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Guney, Ibrahim Ethem; Hacihasanoglu, Yavuz Selim; Tumen, Semih

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Consumer Loan Response to Permanent Labor Income Shocks: Evidence from a Major Minimum Wage Increase*

Ibrahim Ethem Guney †
Central Bank of the Republic of Turkey

Yavuz Selim Hacihasanoglu ‡
Central Bank of the Republic of Turkey

Semih Tumen §
Central Bank of the Republic of Turkey, ERF, GLO, and IZA

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Abstract

We investigate the impact of a substantial minimum wage increase, which became effective in January 2016, on consumer loans in Turkey. Using bank-level data and designing an original identification strategy, we ask whether the loans provided by banks with a historically high share of low-wage loan customers have increased relative to those provided by banks with a historically low share of low-wage loan customers after January 2016. Our results suggest that consumer loan flows have displayed a limited but statistically and economically meaningful increase following the minimum wage hike. This increase mostly comes from the increase in long-term general-purpose loans. Vehicle loans have also increased, while there is no change in housing loans. In the overall, the minimum wage hike has generated a moderate and transitory increase in the flow of consumer loans extended to low-wage earners in Turkey—perhaps due to delayed consumption effect. Consumption of durables, which can further increase household borrowing capacity through collateralized debt channel, has only slightly and temporarily increased. The underlying long-term trends in the stock of consumer loans have hardly changed.

JEL codes: D14, E24, G21, J31.

Keywords: Consumer loans, labor income shocks, minimum wages, triple difference.

*The views expressed here are of our own and do not necessarily reflect those of the Central Bank of the Republic of Turkey. All errors are ours.

†ethem.guney@tcmb.gov.tr. Governor's Office, Central Bank of the Republic of Turkey, Istiklal Cad. No:10, 06050 Ulus, Ankara, Turkey.

‡yavuz.selim@tcmb.gov.tr. Banking and Financial Institutions Department, Central Bank of the Republic of Turkey, Istiklal Cad. No:10, 06050 Ulus, Ankara, Turkey.

§semih.tumen@tcmb.gov.tr. Structural Economic Research Department, Central Bank of the Republic of Turkey, Istiklal Cad. No:10, 06050 Ulus, Ankara, Turkey.

1 Introduction

On January 1st 2016, the Turkish minimum wage increased by approximately 30 percent—as opposed to a usual 5–8 percent yearly increase, which would be more aligned with annual consumer inflation expectations and realizations. This sharp increase generated a significant absolute and relative improvement in the average real income of low-wage households. In an era of increased alertness for threats to financial stability, an immediate concern was the extent of spending and debt response of these households. Would these households respond in a manner to inflate their debt especially through purchases of durable goods, which would further enhance their capacity to increase collateralized debt? In this paper, we estimate the magnitude of the change in consumer loans for low-wage households following the minimum wage hike. The substantial increase in the minimum wage in January 2016 serves as a good laboratory (or natural experiment) to perform this task.

The ideal data set to investigate the consumer loan response to income shocks should provide micro-level information, preferably with a panel/longitudinal dimension, on the details of consumer finances—similar to the certain features of large micro-level data sets such as the Survey of Consumer Finances, Panel Study of Income Dynamics, and Household Finance and Consumption Network. Unfortunately, such a data set does not exist in Turkey yet. Instead, using the available bank-level data at hand, we develop an original empirical design, which consists of two stages, to answer the question we pose. The *first* stage involves data construction. We use bank-level administrative data provided by the Banks Association of Turkey to observe the banks with respect to their historical share of consumer loans extended to low-wage individuals.[1] This share exhibits substantial variation across banks, while within-bank variation over time is much more limited. This suggests that Turkish banks have different traditions or identities measured in terms of the medium-term average characteristics of their customer portfolios. Accordingly, we construct a time invariant parameter for each bank characterizing the share of consumer loans to low-wage individuals—averaged over the observation horizon. This average share is constructed using the observations recorded prior to minimum

[1] To be precise, the low-wage individuals are defined as the individuals paid within the close neighborhood of the minimum wage.

wage hike; thus, it is pre-determined. This setup is based on the main assumption that banks do not have the ability (or willingness) to substantially shift their loan portfolios across low- versus high-income individuals, at least in the short-term.

The *second* stage involves estimation. Using monthly bank-level data, we implement a triple-difference strategy motivated as follows. The first difference compares the level of consumer loans before and after the minimum wage hike, which checks whether there is an increase in consumer loans right after January 1st, 2016. However, there is a possibility that seasonal effects may be generating a jump on every January. The second difference compares the effect obtained from comparing the response before and after January 1st, 2016 to that pertaining to before and after January 1st, 2015—on which the minimum wage increase was only 6 percent.[2] The third difference compares this diff-in-diff structure across banks with historically high versus low share of low-wage loan customers. Overall, our identification strategy utilizes the cross-bank variation in the pre-determined share of low-wage customers and tries to understand how this variation interacts with the consumer loan response observed right after the minimum wage hike.

