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Once or Twice a Month? The Impact of Payment Frequency on Spending Behavior*

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Abstract

We study how the frequency of income payments affects consumption and spending behavior using plausibly exogenous variation across Finnish pension benefit recipients with different surname initials. We find that twice-a-month payments remove the large consumption and spending hikes widely documented to be associated with monthly payments. Compared to those paid twice, those paid once a month end up spending more monthly instead of cutting back on spending late in the month. Consequently, once-a-month payments lead to saving less (or borrowing more), even if the significant extra spending on expensive durable goods is considered as saving.

Keywords: consumption; spending; consumption smoothing; household finance; time preference; payment frequency; social security; pensions
JEL classification codes: D12; D14; D15; H55; I38

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I. Introduction

The empirical literature on the spending response to regular income receipts has shown that spending, and even the consumption of necessities such as food, tend to peak after benefit payments in the US (Stephens, 2003; Shapiro, 2005; Mastrobuoni and Weinberg, 2009; Hastings and Washington, 2010). Similar evidence related not only to benefits but also salaries has been found in other countries (Stephens and Unayama, 2011; Stephens, 2006; Aguila et al., 2017). Although spending peaks can be harmless and even an indication of optimization behavior (e.g., transaction cost minimization), they can also be associated with suboptimally non-smooth consumption (in the case of time inconsistency) and can lead to too little money left for consumption needs and bills in the days before the next payment (Stephens, 2003; Shapiro, 2005; Baugh and Wang, 2021). Moreover, impatience, which is the likely cause of the post-payment consumption peaks, presumably also results in higher overall expenditures and thus saving less for the future or borrowing more. For example, Hurst (2003) reports that responsiveness of spending to predictable income changes earlier in life predicts a low level of net wealth at retirement.

It has been argued that dividing payments into smaller, more frequent installments might remove spending peaks and lead to smoother consumption (Shapiro, 2005; Mastrobuoni and Weinberg, 2009). Some empirical evidence on infrequently (quarterly or every two months) paid benefits suggests that this is the case (Stephens and Unayama, 2011; Aguila et al., 2017). However, salary and especially benefit payments are typically monthly, but there is no empirical evidence on how paying recipients twice a month instead would affect the time patterns of spending and consumption.

Furthermore, there are no estimates on the extent to which more frequent payments alleviate a lack of money late in the pay cycle on the one hand and low savings or high debt accumulation on the other. The results that more frequent payments improve food security are in line with the former effect (Haushofer and Shapiro, 2016; Aguila et al., 2017), but we are not aware of any studies estimating the size of the effect of pay frequency on spending or consumption levels late in the pay cycle. Consistent with the latter effect, some studies find that recipients of frequent payments spend less – and thus save more or borrow less – than recipients of infrequent payments (Haushofer and Shapiro, 2016; Baugh and Correia, 2022).[1]

Some recent studies have presented evidence of a potential benefit of infrequent payments: they can foster investments in expensive durable goods by providing recipients with sufficient liquidity (Haushofer and Shapiro, 2016; Aguila et al., 2017; Brune et al.,

[1]More specifically, Haushofer and Shapiro (2016) find that those with more frequent payments spend less on certain items without spending correspondingly more on the other observed items. However, the authors report a zero effect on savings in accounts.

2021). Therefore, infrequent payments may have a positive effect on saving in the form of durable goods in addition to the negative effect on money savings discussed above. The two effects may coexist, which raises an interesting question of which of them dominates. Furthermore, there is no evidence on the expensive-goods effect from countries with highly developed financial institutions that can alleviate the saving and credit constraints behind the effect.

In this paper, we exploit exogenous variation in benefit payment schedules to study the effects of payment frequency – once a month vs. twice a month – on household spending and consumption. We use detailed expenditure diary and survey data and administrative income data that enable a careful analysis of the timing and level of spending. First, we study whether receiving benefit payments twice a month instead of once a month leads to a smoother monthly spending and consumption pattern. If that is the case, we study the previously unexplored question of the extent to which a smoother pattern is associated with higher expenditures later in the month on the one hand and lower monthly expenditures on the other. Finally, we study whether payment frequency affects spending on durable goods in general and through influencing spending on expensive goods in particular.

The plausibly exogenous variation in payment frequency between households is caused by a unique feature of the Finnish national pension benefit system, the largest public cash transfer program in the country. A recipient's last name initial determined (until 2013) whether she received her national pension benefits in the first days of the month (initials from A to K) or later in the month (other initials). Together with the transfers that were paid in the beginning of the month to all recipients, mostly contribution-based pensions, this led some recipients to receive all of the aforementioned benefits in the first days of the month while others received a share of their benefits later in the month. We show that the surname-initial groups are similar in their observed characteristics, which supports the idea that the variation based on the groups of surname initials is exogenous and, therefore, a convincing novel source of identification of causal effects.

We find clear evidence that once-a-month payments cause post-payment peaks in spending on strictly nondurable goods (goods that are consumed at or soon after purchase) as well as in spending more broadly. In contrast, we do not find similar peaks for those receiving payments twice a month. The post-payment increase in strictly nondurables for the once-a-month group is 24%, which implies that the twice-a-month payment schedule leads to a much smoother consumption pattern. Despite the payment-induced consumption and spending peaks, the once-a-month recipients do not experience periods of significantly lower consumption or spending within the pay cycle compared to the twice-a-month recipients. Instead, they end up spending 4.3% more during an average pay cycle

and having a 3-5% lower net saving rate. In line with the lower net saving rate, we find indicative evidence for the once-a-month group having larger average consumer loans. Finally, we find that infrequent payments lead to significantly more spending on expensive items and, as a result, on durable goods.

