adjusted Replacement Rate	13.59***	9.01	13.65***	13.60***	13.60***	13.11***
	(4.48)	(5.87)	(4.31)	(4.48)	(4.27)	(4.78)
Age?	YES	YES	YES	YES	YES	YES
Male?	YES	YES	YES	YES	YES	YES
Marital Status?	YES	YES	YES	YES	YES	YES
Education Indicators?	YES	YES	YES	YES	YES	YES
Income Indicators?	YES	YES	YES	YES	YES	YES
Wealth Indicators?	YES	YES	YES	YES	YES	YES
Employment Indicators?	YES	YES	YES	YES	YES	YES
Industry of work?	YES	YES	YES	YES	YES	YES
R-squared	0.137	0.141	0.137	0.137	0.138	0.138
Observations	334	334	334	334	334	334

Note: This table presents results using equation 14, for which the dependent variable is the percentual change in monthly spending for the household. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

We found that the coefficients of the pessimist variables are all negative, which was the expected sign. However, we did not find evidence that future expectations significantly impacted

[64] In their survey they asked if the respondent "believed that the economy would be back to normal within 6 months of the survey date" (May 2020).

consumption levels in the month after the pandemic measures started (April 2020). The fact that some people are pessimists seems not to have significantly affected their consumption decisions in our sample.

Additionally, all the coefficients for the interaction terms are positive, which is what we would expect for the group of individuals who are more vulnerable during the pandemic. This positive sign might signal a greater effect on consumption for the pessimists than the non-pessimists. The estimated consumption effect for the pessimists would suggest impacts similar to our mean results found in the first section. However, we do not find a significant difference in the results for pessimists and non-pessimists.

We did not find evidence of heterogenous effects for future expectations of labor income, job situation, or market outlook. This result suggests that people's consumption decisions were not affected by their worries about the future, allowing them to appropriately smooth consumption. In that sense, CERB played a role in helping people to fulfill their consumption needs regardless of their future expectations.

Our finding might explain one of the results in Achou *et al.* (2020). They find that individuals who did not lose their jobs have their spending expectations in line with their income expectations. However, on average, individuals who lost their jobs give a probability of 47.5% that their income in 2020 will decrease by 10% or more, and a chance of 23.3% that their spending will reduce by 10% or more. It is possible that CERB was perceived to be so generous that expectations of future consumption might mainly capture the reduction in spending coming from the decrease in supply or need for certain expenditures. In a way, these respondents expect that they will be able to smooth consumption in the future, maybe due to CERB's generosity.

6.4 Debt repayment and savings

Research has shown that government benefits have been used for purposes different from consumption in the context of the pandemic. It seems that recipients have preferred savings and

paying debts for the cash transfer (Coibion, Gorodnichenko et Weber, 2020). In this section, we explore the role of the CERB on debt repayment and savings contributions.

To investigate the effect of CERB on debt repayment, we take as a dependent variable a dummy which takes the value of one if the individual missed and/or deferred a debt repayment and zero otherwise. From the Survey, we can identify by type of debt individuals who missed and/or deferred their debt repayments because of the pandemic. The categories of debt are mortgage debt, credit card debt, and other debt (e.g., personal loans, student loans, car loans, lines of credit, etc.). As independent variables, we use the same controls as our preferred specification (column 6 in Table 3).

Table 6: Effects on credit card repayment

Importance adjusted Replacement Rate	0.09**	0.05	0.14**	0.12*	0.03
	(0.04)	(0.06)	(0.06)	(0.07)	(0.06)
Ratio of liquid wealth to labor income in the lower quartile x IaRR			-0.25***		
			(0.09)		
Ratio of liquid wealth to labor income in the lower quartile			0.15		
			(0.13)		
Non-housing wealth in the lower quartile x IaRR				-0.19**	
				(0.09)	
Non-housing wealth in the lower quartile				0.13	
				(0.11)	
Pessimist B x IaRR					0.22**
					(0.10)
Pessimist B					0.06
					(0.04)
Age?	NO	YES	YES	YES	YES
Male?	NO	YES	YES	YES	YES
Marital Status?	NO	YES	YES	YES	YES
Education Indicators?	NO	YES	YES	YES	YES
Income Indicators?	NO	YES	YES	YES	YES
Wealth Indicators?	NO	YES	YES	YES	YES
Employment Indicators?	NO	YES	YES	YES	YES
Industry of work?	NO	YES	YES	YES	YES
R-squared	0.017	0.135	0.16	0.149	0.156
Observations	336	334	334	334	334

Note: This table presents the results of regressing a dummy for credit card repayments missed or deferred on the right-hand side variables in equation 14. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

In Table 6 we present estimates from the regression of credit card repayment on the importance adjusted replacement rate and the permanent controls. We present the simplest model in the first column and a model with all the controls in the second column. For the remaining columns, we

add liquidity constraint variables and the corresponding interaction with the importance adjusted replacement rate to our preferred specification (Table 6, column 2).

