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Consumption Effects of Mortgage Payment Holidays: Evidence During the Covid-19 Pandemic

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This appendix describes in detail the steps we take in cleaning our dataset.

A. Data Cleaning

1. **Debit transactions with no tags**

   We drop debit transactions that are not tagged, since we cannot observe the type of spending it refers to. But we keep un-tagged transactions on the credit side because they refer to some form of income, even if we cannot pin down exactly whether it is salary income, or non-labour income.

2. **Users with business accounts**

   We drop users with business accounts. One reason for this is that the nature of the spending may be different for these users, possibly because spending may just reflect business costs which should not be seen as consumption. Similarly, credits in their accounts may also mostly reflect business revenues, not income. In addition, the income/revenue is expressed in gross terms, while for the rest of the sample, the non self-employed, it is net of taxes.

   We identify and drop these users according to one or more of following criteria: (i) users who have debits with the tags 'Business Accommodation' and 'Business Expenses'; (ii) users with salaries or wages as debits, meaning that the user pays salaries through her business accounts; (iii) users with dividends as debits; and (iv) users with the account type 'Other', as it may refer to business accounts.

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3. **Savings accounts**

   We keep savings accounts in our dataset since they have valuable information, such as the amount of interest income.

4. **Pension and investment returns**

   We include them in total savings.

5. **Transfers between accounts**

   We remove transactions which are purely transfers between different accounts within the same household.

6. **Drop small transactions**

   We drop transactions for amounts smaller than £0.5.

7. **Minimum number of transactions**

   We require users to have at least:

   - £200 in debits in all months between January–November 2020
   - 5 transactions per month, every month but one between January–November 2020, and every month but two in 2019.

8. **Large credit card expenses**

   We impose a cut-off of £10,000.

9. **Age**

We restrict the sample to users aged between 18 and 100 years old.

10. **Refunds**

We consider refunds from shopping as part of savings, but not income. We would ideally remove the transaction altogether from the credit and debit sides but that is very challenging, since some refunds may be processed in a different month, and others may be partial refunds (e.g. refund for some items from a grocery store) preventing us from identify the original purchase.

11. **Cash**

We consider cash as a separate category and not part of consumption, since we cannot track how households use the cash (expenditure or saving).

12. **Bank charges**

We treat bank charges, interest charges, and penalty charges separately.

13. **Online shopping spending category**

We aggregate transactions from well-known online merchants, such as Amazon and eBay, to get a sense of shifts in consumption since the Covid-19 shock.

14. **Users with children**

We use the following approach to identify users with children:

- if user's net income $<$ £60,000: we first search for a specific statutory child benefit amount, i.e. £21.05 for one child per week plus £13.95 per week for additional children in 2020, or £20.70 for one child per week plus £13.70 per week for additional children in 2019. We then search for child associated spending in other debits.
- if user's net income $>$ £60,000: we only search for child associated spending.

15. **Number of jobs per user**

We have to assess if any additional monthly labour income comes from the same employer or job or if it is paid from multiple separate sources (suggesting self-employment). This is important to identify salary employed from self-employed users. To identify if multiple labour income payments per month correspond to one or more employment sources, we use the algorithm below:

- For multiple labour income entries paid in the same day :

  - we assume that they come from the same employment source if the account reference for the payment is the same, regardless of the amount;
  - we assume that they come from different employment sources if the account reference for the payment is different, regardless of the amount.

- For multiple labour income entries in a month, paid in different days (approximately 17% of users with salaries):

  - we assume that they come from the same employment source if they are paid 7, 14 or 28 days apart from one another, or the day after or the day before (to account for non-business days), *and* the amount is no more than 20% different from one another;
  - we assume that they come from different employment sources otherwise.

16. **Identification of mortgage payments**

We adopt the following approach to identify regular mortgage repayments across months:

- we require that the value of the monthly mortgage repayment does not vary by more than -5% and +15% between months
- we require that the same mortgage repayment appears at least three months in the data, to make sure we capture consistent payments for the same mortgage

- we require that the same mortgage repayment appears at least two months in a row, to ensure flow of payments.

One of the challenges we have relates to identifying consistent monthly mortgage repayments from other mortgage-related transactions which were labeled as mortgage payments within the same month. There are a few reasons why users multiple mortgage payment transactions per month:

(a) transfers between accounts, e.g. one account only serves to pay the mortgage, while another one is used to restore the balance of the account that makes the payment

(b) early mortgage repayments, which can be scheduled repayments or ad-hoc

(c) possible mortgage fees or penalties

(d) genuine multiple mortgage repayments per month, for instance for property-investors

We make the following adjustments to identify genuine mortgage repayments towards the principal and interest of the loan, from other mortgage-related transactions:

- we catalog mortgage transactions made within the same day, for the same amount and transaction reference, as transfers between different personal accounts of a given user. We then drop duplicated mortgage payment transactions in that month.
- we do not include early repayments in the total amount of regular monthly mortgage payments. Some users have multiple monthly mortgage payments of very small amounts, and they are also very volatile from one month to another. These transactions are most likely irregular early repayments, or fees.

17. **Mortgage DSR and rent-to-income ratio**

We construct mortgage DSRs and rent-to-income ratio by taking mortgage or rental payments divided by after-tax income.

18. **Saving rate**

We compute the saving rate using the identity $S = 1 - C/Y$. The saving rate follows the National Accounts definition, which is also in line with the OECD definition: i.e. disposable income plus pension entitlements minus final consumption expenditure. It thus excludes financial investments from this calculation. The only deviation we make from the National Accounts definition is to not include pension entitlements or pension contributions made by the users to their employers, given that we do not observe them. Household disposable income includes wages and salaries, financial income, and social benefits, net of taxes and social contributions. Household final consumption expenditure refers to spending made by households to meet their everyday needs, such as food, clothing, housing (rent), energy, transport, durable goods (notably cars), health costs, leisure, and miscellaneous services. Housing investment should thus be excluded but not other spending on durable goods. We do not include debt payments other than payments on mortgages. The latter acts as a proxy for owners' equivalent rent. We expand our measure of savings by also considering other forms of non-regular income (e.g. refunds), and ATM withdrawals.

$$\text{Savings rate} = 1 - \frac{\text{non-hous. cons.} + \text{mortg. pay.} + \text{rent pay.} + \text{ATM cash} + \text{other spend.}}{\text{total income} + \text{other income}}$$

19. **Other**

- We winsorize income variables with extreme outliers at the 1% and 99%.