The results suggest that paying people twice instead of once a month leads to a markedly smoother monthly consumption path by removing monthly spending peaks. Further, once-a-month payments result in significantly more monthly spending (on both nondurable and durable goods) than twice-a-month payments. These results together suggest that spending peaks are financed by saving less for future months or by borrowing more instead of cutting back on nondurable spending in the days before the next payment. This means that while a once-a-month payment schedule leads to more savings in the form of durable goods, the twice-a-month schedule leads to more total net savings.

Based on our results, frequent payments seem to lead to more favorable outcomes than infrequent payments although two caveats are in order. First, the result that frequent payments lead to saving more (or borrowing less) would not apply in the case of strong saving and credict constraints prevalent in some developing countries. Second, the cash on hand of a household on different days and weeks is typically affected by the timing of income receipts from multiple sources as well as bill due dates. Therefore, dividing income from a single source (say, pension or salary) into two installments may not have the desired effect on the amount of liquidity available and thus on spending and consumption.

The paper proceeds as follows: Section II. presents the relevant institutions and the payment schedules, as well as the data and estimation methods. Section III. presents the results, and Section IV. discusses and concludes.

II. Payment dates, data and estimation

A. The benefits and their payment dates

In this paper, we focus on the spending and consumption behavior of the majority of national pension benefit recipient households who also receive contribution-based pensions or other benefits paid in the first days of the month (88% of the national pension benefit recipients in our data). For this group, there is exogenous variation in the frequency of receiving payments, which we discuss in detail below. Benefits within the national pension scheme and contribution-based pension benefits are the main sources of income for Finnish retirees as well as sources of income support for a smaller group of bereaved households.

National pension benefits. National pension benefits, paid by the Social Security Institu-

tion, include old-age national pensions, pensions for the long-term unemployed, pensions for the disabled, bereavement support, and various supplements for pension recipients. These were paid on different days of the month depending on the surname initial of the recipient. Individuals with surname initials between A–K, L–R and S–Z,Å,Ä,Ö were paid their benefits on the 4th, 14th and 22nd day of the month, respectively. Weekends and bank holidays move these payments to an earlier date.[2]

Beginning-of-the-month benefits. The benefits paid in the first days of the month include contribution-based old-age and early pensions, contribution-based bereavement support and the adult study allowance. The contribution-based benefits are paid by several pension insurance companies which determine their own payment dates. Although our data do not have information on which institution pays who, we know based on aggregate statistics that the 1st banking day of the month is the most common payment day but many are paid on the 2nd, 3rd or 4th of the month.[3] Weekends and holidays move the payments of the 1st, 2nd and 4th day to a later day and those of the 3rd day to an earlier day.

Taking into account these two classes of benefits, the surname-initial rule means that there is plausibly exogenous variation in the frequency of payments: The A–K group received both types of benefits in the first days of the month whereas the L–R and S–Ö groups received the national pension benefits later in the month. As we will see below, the national pension benefits account for more than one-third of the benefits and likely an even larger share of discretionary income in our sample. Although in practice the A–K group's two payments do not usually arrive on exactly the same day, the difference to a single-payment scheme is small, so we label the A–K group the 'once-a-month group' as opposed to the two other 'twice-a-month groups'.

B. Data

We use the Household Budget Survey (HBS) carried out by Statistics Finland to study spending and consumption behavior. The HBS is designed to cover all household spending and includes detailed household-level diary data over a 14-day period on spending in more than 400 (mostly nondurable) product categories and annual survey data of other spending in almost 200 categories.[4] In the HBS, each participating household is randomly

[2]This procedure was originally established decades ago in order to avoid an overly high number of transactions in the banking system on the same day.

[3]Because the state pension company pays contribution-based benefits on the 20th of the month, an estimated 3.6% of our sample households do not receive a payment in this category in the beginning of the month. With no payer information, we can neither exclude these households nor control for the 20th-day payments in the regressions. Although these payments can have effects on spending patterns, these are plausibly similar across the surname-initial groups. We return to the issue of such general timing-of-spending impacts later in the paper.

[4]The product categorization is based on the UN-COICOP classification.

assigned to one of the 26 consecutive 14-day diary periods. The households are first interviewed about their other spending by phone or in person and then keep an expenditure diary and collect all their purchase receipts during the diary period, both of which are submitted to Statistics Finland. The HBS includes detailed administrative register data on income by category and register and survey data on household characteristics. We also link individual-level tax registers and surname-initial information from the Population Registry to the HBS. Based on the surname initials and the Social Insurance Institution disbursement rules described above, we know the dates of the national pension benefit payments of the individuals.

Purchases of goods that are consumed soon after purchase (such as fresh food and many transportation and entertainment services) are of particular interest as they are directly linked to actual consumption within the 14-day diary period. Therefore, spending on strictly nondurable goods is our main outcome in the timing-of-spending analysis, although we also analyze the timing of total diary-measured spending.[5]

We use all rounds of the HBS between 1985 and 2012 (i.e., 1985, 1990, 1994, 1995, 1996, 1998, 2001, 2006 and 2012). We want to focus on households that have only one national pension payment day, and, therefore, restrict the analyses to households in which all recipients belong to the same surname-initial group. To avoid incorrect assignment of payment days, we use the information on surname at birth and at HBS participation and exclude households whose members have changed surname initial groups. For the analyses, we construct weights that correct for the unrepresentativeness and imbalance between the surname-initial groups in the household characteristics resulting from these sample restrictions.[6] We are left with a sample of 5,335 households, 42% of which belong to the once-a-month group.

C. Descriptive statistics

Exogeneity of the payment date variation stemming from surname initials requires that the three surname-initial groups do not differ from each other in any relevant way. To our knowledge, there are neither universal nor Finland-specific mechanisms that would

[5]Table A1 in the Online Appendix includes a detailed description of the strictly nondurable category.