For the first two columns, we observe that the coefficients of our variable of interest are positive, meaning that, on average, a decrease in the benefit levels would not lead to an increase in the probability of missed and/or deferred credit card repayments. For a household where the respondent's labor income is the only income source (importance = 1), a benefit level of 53% will contribute with a probability of 4.8% to miss or defer a credit card repayment. The effect remains positive when controlling for observables, but it becomes insignificant.

In column three in Table 6, we found evidence of heterogeneous effects for respondents with the ratio of liquid wealth to labor income in the lower quartile of the sample (0.62 or less); the interaction coefficient is significant at 1%. Considering again the case where the labor income of the respondent is the only source of income for the household, for individuals with a ratio of liquid wealth to labor income in t equal to 0.62 or below, a 10 percentage point cut in benefit levels would lead to an increase of 1.1% in the probability to miss and/or defer credit card payments. Also, evaluating at a benefit level of 53%, households in this group will have a 1.75% more probability of missing or deferring credit card repayments than households that are not liquidity constrained. Moreover, our results show that benefit levels beyond 60% would lead to the probability of missing/deferring credit card repayments for liquidity constrained households to be less than the corresponding probability for no liquidity constrained households when controlling for the other variables.

In column four, we investigate heterogeneous effects for respondents with no non-housing wealth. Our results are in line with the previous paragraph. For households with no non-housing wealth, where the respondent’s labor income is the sole source of income, a 10 percentage point cut in benefit levels leads to an increase of 0.7% in the probability of credit card repayment being missed or deferred. A benefit level of 53% leads households with no non-housing wealth to have a 2.93% more likelihood of missing or deferring credit card repayments than households with non-housing wealth.

For both measures of liquidity-constrained individuals, we have found heterogeneous effects. Our results indicate that a decrease in the benefit levels would lead to an increase in the probability of missing/deferring credit card repayments for liquidity-constrained individuals. This suggests that CERB was indeed used to make credit card repayments and that the level of income replaced determines how likely the credit repayment is. Thus, it seems that CERB was generous enough to allow receivers to cover their consumption needs, and it even went to the extent of helping them with their credit card debt repayments obligations.

We are again evaluating at benefit levels equal to 53%, for households with the respondent's labor income as the sole source of income. We found that, on average, households with zero non-housing wealth will show an additional probability of missing/deferring a credit card repayment, around twice the additional chance for households having 62% of their monthly labor income as non-housing wealth. Even though we find significant heterogeneous effects on credit card repayment for liquidity-constrained individuals, the magnitude of the impact of changes in UI benefits is small.

We also explore heterogeneous effects for the future expectations of the respondent. In column five in Table 6 we observe significant results at 5% for the interaction term. Results suggest that for individuals with negative future expectations regarding their work situation, a decrease in the benefit levels would not lead to an increase in the probability of missing/deferring debt payments. However, evaluating at benefit levels of 53% for households where the respondent is the sole breadwinner. If the respondent has a negative future expectation regarding his work situation, then the household has a 17.66% more chance of missing/deferring credit card repayments than households where the respondent is not a pessimist. From this, we learn that being a pessimist has, on average, a more significant impact on the probability of credit card missed/deferred repayments than for liquidity-constrained individuals. It is possible that pessimist individuals choose to miss or defer credit card repayments to keep more cash with themselves[65], maybe as precautionary savings.

[65] Our results are driven by deferred credit card repayments. Deferring payments allow individuals to keep using the credit card.

In Table 7 we present estimates from the regression of other debt repayment on the importance adjusted replacement rate and the permanent controls. The category of other debt repayments refers to any type of debt that is not a credit card or mortgage. It consists of personal loans, student loans, car loans, lines of credit, etc. We present the simplest model in the first column and models with all the controls in the remaining columns (controls correspond to those from column 6 in Table 3). We do not find definitive evidence of an effect on other debt repayment; however, results show some suggestive evidence.

Table 7: Effects on other debt repayment

Importance adjusted Replacement Rate	0.07**	0.01	-0.08
	(0.03)	(0.05)	(0.07)
Pessimist A x IaRR			0.15*
			(0.08)
Pessimist A			-0.03
			(0.04)
Age?	NO	YES	YES
Male?	NO	YES	YES
Marital Status?	NO	YES	YES
Education Indicators?	NO	YES	YES
Income Indicators?	NO	YES	YES
Wealth Indicators?	NO	YES	YES
Employment Indicators?	NO	YES	YES
Industry of work?	NO	YES	YES
R-squared	0.013	0.17	0.18
Observations	336	334	334

Note: This table presents the results of regressing a dummy for other debt repayment missed or deferred on the right-hand side variables in equation 14. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

In the first two columns in table 7, we observe that the coefficients of our variable of interest are positive. These results might suggest that, on average, a decrease in the benefit levels would not lead to an increase in the probability of missing/deferring other debt payments.

In column three in Table 7, we observe significant results at 10% for the interaction term. Results might suggest that for individuals with negative future expectations regarding labor income, a decrease in the benefit levels would not lead to an increase in the probability of missing/deferring debt payments. Also, evaluating at benefit levels equal to 53%, households in which the respondent

is a pessimist and his labor income is the only source of income will have a 5% more chance to miss/defer other debt repayment than non-pessimist households. In unreported results, mortgage debt was also investigated; however, no results were found.