[6]For example, multi-member households become underrepresented as only they can drop out of the sample due to having members from more than one surname-initial group. Such underrepresentation of multi-member households is likely to be more severe in smaller surname-initial groups, leading to between-group imbalances. This is simply because, under random matching into households, a larger share of people from a small than from a large group form inter-group households and, as a result, drop out of our sample. In the weighting scheme, representativeness and balance are restored by the non-excluded multi-name / name-changer households representing the excluded multi-group / group-changer households. Weighting yields the same share of multi-name / name-changer households in each payment group in the estimation sample as in the baseline sample. The weights are $w_{m,g} = share_m^{baseline} / share_{m,g}^{estimation}$, where m is the multi-name/name-changer status; g is the surname-initial group; $baseline$ / $estimation$ refers to the sample.

systematically link surname initials to spending behavior either directly or through some other factors. There are no notable general differences between the surnames included in the three initial groups.[7] That despite their identical connotations, the three most common surnames in Finland – Korhonen, Mäkinen and Virtanen – belong to different surname-initial groups is a simple illustration of the argument that the groups are essentially similar. When it comes to observable characteristics, Table 1 highlights that there are no statistically significant differences between the groups in the key observables (income, household composition and housing) in our sample. Therefore, the only meaningful difference between the surname-initial groups is their different benefit payment profiles described above.

Table 1 shows that the sample households receive around 420 euros per month of national pension benefits and 1,203 euros per month of contribution-based pensions and other beginning-of-the-month benefits (all in 2015 prices). The sample households, on average, receive 76% of their regular income (benefits and wages) as beginning-of-the-month and national pension benefits. On average, approximately one-third of the benefits are national pension benefits.[8] As housing-related bills are usually due in the beginning of the month, national pension benefits probably account for a markedly larger share of discretionary income. The relatively low average age of the sample reflects the aforementioned early-retirement and bereavement benefits included in the national pension scheme. In about 60% of households there is a married or cohabiting couple, there are typically no children in the sample households and, finally, most households are owner-occupiers.

D. Estimation

To examine the impact of payment frequency on consumption smoothing, we estimate how consumption varies between different times of the month for the three surname-initial groups. Spending on strictly nondurable goods is used to measure consumption. To identify spending peaks associated with income receipts, much of the literature estimates average spending differences between shorter time periods (e.g., weeks) within the pay cycle. We adopt a similar approach and, based on the benefit payments, divide the month into three periods, one of which is the reference period. Taking into account that the HBS measures 14-day spending sums, a regression that can be used to estimate average daily spending differences between two other periods of the month and a chosen reference

[7] Names of Finnish origin do not have prefixes related to social, ethnic or geographical background. Foreign names with prefixes were very rare in the sample period.

[8] These shares are calculated from before-tax income figures. As the average withholding rate is larger for wages than for the benefits and some of the national pension benefits are tax-free, the actual (i.e., net of withholding taxes) average shares are larger than those presented above.

period (p_r) for a single group has the following form:[9]

$$c_i = \sum_{p \neq p_r} \beta_p n_{i,p} + \alpha 14 + \varepsilon_i \qquad p \in \{1,2,3\}, \tag{1}$$

where c_i denotes the sum of spending during the 14-day diary period observed in the data for household i. The right-hand-side variables (n_p) are counts of the spending diary days that fall within the two non-reference periods of the month, 14 is the constant of the model and ε_i is the error term. The parameters of interest, β_p, measure how much more on average is spent daily during the non-reference periods of the month than during the reference period p_r. As the total number of diary days, 14, is used as the model's constant, the coefficient on it, α, measures the average daily spending during the reference period.

Different intra-month spending patterns for the three surname-initial groups can be allowed for by simply interacting the count variables (n) and the constant in equation (1) with surname-initial-group indicators. We, however, set the reference period for each group to be its 'no-payment' or 'pre-payment' period: the second (middle-of-the-month) period for the $S-\ddot{O}$ group which receives national pension benefits on the 22nd of the month (i.e., $p_r^{S\ddot{O}} = 2$) and the third (end-of-the-month) period for the two other groups (i.e., $p_r^{AK}, p_r^{LR} = 3$), respectively. Moreover, the once-a-month group's reference period is used as an overall reference period to facilitate between-group comparisons of reference period spending (more on the interpretations below and in Online Appendix B). Finally, adding control variables yields the equation to be estimated:

$$\begin{aligned} c_i = & \left(\sum_{p \neq p_r^{AK}} \beta_p^{AK} n_{i,p} \right) I_i^{AK} + \alpha 14 \\ & + \left(\sum_{p \neq p_r^{LR}} \beta_p^{LR} n_{i,p} \right) I_i^{LR} + \delta^{LR} 14 I_i^{LR} \\ & + \left(\sum_{p \neq p_r^{S\ddot{O}}} \beta_p^{S\ddot{O}} n_{i,p} \right) I_i^{S\ddot{O}} + \delta^{S\ddot{O}} 14 I_i^{S\ddot{O}} + \gamma' x_i + \varepsilon_i \qquad p \in \{1,2,3\}, \end{aligned} \tag{2}$$

where I_i^{AK}, I_i^{LR}, and $I_i^{S\ddot{O}}$ are the indicators for the three surname-initial groups and x_i is a vector of control variables. In addition to two β-parameters for each surname-initial group that measure between-period spending variation within groups, equation (2) includes the

[9] In Online Appendix B, we derive this equation from a simple model that is similar to the one applied to daily data by, for example, Stephens (2003).

parameters α, δ^{LR}, and $\delta^{S\ddot{O}}$. The latter two of these measure the differences in reference-period spending between the two twice-a-month surname-initial groups, *L-R* and *S-Ö*, and the once-a-month group *A-K*, respectively. For an example of how these differences reflect the extent to which spending peaks lead to cutting back on spending in the reference period, consider the case in which only the once-a-month group's spending peaks (in either or both of the non-reference periods). In that case, no differences in the reference-period spending (i.e., $\delta^{LR} = 0$, $\delta^{S\ddot{O}} = 0$) means that the peak does not affect spending in the reference period but, instead, translates into more overall spending during the month. Lower reference-period spending for the once-a-month group (i.e., $\delta^{LR} > 0$, $\delta^{S\ddot{O}} > 0$), on the other hand, means that the spending peak leads to cutting back on spending in the reference period.

Let us now get into the exact definitions of the regressors in equation (2). First, we need to define the 1st, 2nd, and 3rd period of the month. In principle, the first period includes the days from the 4th (the first national pension payment date) to the 13th of the month, the second from the 14th (the second payment date) to the 21st, and the third from the 22nd (the third payment date) to the 3rd of the next month. In practice, however, many of the payments are advanced due to weekends and holidays, so we adjust the beginning and end dates accordingly.[10] Second, because we are interested in the effects of specific benefit payments, we need to control for the effects of income from other sources on spending patterns. Although we do not have data on the dates of the other payments, simply controlling for other income interacted with the count variables (n) will capture such effects because they are conceivably uniform across the groups. We include separate interaction variables for labor income, other benefit income, and other income (such as capital gains).[11] We also control for household characteristics and the timing, month and year, of the expenditure diary period (see Table 2 footnotes for details).

The above approach gives us an idea of the consequences of payment frequency on consumption and spending. To get a more complete picture, we look at the cross-group differences in the level of total (diary- and survey-measured) spending and saving. To estimate these differences and the differences in expensive and durable goods spending, we use simple regressions with payment frequency indicators and control variables as the regressors (see Table 3 footnotes for details).

[10] We set the first period to start (and the third period to end) according to the national pension payment instead of according to the first contribution-based pension payments because this choice leads to a slightly larger R-squared and, thus, better capture of the actual intra-month spending variation in the data. Our conclusions are not sensitive to how the month is divided into periods (see Table A2 in the Online Appendix for a robustness check).

[11] We cannot, however, similarly control for the 20th-day contribution-based benefits discussed earlier because we do not know which households receive them. Nor can we control for their general effects on the post-20th days because such a control variable would be highly multicollinear with the count variables (n). Therefore, we resort to discussing the effects of these payments on our results and interpretations.

III. Results

A. Consumption and spending peaks

To illustrate the results on spending smoothness, Figure 1 plots the average daily spending differences for the three surname-initial groups from group-specific reference-period spending (set equal to zero in the figure). The estimates are produced by estimating equation (2) with spending on strictly nondurable goods (above) and all diary-measured goods (below) as the dependent variables. The corresponding estimates are presented in the first six rows of columns (1) and (2) of Table 2.

Figure 1 shows that there are noticeable differences in the within-month spending patterns between the three payment groups. Average daily spending for the members of the once-a-month group increases significantly in the beginning of the month. This group has a clearly decreasing spending and consumption profile towards the end of the month. As an example, the daily spending on strictly nondurable goods for the once-a-month group is 2.45 euros larger in the first than in the last period of the month. The post-payment spending on strictly nondurables is about 24% higher, and the total diary-measured spending about 21% higher, than the pre-payment average daily spending in the respective spending category. Unlike in earlier studies that typically find that total diary-measured spending is relatively more responsive than spending on strictly nondurables (Stephens, 2003, 2006; Stephens and Unayama, 2011), our diary data exclude most expensive and rarely-bought items.[12] Later in the paper, we present evidence consistent with the earlier literature that payment frequency has large effects on expensive-good purchases.

In contrast to those of the once-a-month group, the spending patterns of the groups paid twice a month do not exhibit large, statistically significant peaks. If anything, both of these groups appear to spend only slightly more after the national pension payment (14th of the month for the L–R group and 22th of the month for the S–Ö group, respectively).

The above results are robust to redefining the first period of the month to begin earlier, that is, when the first contribution-based pensions are paid (see Table A2 in the Online Appendix).[13] As discussed earlier, we should assess the consequences of the fact that a small share of the sample households receive contribution-based pensions on the 20th instead of the first days of the month. If these payments caused a spending hike, it would slightly in-

[12] Our diary data exclude most recurring expenditures which, according to Gelman et al. (2014), constitute a large part of the expenditure hikes associated with payments.

[13] The lower R-squared of this alternative specification – together with the overall absence of a significant beginning-of-the-month spending hike for the twice-a-month groups – suggests that the beginning-of-the-month income receipt alone does not trigger a spending hike. A possible reason is that the beginning-of-the-month benefits may be mostly used to pay, instead of for discretionary spending, for recurring spending like housing-related bills which are typically due early in the month. Gelman et al. (2014) show that, indeed, recurring spending tends to coincide with regular income receipts.

flate the daily spending estimates for the last two periods of the month for all three groups, possibly at the expense of spending in the beginning of the month. This means that were we able to identify and exclude these households, our result of a beginning-of-the-month peak for the once-a-month group, but not for the twice-a-month groups, would be even somewhat stronger.

These results suggest that more frequent payments lead to smoother within-month spending and consumption patterns. More specifically, unlike once-a-month payments, twice-a-month payments induce no or only insignificant spending and consumption hikes.