Table 8: Effects on RRSP and TFSA withdrawals

A. Effects on RRSP withdrawals			
Importance adjusted Replacement Rate	-0.08***	-0.07	-0.09**
	(0.03)	(0.04)	(0.05)
Pessimist B x IaRR			0.14*
			(0.08)
Pessimist B		-0.03	-0.04
		(0.03)	(0.03)
B. Effects on TFSA withdrawals			
Importance adjusted Replacement Rate	-0.05*	-0.02	-0.04
	(0.03)	(0.04)	(0.04)
Pessimist B x IaRR			0.14*
			(0.07)
Pessimist B		-0.05*	-0.06*
		(0.03)	(0.03)
Age?	NO	YES	YES
Male?	NO	YES	YES
Marital Status?	NO	YES	YES
Education Indicators?	NO	YES	YES
Income Indicators?	NO	YES	YES
Wealth Indicators?	NO	YES	YES
Employment Indicators?	NO	YES	YES
Industry of work?	NO	YES	YES
R-squared Panel A	0.023	0.128	0.137
R-squared Panel B	0.011	0.185	0.195
Observations	336	334	334

Note: This table presents the results of regressing a dummy for withdrawals on the right-hand side variables in equation 14. In Panel A, the dummy indicates RRSP withdrawals and in Panel B, it indicates TFSA withdrawals. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

To investigate the effects of CERB on savings, we take as a dependent variable a dummy which takes a value of one if the individual withdraws from a particular saving account and zero otherwise. The Survey enabled us to identify to which saving accounts the respondents withdrew due to the COVID-19 crisis; these accounts are classified into four categories. The types of savings accounts are RRSP, TFSA, other registered savings plans (such as RESP, RDSP, LIRA, RRIF, LIF), and other savings/investments (including cash, bank accounts, investment accounts that are

not registered, etc.). As independent variables, we use the same controls as our preferred specification (column 6 in Table 3).

In Table 8, we present estimates from the regression of RRSP and TFSA withdrawals on the importance adjusted replacement rate and permanent controls. We did not find definitive evidence of an effect of the CERB on RRSP or TFSA withdrawals; however, our results suggest that future expectations might be an important driver.

Results in the first column of Table 8 suggest a negative relationship between savings withdrawals and the benefit levels. For households where the respondent's labor income is the sole source of income, a 10 percentage point cut in benefit levels leads to an increase of 0.8% in the probability of RRSP withdrawal and an increase of 0.5% in the probability of TFSA withdrawal. The negative coefficient remains stable when adding controls for both panels; however, it loses significance. Results in the third column might suggest heterogeneity for pessimist people. For individuals with negative future expectations regarding their work situation, a decrease in the benefit levels would not lead to withdrawals from RRSP or TFSA accounts.

7. Conclusions

In this study, we have used a survey from The Retirement and Savings Institute that gathered information on how COVID-19 affected household finances in Canada. Using a sample of CERB applicants in Quebec, we investigate the consumption benefits of this cash transfer. Also, we have explored heterogeneity in our results for liquidity constraints individuals and the role of future expectations in consumption behavior.

This study contributes to the literature on the benefits of UI. While studies on UI have been using statutory replacement rates, our replacement rate has been built taking into account the characteristics of the CERB program, which allowed applicants to have some income in the period where they received the cash transfer. Our mean replacement rate is 1.15 for the sample. We found an average effect of the CERB policy, which indicates that reducing 10% in the replaced income

leads to a 1.4% fall in household spending. This small effect on consumption from an unanticipated income change seems to align with the PIH theoretical prediction.

We also discovered that this effect masks heterogeneity for people with labor income in the lowest quartile. This group consists of individuals with pre-pandemic labor income equal to $2,500 or less; for them, the CERB cash transfer resulted in an increase in income with regards to their pre-pandemic labor income. We found that for this group reducing 10% in the replaced income leads to a 0.3% fall in household spending; therefore, for them, the policy is not as effective in stimulating consumption. This result suggests that these individuals might have preferred to save or pay debt with the CERB cash transfer instead of using it for consumption. More granular data would be needed to make a deeper analysis.

We investigated other traditional liquidity constraints subgroups such as non-housing wealth, the ratio of liquid wealth to labor income, being not a homeowner, having missed or deferred loan payments, age, and level of education. We did not find significantly different results for these groups. Additionally, we investigated future expectations by classifying our sample as pessimists and not pessimists regarding labor income, job situation, and market outlook. We did not find heterogeneity in the results for pessimists, suggesting that people's consumption decisions were not affected by their expectations of future labor income, job situation, or market outlook.

Our findings show that the CERB program was generous and useful in smoothing consumption. Even though the mean effects of the CERB levels on consumption are small, we find that the program was so helpful that people with liquidity constraints (evaluated as labor income in t equal to or below $2,500) were not the most benefited. The program not only allowed them to cover their expenses, but it might have also helped to increase savings or reduce debt. Our estimates suggest that people who found the CERB amount more useful to smooth consumption are in the group whose labor income was above $2,500.