B. Spending late in the pay cycle, overall spending and saving

To examine the consequences of spending-peak removal by more frequent payments, the two bottom rows of Table 2 present between-group comparisons of reference-period spending. The differences are small and statistically insignificant, suggesting that the once-a-month group's spending peak is not associated with significantly lower expenditures and consumption late in the month but, instead, higher total expenditures during the month. To take a closer look at this, we investigate the differences in annual total spending and (net) saving behavior between the twice-a-month groups and the once-a-month group in columns (1)-(2) of Panel A of Table 3.[14] Consistent with the above findings, the once-a-month group spends 852 euros more annually than the twice-a-month groups.[15] In relative terms, the once-a-month group spends about 4.3% more – and saves 3.2% less of their income – than the twice-a-month groups. The regression of the saving rate in column (2) further supports the notion of the once-a-month group saving less.[16]

In sum, our results thus far suggest that households who receive their benefits in bulk spend more in the first days and weeks of the month and, rather than cutting back on spending later in the month, finance the extra spending by saving less for future months. With no asset or consumer debt data available, we cannot break the saving effect down into effects on wealth accumulation, spending money saved earlier and borrowing more. Accruing less wealth may be an important way of saving less given that the sample households are, on average, net savers and save about 20% of their disposable income, although we do not know how much of this is discretionary instead of, for example, loan amortization or recurring saving to which they are committed. When it comes to debt, however, the HBS records interest payments on consumption loans. We examine interest payments

[14] In the HBS, annual total spending is calculated based on two-week spending on the diary-measured goods and the survey-measured annual spending on other goods.

[15] Because we control for disposable income, a regression of money saved (income less money spent) would yield the same numbers.

[16] The loss of a couple of observations when regressing the saving rate is due to some households having negative disposable income (probably due to large tax-deductible costs).

in columns (3) and (4) of Panel A of Table 3. While roughly equal shares of households pay interest regardless of the payment frequency, the once-a-month households' payments are statistically significantly larger than those of the twice-a-month households. Therefore, with the data at hand, we find indicative evidence for dependence of indebtedness on payment frequency.[17]

C. Spending on expensive and durable goods

Next we utilize the detailed spending categories of the HBS to investigate if, as hypothesized in the literature, payment frequency impacts overall spending on expensive goods.[18] As most expensive goods are durable, increased spending on these can partly counteract the estimated lower saving brought about by infrequent payments. To see whether this is the case, we also estimate the effect of payment frequency on spending on expensive durable goods (including semi-durables). Because the effects on durable goods need not be exclusively due to the expensive-goods mechanism, we also estimate the effect on total durables.

Based on the results in Panel B of Table 3, more frequent payments lead to 439 euros (9.5%) lower annual spending on expensive goods. Therefore, about half of the total effect on spending comes from expensive items and the relative effect on these is much larger than the about 4.3% effect on total spending. Expensive goods are thus disproportionately affected by payment frequency. The results in columns (2) and (3) of Panel B further support the expensive-goods hypothesis: frequent payments lead to 448 euros, or 11.6%, statistically significantly lower spending on expensive durables, while the effect on inexpensive durables is only 16 euros, or 1.5%, and statistically insignificant.[19] The estimated total difference in the durable goods expenditures between the twice-a-month groups and the once-a-month group is about 464 euros, which amounts to 54.5% of the difference in total spending. Our results thus indicate that although infrequent payments lead recipients to save significantly less (or borrow more) money, half of this effect is counterbalanced by their larger investments in durable goods.

[17] We cannot, of course, rule out the higher interest payments being at least partly due to higher interest rates. However, that would be consistent with our other findings because high interest rates on consumer loans are likely an indication of weaker balance sheets or worse financial health (as assessed by lenders).

[18] The expensive-items category includes items that, to our knowledge, typically cost at least a hundred current-day euros in Finland in the sample period (see Table A1 in the Online Appendix for details).

[19] The whole effect on expensive goods comes from expensive durables, while spending on expensive nondurable goods (almost exclusively travel and accommodation) is estimated to be irresponsive to payment frequency.

IV. Discussion and conclusions

We study how the frequency of payments affects spending behavior among benefit recipients. We find more consumption and spending in the days after payments for those who received most of their income in the first days of the month compared to those who received their incomes in a more dispersed manner. This result supports the notion that splitting payments to semi-monthly installments can lead to smoother consumption and spending.

By showing that infrequent payments lead to higher overall expenditures, our results further suggest that people finance the payment-induced spending peaks predominantly by saving less or borrowing more instead of cutting back on spending later in the pay cycle. Earlier studies on spending and consumption peaks associated with regular income payments have found that peaks are more prevalent among households with less assets. Our findings suggest that this is the case because asset accumulation is affected by spending peaks.

Although infrequent payments lead to more spending during the pay cycle and, hence, less money saved or more debt, they also lead to more spending on expensive, mostly durable, goods. The latter effect, also found by some earlier studies, is what makes infrequent payments appealing because they can thereby increase saving. However, according to our results, the net effect of infrequent payments on total saving, in the form of money and durables, is negative.

According to our results, the recipients of frequent payments do not spend as much on expensive goods as the recipients of infrequent payments despite saving sufficiently more (or borrowing sufficiently less) to be able to do so. The theoretical reason for this may lie in short-run impatience. The reason for not buying more expensive goods than they do by simply saving enough money would then be that they do not accumulate liquidity, and only save using illiquid assets. The reason for not borrowing, on the other hand, might be that the cost of credit exceeds the utility from buying more expensive goods and, therefore, these purchases are made only by those who receive enough liquidity at once. Although we find that infrequent payments fail to promote total net saving despite promoting saving in the form of expensive durables, an interesting possibility is that they may succeed in doing so in developing countries. This is because poorly developed financial institutions constraint saving and borrowing of money and, therefore, force households to finance all extra purchases – including those of expensive durables – by cutting back on other spending during the same pay cycle. However, the benefit of more investments in durables then comes at the risk of recipients not having enough money to buy necessities such as food toward the end of the pay cycle.[20]

[20]This effect combination has been found for Kenya and Mexico (Haushofer and Shapiro, 2016; Aguila

From a policy perspective, our results suggest that any potential negative implications of consumption and spending increases in the days after benefit or other payment dates can be mitigated by increasing the payment frequency. However, in most real-world scenarios many households receive income payments from multiple sources. The typically unknown and heterogeneous time profiles of other income payments result in spending peaks of their own and, thus, complicate the design of an effective frequent-payment scheme for income from a single source.[21] It can be conjectured that some regular bills such as housing bills, by affecting the money at hand, also have spending-pattern effects and similarly complicate policy design.

et al., 2017).

[21] This seems to be true in our case: Not controlling for other income yields a less pronounced smoothing effect of the twice-a-month scheme. The other income payments, especially wages (often paid in the middle of the month), appear to cause a middle-of-the-month spending and consumption peak in our sample.

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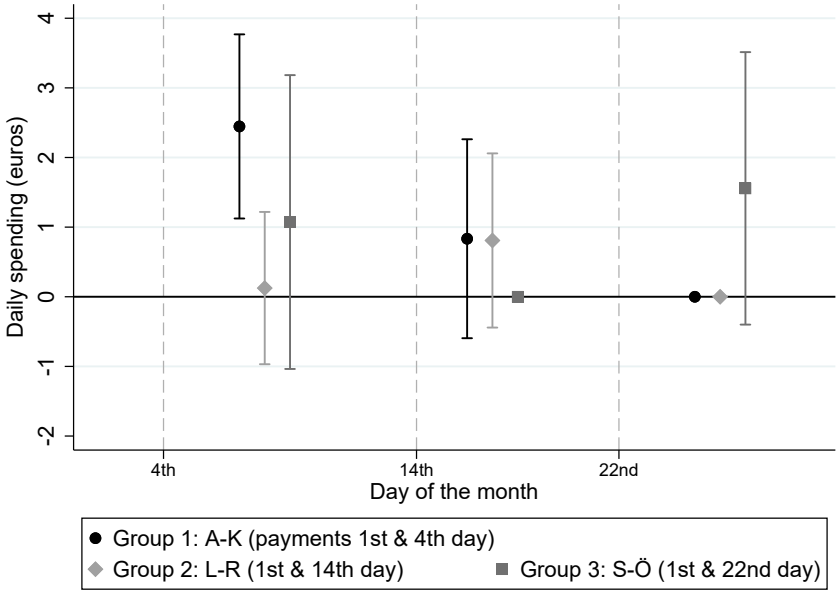
Figures and Tables

Table 1: Descriptive statistics for the three surname-initial groups

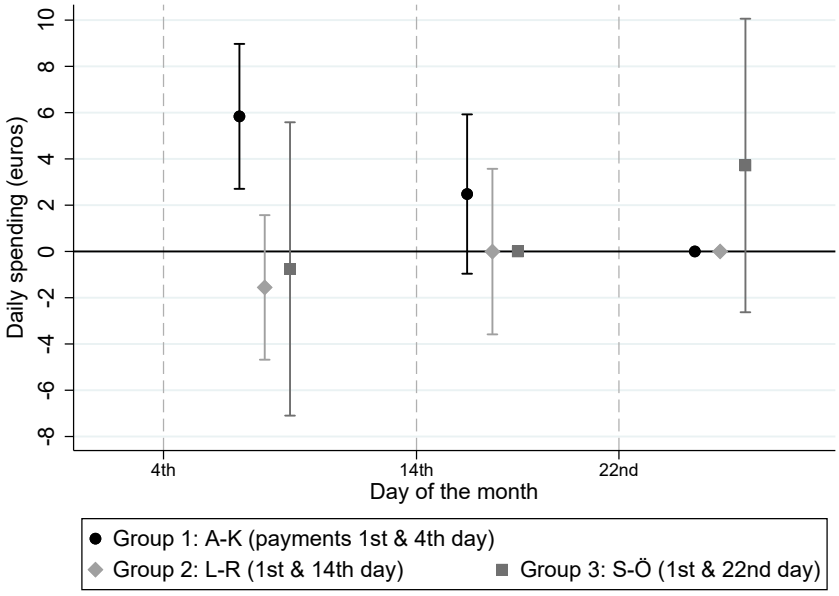
	(1) A–K	(2) L–R	(3) S–Ö	p-values (1) vs (2)	p-values (1) vs (3)
Income					
Benefits paid based on surnames, eur/month	427	415	413	0.330	0.372
Beginning-of-the-month benefits, eur/month	1,205	1,197	1,214	0.842	0.861
Equivalent gross income, eur/month	1,807	1,801	1,833	0.860	0.610
Household type					
Household age, years	64.5	63.8	64.8	0.191	0.636
A couple	0.60	0.61	0.63	0.489	0.175
Number of household members	2.14	2.12	2.09	0.514	0.384
Number of children aged <17	0.14	0.12	0.11	0.238	0.306
Housing type					
Own	0.80	0.81	0.81	0.356	0.755
Rented	0.19	0.18	0.18	0.511	0.626
Other	0.01	0.01	0.01	0.183	0.559
N	2,238	2,072	1,025		

Notes: Table presents the weighted descriptive statistics for the three surname-initial groups. The weights overweight the multi-surname-group and surname-changer households remaining in the estimation sample to get as much representation for such households as there is in the pre-restrictions sample. All variables are presented at the household level. Monetary amounts in 2015 euros.

Figure 1: Average daily spending patterns for the three payment groups, relative to groups' reference periods.



(a) Strictly nondurable goods



(b) Total spending

Notes: Figure plots the regression estimates and 95% confidence intervals for average daily within-group spending differences for the three surname-initial groups relative to their reference period. The estimates are obtained by estimating equation (2) and presented in Table 2. The upper graph is for strictly nondurable goods and the lower for all diary-measured goods. Average daily spending on strictly nondurables in the estimation sample is 13.1 euros and total spending 27.0 euros.

Table 2: Results for monthly spending patterns.