We also investigated the relationship between CERB and debt repayments. Results show that, on average, a decrease in the replaced income would not lead to an increase in the probability of missing or deferring credit card repayments. However, we find heterogeneity for liquidity-

constraint individuals. Our estimations indicate that a 10 percentage point cut in benefit levels leads to an increase of 0.7% in the probability of credit card repayment being missed or deferred for individuals with no non-housing wealth. Additionally, we found that for individuals with a negative future expectation regarding their work situation, then their household has a 17.66% more chance of missing or deferring credit card repayments than households where the respondent is not a pessimist. This suggests that pessimists might have preferred to miss or defer credit card repayments to keep some precautionary savings.

Bibliography

Achou, Bertrand, David Boisclair, Philippe d'Astous, Raquel Fonseca, Franca Glenzer et Pierre-Carl Michaud (2020). « Early impact of the covid-19 pandemic on household finances in quebec », *Canadian Public Policy*, vol. 46, no S3, p. S217-S235.

Agarwal, Sumit, Chunlin Liu et Nicholas S Souleles (2007). « The reaction of consumer spending and debt to tax rebates—evidence from consumer credit data », *Journal of political Economy*, vol. 115, no 6, p. 986-1019.

Agarwal, Sumit et Wenlan Qian (2014). « Consumption and debt response to unanticipated income shocks: Evidence from a natural experiment in singapore », *American Economic Review*, vol. 104, no 12, p. 4205-4230.

Alexander, Diane et Ezra Karger (2020). « Do stay-at-home orders cause people to stay at home? Effects of stay-at-home orders on consumer behavior », *The Review of Economics and Statistics*, p. 1-25.

Andersen, Asger Lau, Emil Toft Hansen, Niels Johannesen et Adam Sheridan (2020). « Consumer responses to the covid-19 crisis: Evidence from bank account transaction data », *Available at SSRN 3609814*.

Baker, Scott R, Robert A Farrokhnia, Steffen Meyer, Michaela Pagel et Constantine Yannelis (2020a). « How does household spending respond to an epidemic? Consumption during the 2020 covid-19 pandemic », *The Review of Asset Pricing Studies*, vol. 10, no 4, p. 834-862.

Baker, Scott R, Robert A Farrokhnia, Steffen Meyer, Michaela Pagel et Constantine Yannelis (2020b). *Income, liquidity, and the consumption response to the 2020 economic stimulus payments*, National Bureau of Economic Research.

Bateman, Hazel, Loretti Dobrescu, Junhao Liu, Ben Rhodri Newell et Susan Thorp (2022). « Determinants of early-access to retirement savings: Lessons from the covid-19 pandemic », *Available at SSRN 4121240*.

Bodkin, Ronald (1959). « Windfall income and consumption », *The American Economic Review*, vol. 49, no 4, p. 602-614.

Bounie, David, Youssouf Camara et John W Galbraith (2020). « Consumers' mobility, expenditure and online-offline substitution response to covid-19: Evidence from french transaction data », *Available at SSRN 3588373*.

Broda, Christian et Jonathan A Parker (2014). « The economic stimulus payments of 2008 and the aggregate demand for consumption », *Journal of Monetary Economics*, vol. 68, p. S20-S36.

Browning, Martin et Thomas F Crossley (2001). « Unemployment insurance benefit levels and consumption changes », *Journal of public Economics*, vol. 80, no 1, p. 1-23.

Cajner, Tomaz, Leland D Crane, Ryan A Decker, John Grigsby, Adrian Hamins-Puertolas, Erik Hurst, *et al.* (2020). *The us labor market during the beginning of the pandemic recession*, National Bureau of Economic Research.

Carvalho, Bruno, Susana Peralta et Joao Pereira dos Santos (2020). « What and how did people buy during the great lockdown? ».

Carvalho, Vasco M, Juan R Garcia, Stephen Hansen, Álvaro Ortiz, Tomasa Rodrigo, José V Rodríguez Mora, *et al.* (2020). « Tracking the covid-19 crisis with high-resolution transaction data », *Royal Society Open Science*, vol. 8, no 8, p. 210218.

Casado, Miguel Garza, Britta Glennon, Julia Lane, David McQuown, Daniel Rich et Bruce A Weinberg (2020). *The aggregate effects of fiscal stimulus: Evidence from the covid-19 unemployment supplement*, National Bureau of Economic Research.

Chetty, Raj, John N Friedman, Nathaniel Hendren, Michael Stepner et The Opportunity Insights Team (2020). *How did covid-19 and stabilization policies affect spending and employment? A new real-time economic tracker based on private sector data*, vol. 27431, National Bureau of Economic Research Cambridge, MA.

Christelis, Dimitris, Dimitris Georgarakos, Tullio Jappelli et Geoff Kenny (2020). « The covid-19 crisis and consumption: Survey evidence from six eu countries ».