	(1) Strictly nondurables (diary)	(2) Total spending (diary)
Within-group		
β_1^{AK}	2.45***	5.84***
	(0.67)	(1.60)
β_2^{AK}	0.83	2.48
	(0.73)	(1.76)
β_1^{LR}	0.12	-1.55
	(0.56)	(1.59)
β_2^{LR}	0.81	-0.01
	(0.64)	(1.83)
$\beta_1^{S\ddot{O}}$	1.07	-0.76
	(1.08)	(3.23)
$\beta_3^{S\ddot{O}}$	1.56	3.72
	(1.00)	(3.24)
Between-group		
δ^{LR}	0.06	1.68
	(0.43)	(1.18)
$\delta^{S\ddot{O}}$	-0.63	-0.74
	(0.81)	(2.57)
daily mean	10.62	28.91
N	5,335	5,335

Notes: Table presents the regression results from equation (2). Dependent variables: spending on strictly nondurable goods; total diary-measured spending. For more information on the strictly nondurable category, see the Online Appendix. The 'Within-group' parameters measure the within-group spending differences (euros) between the other two periods and group's reference period. The 'Between-group' parameters measure reference-period spending differences (euros) between the twice-a-month groups (*LR*, *SÖ*) and the once-a-month group (*AK*). Robust standard errors in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level, respectively. Regressions are weighted by overweighting the multi-surname-group and surname-changer households remaining in the estimation sample to get as much representation for such households as there is in the pre-restrictions sample. Control variables: labor income, other benefit income, and other income, each interacted with the three timing count variables (n), number of household members, number of children (age <17) in the household, dummy for whether household is a couple, proxy for age of the household (age of the household head or, if there is a couple, older of the couple), housing tenure dummies, year and month (count variables of diary days falling into each year and similar variables for the 12 months).

Table 3: Results for total spending, saving, consumption loan interest, and expensive and durable goods

Panel A

	(1) Total spending	(2) Saving rate	(3) Consumer-loan interest	(4) Paid consumer-loan interest (dummy)
Twice-a-month	-852***	0.046***	-21*	-0.012
	(307)	(0.018)	(12)	(0.011)
Ref. group mean	20,677	0.17	105	0.16
N	5,335	5,332	5,335	5,335

Panel B

	(1) Expensive goods	(2) Expensive durables	(3) Inexpensive durables	(4) Total durables
Twice-a-month	-439**	-448***	-16	-464**
	(185)	(171)	(58)	(188)
Ref. group mean	4,629	3,872	1,080	4,952
N	5,335	5,335	5,335	5,335

Notes: Table presents regressions of dependent variables on an indicator of a twice-a-month payment scheme (reference group: once-a-month group) and control variables. Upper-panel dep. variables: total spending; saving rate = (disp. income - total spending)/disp. income; interest payments on consumer loans; indicator of having made interest payments. Lower-panel dep. variables: expensive-goods spending (typical price at least one hundred euros, assessed by the authors); expensive durable goods; inexpensive durable goods; all durable goods. For information on the expensive-goods categorization, see the Online Appendix. Robust standard errors in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level, respectively. Regressions are weighted by overweighting the multi-surname-group and surname-changer households remaining in the estimation sample to get as much representation for such households as there is in the pre-restrictions sample. Control variables: household disposable income and its square, number of household members, number of children (age <17) in the household, dummy for whether household is a couple, proxy for age of the household (age of the household head or, if there is a couple, older of the couple), housing tenure dummies, year and month (count variables of diary days falling into each year and similar variables for the 12 months).

Online Appendix A

Table A1: Expenditure categorizations.

	Strictly nondurable	Expensive
Food, beverages, tobacco	Food expiring in (less than) 2 weeks	–
Clothes, footwear	–	All (excl. t- and sweatshirts, tracksuits, underwear, night garments, socks, stockings, tights, babies' clothes, accessories & repairs)
Housing	–	Secondary / vacation home costs; Renovations
Furnishing, home equipment, maintenance	Laundry shops	Furniture (excl. decorative objects, rugs) & repairs; Art objects; Large appliances, Repairs; Motorized tools for home, garden; Safety, alarm systems
Health costs	Health-related transport	Assistive products
Transport	Public transport, taxis, short-distance train & bus, vehicle rentals; Parking & tolls	Vehicles & rentals, repairs, maintenance, etc.; Driving licence costs; Int. and long domestic travel; Domestic travel by air & water
Communications	–	Phone devices
Recreation, sport, culture	Recreational, sport, cultural events; Hire, rentals of recreational equipment movies; Gambling	TV, video, audio devices, cameras, computers, typewriters, calculators & repairs; Major recreational durables; Sport etc. equipment; Pets; Theater etc. season tickets, ticket packs; Package tours
Education	–	–
Restaurants and accommodation	Restaurants and cafes	Accommodation
Other	–	Beauty, hygiene electric appliances; Watches, clocks; Bags & cases; Baby carriages etc.; Building permit fees

Notes: Table shows the items included in strictly nondurable goods and expensive goods categories used in the analysis.

Table A2: Results for monthly spending patterns: alternative division of the month into periods.