Chronopoulos, Dimitris K, Marcel Lukas et John OS Wilson (2020). « Consumer spending responses to the covid-19 pandemic: An assessment of great britain », *Available at SSRN 3586723*.

Coibion, Olivier, Yuriy Gorodnichenko et Michael Weber (2020). *How did us consumers use their stimulus payments?*, National Bureau of Economic Research.

Cox, Natalie, Peter Ganong, Pascal Noel, Joseph Vavra, Arlene Wong, Diana Farrell, *et al.* (2020). « Initial impacts of the pandemic on consumer behavior: Evidence from linked income, spending, and savings data », *Brookings Papers on Economic Activity*, vol. 2020, no 2, p. 35-82.

Drescher, Katharina, Pirmin Fessler et Peter Lindner (2020). « Helicopter money in europe: New evidence on the marginal propensity to consume across european households », *Economics Letters*, vol. 195, p. 109416.

Dunn, Abe, Kyle Hood et Alexander Driessen (2020). *Measuring the effects of the covid-19 pandemic on consumer spending using card transaction data*, US Department of Commerce, Bureau of Economic Analysis.

East, Chloe N et Elira Kuka (2015). « Reexamining the consumption smoothing benefits of unemployment insurance », *Journal of Public Economics*, vol. 132, p. 32-50.

Farrell, Diana, Peter Ganong, Fiona Greig, Max Liebeskind, Pascal Noel et Joseph Vavra (2020). « Consumption effects of unemployment insurance during the covid-19 pandemic », *Available at SSRN 3654274*.

Feldman, Naomi et Ori Heffetz (2022). « A grant to every citizen: Survey evidence of the impact of a direct government payment in israel », *National Tax Journal*, vol. 75, no 2, p. 000-000.

Flavin, Marjorie A (1981). « The adjustment of consumption to changing expectations about future income », *Journal of political economy*, vol. 89, no 5, p. 974-1009.

Friedman, Milton (1957). « The permanent income hypothesis », dans *A theory of the consumption function*, Princeton University Press, p. 20-37.

Ganong, Peter et Pascal Noel (2019). « Consumer spending during unemployment: Positive and normative implications », *American economic review*, vol. 109, no 7, p. 2383-2424.

Ganong, Peter, Pascal Noel et Joseph Vavra (2020). « Us unemployment insurance replacement rates during the pandemic », *Journal of Public Economics*, vol. 191, p. 104273.

García-Montalvo, José et Marta Reynal-Querol (2020). *Distributional effects of covid-19 on spending: A first look at the evidence from spain*.

Gertler, Paul et Jonathan Gruber (2002). « Insuring consumption against illness », *American economic review*, vol. 92, no 1, p. 51-70.
Gourinchas, Pierre-Olivier et Jonathan A Parker (2002). « Consumption over the life cycle », *Econometrica*, vol. 70, no 1, p. 47-89.
Gruber, Jonathan (1997). « The consumption smoothing benefits of unemployment insurance », *The American Economic Review*, vol. 87, no 1, p. 192-205.
Hacioglu Hoke, Sinem, Diego R Känzig et Paolo Surico (2020). « Consumption in the time of covid-19: Evidence from uk transaction data ».
Hacıoğlu-Hoke, Sinem, Diego R Känzig et Paolo Surico (2021). « The distributional impact of the pandemic », *European Economic Review*, vol. 134, p. 103680.
Hall, Robert E (1978). « Stochastic implications of the life cycle-permanent income hypothesis: Theory and evidence », *Journal of political economy*, vol. 86, no 6, p. 971-987.
Hanspal, Tobin, Annika Weber et Johannes Wohlfart (2021). « Exposure to the covid-19 stock market crash and its effect on household expectations », *The Review of Economics and Statistics*, vol. 103, no 5, p. 994-1010.
Hsieh, Chang-Tai (2003). « Do consumers react to anticipated income changes? Evidence from the alaska permanent fund », *American Economic Review*, vol. 93, no 1, p. 397-405.
Jappelli, Tullio, Jörn-Steffen Pischke et Nicholas S Souleles (1998). « Testing for liquidity constraints in euler equations with complementary data sources », *Review of Economics and statistics*, vol. 80, no 2, p. 251-262.
Jappelli, Tullio et Luigi Pistaferri (2010). « The consumption response to income changes », *Annu. Rev. Econ.*, vol. 2, no 1, p. 479-506.
Jappelli, Tullio et Luigi Pistaferri (2011). « Financial integration and consumption smoothing », *The Economic Journal*, vol. 121, no 553, p. 678-706.
Johnson, David S, Jonathan A Parker et Nicholas S Souleles (2006). « Household expenditure and the income tax rebates of 2001 », *American Economic Review*, vol. 96, no 5, p. 1589-1610.
Kaplan, Greg et Giovanni L Violante (2014). « A model of the consumption response to fiscal stimulus payments », *Econometrica*, vol. 82, no 4, p. 1199-1239.
Karger, Ezra et Aastha Rajan (2020). « Heterogeneity in the marginal propensity to consume: Evidence from covid-19 stimulus payments », *FRB of Chicago Working Paper No. WP 2020-15*.
Kubota, So, Koichiro Onishi et Yuta Toyama (2021). « Consumption responses to covid-19 payments: Evidence from a natural experiment and bank account data », *Journal of Economic Behavior & Organization*, vol. 188, p. 1-17.
Misra, Kanishka et Paolo Surico (2014). « Consumption, income changes, and heterogeneity: Evidence from two fiscal stimulus programs », *American Economic Journal: Macroeconomics*, vol. 6, no 4, p. 84-106.
Mitman, Kurt et Stanislav Rabinovich (2020). « Optimal unemployment benefits in the pandemic ».
Modigliani, Franco et Richard Brumberg (1954). « Utility analysis and the consumption function: An interpretation of cross-section data », *Franco Modigliani*, vol. 1, no 1, p. 388-436.
Parker, Jonathan A, Nicholas S Souleles, David S Johnson et Robert McClelland (2013). « Consumer spending and the economic stimulus payments of 2008 », *American Economic Review*, vol. 103, no 6, p. 2530-2553.
Paxson, Christina H (1992). « Using weather variability to estimate the response of savings to transitory income in thailand », *The American Economic Review*, p. 15-33.

Paxson, Christina H (1993). « Consumption and income seasonality in thailand », *Journal of political Economy*, vol. 101, no 1, p. 39-72.

Sheridan, Adam, Asger Lau Andersen, Emil Toft Hansen et Niels Johannesen (2020). « Social distancing laws cause only small losses of economic activity during the covid-19 pandemic in scandinavia », *Proceedings of the National Academy of Sciences*, vol. 117, no 34, p. 20468-20473.

Souleles, Nicholas S (1999). « The response of household consumption to income tax refunds », *American Economic Review*, vol. 89, no 4, p. 947-958.

Stephens Jr, Melvin (2001). « The long-run consumption effects of earnings shocks », *Review of Economics and Statistics*, vol. 83, no 1, p. 28-36.

Stephens Jr, Melvin (2008). « The consumption response to predictable changes in discretionary income: Evidence from the repayment of vehicle loans », *The Review of Economics and Statistics*, vol. 90, no 2, p. 241-252.

Wolpin, Kenneth I (1982). « A new test of the permanent income hypothesis: The impact of weather on the income and consumption of farm households in india », *International Economic Review*, p. 583-594.

Zeldes, Stephen P (1989). « Consumption and liquidity constraints: An empirical investigation », *Journal of political economy*, vol. 97, no 2, p. 305-346.

Appendix

Table A1: Summary Statistics Comparison for the sample, CERB Applicants and Non-CERBApplicants

	Sample		CERB Applicants		Non-CERB Applicants	
Characteristics	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Age, yr	43.2	10.9	43.0	11.3	43.2	10.8
Male	55.6%		51.9%		50.0%	
Marital status						
Single	28.8%		29.8%		30.1%	
Separated/Divorced	11.1%		11.0%		10.3%	
Married, spouse with no income at job loss	5.9%		6.9%		6.4%	
Married, spouse w/income at job loss	54.2%		52.3%		53.2%	
Education						
Less than high school	5.2%		6.3%		5.8%	
High school	40.8%		41.3%		32.5%	
More than high school	54.0%		52.4%		61.8%	
Employment						
Laid off or looking for work in April 2020	83%		81.8%		24.01%	
Feasibility to work from home in 2019	30.0%		29.8%		43.4%	
Reduced the cost of work	82.6%		82.1%		50.8%	
Industry of work						
Utilities	5.9%		6.8%		9.9%	
Construction	3.8%		3.4%		3.6%	
Manufacturing	12.9%		13.7%		6.1%	
Retail trade	9.4%		10.8%		5.8%	
Transportation and warehousing	7.5%		7.0%		5.1%	
Professional, scientific and technical services	9.3%		8.2%		9.7%	
Educational services	4.6%		5.1%		7.4%	
Health care and social assistance	6.1%		6.0%		8.8%	
Arts, entertainment and recreation	4.1%		4.2%		1.7%	
Accommodation and food services	8.5%		8.1%		2.5%	
Other services (except public administration)	12.9%		12.1%		10.9%	
Other Industries	15.0%		14.8%		28.6%	
Income Indicators						
Monthly household income in 2019, $	7,686.5	4,919.5	7,579.1	5,070.0	10,055.4	10,905.7
Monthly labor income in 2019, $	4,065.9	2,522.0	3,792.0	2,659.7	4,877.9	4,577.5
Change in monthly labor income in April 2020, $	-1,889.8	2,437.4	-1,753.7	2,362.2	-141.5	3,978.9
Respondent had other income in 2019	43.4%		40.6%		36.7%	
Monthly other income in 2019, $	972.0	1,752.1	879.8	1,721.8	1,139.1	4,729.9
Change in monthly other income in April 2020, $	-272.6	1,150.7	-1,628.5	28,974.2	-31.1	1,326.7