	(1) Strictly nondurables (diary)	(2) Total spending (diary)
Within-group		
β_1^{AK}	2.18***	5.41***
	(0.67)	(1.60)
β_2^{AK}	1.29	3.68*
	(0.82)	(1.94)
β_1^{LR}	0.09	-1.20
	(0.55)	(1.55)
β_2^{LR}	0.83	-0.17
	(0.70)	(1.99)
$\beta_1^{S\ddot{O}}$	1.15	-0.57
	(0.98)	(3.02)
$\beta_3^{S\ddot{O}}$	1.70	4.44
	(1.09)	(3.52)
Between-group		
δ^{LR}	0.23	2.19
	(0.51)	(1.37)
$\delta^{S\ddot{O}}$	-0.51	-0.73
	(0.86)	(2.67)
daily mean	10.62	28.91
N	5,335	5,335

Notes: Table presents the regression results from equation (2), using an alternative division of the month into periods (1st to 13th, 14th to 21st, and 22nd to last). Dependent variables: spending on strictly nondurable goods; total diary-measured spending. For more information on the strictly nondurable category, see the Online Appendix. The 'Within-group' parameters measure the within-group spending differences (euros) between the other two periods and group's reference period. The 'Between-group' parameters measure reference-period spending differences (euros) between the twice-a-month groups (*LR*, *SÖ*) and the once-a-month group (*AK*). Robust standard errors in parentheses. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level, respectively. Regressions are weighted by overweighting the multi-surname-group and surname-changer households remaining in the estimation sample to get as much representation for such households as there is in the pre-restrictions sample. Control variables: labor income, other benefit income, and other income, each interacted with the three timing count variables (n), number of household members, number of children (age <17) in the household, dummy for whether household is a couple, proxy for age of the household (age of the household head or, if there is a couple, older of the couple), housing tenure dummies, year and month (count variables of diary days falling into each year and similar variables for the 12 months).

Online Appendix B

This Online Appendix shows how two-week aggregate spending data can be used to estimate differences in average daily spending between different days or periods (groups of days) of the month. Further, the model of spending smoothness for three groups with different reference periods estimated in the paper is derived.

First, assume a data set consisting of some number of daily spending observations for each household. The following regression can be used to estimate differences in the average daily spending between the other days of the month ($m = 1, 2, ..., 31$; excl. m_r) and the reference day m_r:

$$c_{i,d} = a + \sum_{m \neq m_r} b_m D_{i,d,m} + e_{i,d}, \tag{1}$$

where $c_{i,d}$ denotes household i's spending on the dth day of observation, $D_{i,d,m}$ is a dummy indicating whether the day d is the mth day of the month. Therefore, a measures the average spending on the reference day and parameters b_m measure how much more (/less) the households, on average, spend on the other days of the month.

However, for multiple reasons (e.g. weekends, holidays) and by chance, the exact day of making purchases may vary greatly across households and time periods. Hence, the variance in daily spending can be large, and pooling days yields more easily interpretable results. For example, Stephens (2003) pools days into seven-day periods to estimate average spending in weeks at different distances to the payments.

Moving from equation (1) to a model of between-period spending differences is done by dividing the 31 days of the month into J periods ($p = 1, 2, ..., J$; excl. p_r), one of which is the chosen reference period (p_r), and restricting the daily spending parameters b_m to be equal within each period and to equal zero in the reference period. This yields

$$c_{i,d} = \alpha + \sum_{p \neq p_r} \beta_p D_{i,d,p} + \varepsilon_{i,d}, \tag{2}$$

where $D_{i,d,p}$ is a dummy indicating whether day d falls into period p. α measures the average daily spending in the reference period and parameters β_p measure how much more (or less) than this the households spend daily, on average, on the days of the other periods.

Next, let us show how a data set (such as ours) consisting of observations of 14-day spending sums for households can be used to estimate the average daily spending parameters of equations (1) and (2) above. As we are interested spending differences between periods rather than between single days, we proceed with the pooled model (2). To get a model of the 14-day spending sum, equation (2) can simply be summed over the

14 days of observation for each household:

$$\sum_{d=1}^{14} c_{i,d} = \sum_{d=1}^{14} \alpha + \sum_{d=1}^{14} \sum_{p \neq p_r} \beta_p D_{i,d,p} + \sum_{d=1}^{14} \varepsilon_{i,d} \tag{3}$$

which, simplifying the notation, becomes

$$c_i = \alpha 14 + \sum_{p \neq p_r} \beta_p n_{i,p} + \varepsilon_i, \tag{4}$$

where c_i is the 14-day spending sum for household i observed in the data, variables $n_{i,p} = \sum_{d=1}^{14} D_{i,d,p}$ are the counts of days in the 14-day observation period that fall within periods p, and ε_i is the error term. Estimating equation (4) yields estimates for equation (2)'s parameters of interest, β_p's, and parameter α can be either estimated by using number 14 as the model constant or recovered by dividing the constant-term estimate by 14.

We want our regression model to allow for different intra-month spending patterns for the three payment groups. This can be achieved by including the regressors and the constant of equation (4) interacted with group dummies. As we model three-period spending patterns for three groups, the model will have 3×3 parameters that capture the spending patterns. Out of the many equivalent formulations of such a model, we choose the one the parameters of which directly give us a) within-group spending comparisons between the two other periods and the reference period and b) between-group reference-period spending comparisons between the twice-a-month groups and the once-a-month group. Further, we choose each group's reference period from the three periods based on the group's pay cycle (see the main text). The model (excluding control variables) to be estimated is

$$\begin{aligned} c_i = & \left(\sum_{p \neq p_r^{AK}} \beta_p^{AK} n_{i,p} \right) I_i^{AK} + \alpha 14 \\ & + \left(\sum_{p \neq p_r^{LR}} \beta_p^{LR} n_{i,p} \right) I_i^{LR} + \delta^{LR} 14 I_i^{LR} \\ & + \left(\sum_{p \neq p_r^{S\ddot{O}}} \beta_p^{S\ddot{O}} n_{i,p} \right) I_i^{S\ddot{O}} + \delta^{S\ddot{O}} 14 I_i^{S\ddot{O}} + \varepsilon_i, \end{aligned} \tag{5}$$

where I_i^gs are the group indicator dummies for the three surname-initial groups ($g = AK, LR, S\ddot{O}$), β_p^gs are the group-specific spending differences between other periods and the reference period, δ^gs are the reference-period spending differences between the twice-a-month groups (LR and $S\ddot{O}$) and the once-a-month group (AK), and α is the reference-period spending level of the once-a-month group (AK).