Monthly labor income for spouse in 2019, $	3,751.4	2,948.7	3,527.0	2,892.0	4,406.7	4,080.2
Change in monthly labor income for spouse in April 2020, $	-828.4	1,840.0	-722.5	1,697.1	-282.0	2,844.2
Monthly other income for spouse in 2019, $	658.8	1,461.2	676.8	1,522.2	1,234.2	5,627.0
Change in monthly other income for spouse in April 2020, $	-115.8	730.5	-106.8	673.1	42.5	2,104.9
Importance	0.63	0.30	0.63	0.31		
Importance adjusted Replacement Rate	0.13	0.43	0.13	0.43		
Consumption Indicators						
Monthly spending in 2019, $	4,099.5	7,154.4	4,097.8	7,494.4	4,397.6	9,936.9
Change in monthly spending in April 2020, $	-733.9	2,268.4	-676.9	2,615.1	-339.2	2,460.4
Percentual change in monthly spending in April 2020	-14.2%	22.0%	-3.1%	102.0%	-2.4%	154.0%
Wealth Indicators						
Homeowner	63.1%		60.9%		65.1%	
Had more than 1mo of labor income in non-housing wealth	68.3%		66.6%		66.6%	
Received Social Assistance in 2018	32.1%		33.6%		25.6%	
Observations	336		423		2245	

Notes: This table presents summary statistics of variables collected through the Survey. Respondents who were retired in 2019 are omitted. The group labeled as "Sample" are a subgroup of the group labeled as "CERB Applicants." Statistical weights built based on the 2016 Census were applied to the raw data. For continuous variables, the mean and standard deviation is shown, and for binary variables, the share is shown.
Source: Retirement and Savings Institute – Research Chair in Intergenerational Economics – Centre Interuniversitaire de Recherche en Analyse des Organisations Web survey conducted from 8 to 20 May 2020 using the AskingCanadians panel.

Table A2: Baseline Results with different definitions of IaRR

Importance adjusted Replacement Rate	13.93***			
	(4.24)			
Importance adjusted Replacement Rate 2		11.56***		
		(3.90)		
Replacement Rate Household			12.35***	
			(3.62)	
Replacement Rate Household 2				10.35***
				(3.50)
Importance	-11.17			
	(17.45)			
Importance 2		22.23*		
		(12.45)		
Married, spouse w/income at job loss omitted				
Single	8.39*	3.83	10.15**	11.72**
	(4.44)	(5.74)	(4.40)	(4.55)
Separated/Divorced	6.08	0.63	6.88	8.47
	(5.51)	(6.49)	(5.45)	(5.60)
Married, spouse with no income at job loss	12.12*	8.7	13.78**	14.20**
	(6.26)	(6.89)	(6.32)	(6.37)
Ln(monthly labor income 2019)	-0.04	-10.21**	-5.45	-6.43
	(7.49)	(5.03)	(4.77)	(4.76)
Constant	-4.71	-34.81**	-19.49	-19.67
	(22.31)	(16.92)	(14.70)	(15.03)
Age?	YES	YES	YES	YES
Male?	YES	YES	YES	YES
Education Indicators?	YES	YES	YES	YES
Income Indicators?	YES	YES	YES	YES
Wealth Indicators?	YES	YES	YES	YES
Employment Indicators?	YES	YES	YES	YES
Industry of work?	YES	YES	YES	YES
R-squared	0.136	0.155	0.159	0.15
Observations	334	325	306	306

Note: This table presents results using equation 14, for which the dependent variable is the percentual change in monthly spending for the household. ***, **, and * represent significance at the 1, 5, and 10 percent level, respectively.

Table A3: Liquidity Constraints and Income

Labor income is in the lowest quartile crossed with IaRR	-20.76***	
	(7.62)	
Labor income is in the lowest quartile	1.44	
	(4.72)	
Labor income between 1st and 2nd quartile crossed with IaRR		3.65
		(10.33)
Labor income between 1st and 2nd quartile		3.54
		(3.46)
Importance adjusted Replacement Rate	23.78***	13.29***
	(5.59)	(4.51)
Importance	-21.84	-13.69
	(17.73)	(17.61)
Age?	YES	YES
Male?	YES	YES
Marital Status?	YES	YES
Education Indicators?	YES	YES
Income Indicators?	YES	YES
Wealth Indicators?	YES	YES
Employment Indicators?	YES	YES
Industry of work?	YES	YES
R-squared	0.158	0.141
Observations	334	334

Note: This table presents results using equation 14 for which the dependent variable is the percentual change in monthly spending for the household. ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

Table A4: Variables Construction

Variable ID	Definition	Formula
Dependent variable		
spending_i	monthly spending in 2019 for hh ($)	raw data
diff_m_spending_i	change in monthly spending for hh from 2019 to 2020 ($)	estimated from raw data
spending_i20	monthly spending in 2020 for hh ($)	spending_i + diff_m_spending_i
diffp_m_spending_i	percentual change in monthly spending for hh from 2019 to 2020 (%)	diff_m_spending_i / spending_i
y1	Dependent variable	diffp_m_spending_i *100
Importance adjusted Replacement rate		
income_i	yearly work income in 2019 for i	raw data
m_income_i	monthly work income in 2019 for i	income_i / 12
diff_m_income_i	change in monthly work income for i from 2019 to 2020 ($)	estimated from raw data
m_income_i20	monthly work income in 2020 for i	m_income_i + diff_m_income_i
income_hh	yearly income in 2019 for hh	raw data
m_income_hh	monthly income in 2019 for hh	income_hh / 12
RR1	Replacement Rate (RR)	(2000 + m_income_i20)/ m_income_i
importance_0	Importance	m_income_i / m_income_hh
IaRR1	Importance adjusted Replacement Rate (IaRR)	(2000+ m_income_i20 - m_income_i) / m_income_hh
otherincome_i	yearly other income 2019 for i	raw data
m_otherincome_i	monthly other income 2019 for i	otherincome_i / 12
diff_m_otherincome_i	change in monthly other income for i from 2019 to 2020 ($)	estimated from raw data
m_otherincome_i20	monthly other income 2020 for i	m_otherincome_i + diff_m_otherincome_i
RR2	Replacement Rate 2 (RR2)	2000 / (m_income_i + m_otherincome_i)
importance_1	Importance 2	(m_income_i + m_otherincome_i) / m_income_hh
IaRR12	Importance adjusted Replacement Rate 2 (IaRR2)	(2000+ m_income_i20 - m_income_i + m_otherincome_i20 - m_otherincome_i) / m_income_hh
income_sp_i	yearly work income in 2019 for sp	raw data
m_income_sp_i	monthly work income in 2019 for sp	income_sp_i / 12
diff_m_income_sp_i	change in monthly work income for sp from 2019 to 2020 ($)	estimated from raw data
m_income_sp_i20	monthly work income in 2020 for sp	m_income_sp_i + diff_m_income_sp_i
otherincome_sp_i	yearly other income 2019 for sp	raw data
m_otherincome_sp_i	monthly other income 2019 for sp	otherincome_sp_i / 12
diff_m_otherincome_sp_i	change in monthly other income for sp from 2019 to 2020 ($)	estimated from raw data
m_otherincome_sp_i20	monthly other income 2020 for sp	m_otherincome_sp_i + diff_m_otherincome_sp_i
IaRR5	Replacement Rate household (RRH)	(2000+ m_income_i20 - m_income_i + m_otherincome_i20 - m_otherincome_i + m_income_sp_i20 - m_income_sp_i + m_otherincome_sp_i20 - m_otherincome_sp_i) / m_income_hh
IaRR52	Replacement Rate household 2 (RRH2)	equal to IaRR5 if spouse did not lose job, otherwise (2000+ m_income_i20 - m_income_i + m_otherincome_i20 - m_otherincome_i + 2000 + m_income_sp_i20 - m_income_sp_i + m_otherincome_sp_i20 - m_otherincome_sp_i) / m_income_hh
Other variables		
age		raw data
age40	Age (in decades from 40)	(age - 40) / 10
male	dummy	raw data
single	Marital status: dummies, separ includes divorced,separated and	estimated from raw data
separ	widow; couple1inc includes married or common-law with partner	estimated from raw data
couple1inc	with no income in 2019. Omitted category is married or common-law with partner with income in 2019.	estimated from raw data
highsch	Education: dummies, less than high school is the omitted category	estimated from raw data
morethanhs		estimated from raw data
rrsp19	RRSP (Registered Retirement Savings Plan), both individual and group-based (4)	raw data
tfsa19	TFSA (Tax Free Savings Account), both individual and group-based ($)	raw data
regsavings19	Other registered savings plans (for instance, RESP, RDSP, LIRA, RRIF, LIF). Registered Education Savings Plan (RESP), Registered Disability Savings Plan (RDSP), Locked-In Retirement Account	raw data

	(LIRA), Registered Retirement Income Fund (RRIF), Life Income Funds (LIF). ($)	
othersavings19	Other savings / investments not included above (cash, bank accounts, investment accounts that are not registered, etc.) ($)	raw data
nonhwealth	non-housing wealth	rrsp19 + tfsa19 + regsavings19 + othersavings19
D_nonhwealth	dummy, for RRSP, TFSA, other registered savings plans, other savings or investments	estimated from raw data
homeowner	dummy, for primary residence, secondary residence or other residential real state	estimated from raw data
soc_assistance	dummy, eligible for social assistance in 2018	estimated from raw data
m_income_hh1000	monthly income in 2019 for hh in $1,000s	m_income_hh / 1000
lnm_income_hh1000		ln(m_income_hh1000)
m_income_i1000	monthly work income in 2019 for i in $1,000s	m_income_i/1000
lnm_income_i1000	Ln(monthly work income 2019)	ln(m_income_i1000)
lnm_income_i1000sq		lnm_income_i1000 ^ 2
lnm_income_i1000cub		lnm_income_i1000 ^ 3
Dindustry(i)	dummies for industries	estimated from raw data

Note: i refers to the respondent, sp refers to the spouse of the respondent and hh refers to household.