We find that, on average, consumer loan flows have increased moderately and temporarily following the minimum wage hike. We further detect four key empirical patterns. **First**, we document that this increase mostly comes from the increase in long-term general-purpose loans. **Second**, we report that vehicle loans have also increased notably. **Third**, there is no change in housing loans. **Finally**, we test whether the minimum wage hike has generated an increase in revolving personal credit card usage and overdraft accounts. We find an increase in overdrafts, while revolving personal credit card use has not changed. Back of the envelope calculations yield the result that the monthly flow of consumer loans increased in the range of 10–15 percent after the minimum wage hike. We also observe that this is likely a transitory effect that tends to dampen over time, which suggests that the consumer loan response emerged perhaps mostly due to a delayed consumption effect. The documented empirical patterns imply that the increase in consumer loans following the minimum wage hike only partially

[2]Earlier years, on which the minimum wage increase was relatively low, are also used for robustness purposes.

generated an increase in durables—i.e. vehicles—and that such a limited increase in durables consumption is not likely to generate a significant additional collateralized borrowing room for low-wage workers. We also argue that, from a financial stability and macro-prudential policy perspective, the observed increase in consumer loans has been manageable and it does not distort the ongoing trends in the stock of consumer loans.

The plan of the paper is as follows. Section 2 reviews the relevant literature and discusses how our paper is linked to the findings in the related papers. Section 3 describes our data and data construction principles. Section 4 defines and elaborates the econometric identification strategy we use. Section 5 discusses the empirical results and their implications. Section 6 concludes.

2 Related Literature

There is a newly emerging literature aiming to address the question: "what is the impact of social insurance and economic assistance programs on the spending and debt behavior of low-income households?" This is an important question, because low-income households are often characterized with substantial borrowing constraints. Whether those programs can relax those borrowing constraints and generate an economically significant spending and debt response is not well understood.

The existing studies in the literature often utilize various natural experiments generated by abrupt and unexpected income shocks to obtain convincing causal estimates of the magnitude of the spending and debt response. Shapiro and Slemrod (2003, 2009) estimate the spending response to income tax rebates in the United States and conclude that tax rebates have very limited role, if any, in increasing aggregate demand.[3] Souleles, Parker, and Johnson (2006), on the other hand, document substantially higher spending response to income tax rebates especially for low-income households. Agarwal, Liu, and Souleles (2007) report a similar finding for low-income households, while they also show that saving motives have been much more dominant for unconstrained households. Stephens and Unayama (2011) estimate the

[3]In an earlier paper, Shapiro and Slemrod (1995) report a relatively higher spending response to a change in tax withholding.

impact of quarterly pension benefit distribution on spending and document significant effects. Agarwal and Qian (2014) utilize an unexpected cash payout in Singapore by the government to adult Singaporeans to estimate the impact of income shocks on spending and debt response and they report a stronger response for low-income households than high-income households.[4]

In this paper, we use a sharp increase in the minimum wage (around 30 percent) in Turkey as a natural experiment to estimate the magnitude of the consumer loan response to a permanent labor income shock. Although the minimum wage increase was publicly discussed in advance, whether it will be implemented or not was uncertain. So, the consumer loan response is most likely observed after the policy is implemented as it would be difficult to convince the banks to extend additional loans to low-wage households in exchange for an anticipated increase in the minimum wage. The official announcement was made on December 31st, 2015.

Our paper is most closely related to Aaronson, Agarwal, and French (2012), who estimate the spending and debt response to minimum wage hikes in the United States. They document a large response to minimum wage increases in the United States. They also document that this response is caused by a small number of households purchasing vehicles and has persisted for several quarters. We find a smaller response than Aaronson, Agarwal, and French (2012) document. To start with, we find that the general purpose loans, which are among the most commonly used consumer loan types in Turkey, have increased following the Turkish minimum wage hike. Similar to Aaronson, Agarwal, and French (2012), we also document an increase in vehicle loans, but the magnitude is rather small. The duration/persistence of the consumer loan response in Turkey has been much shorter than Aaronson, Agarwal, and French (2012) report for the United States. Overall, the consumer loan response to a minimum wage hike in Turkey suggests that low-income households spent the extra income for their delayed consumption needs (other than durables, i.e., vehicles and housing) and the response dampened quickly after the minimum wage hike.

The effect of minimum wage on employment, earnings, consumer prices, poverty, inequality,

[4]Other relevant papers in the literature include Wolpin (1982), Carroll (1992, 1997), Paxson (1993), Gruber (1997), Parker (1999), Souleles (1999, 2000, 2002), Hsieh (2003), Stephens (2003, 2006, 2008), Parker, Souleles, Johnson, and McClelland (2013), Jappelli and Pistaferri (2014), and Agarwal, Marwell, and McGranahan (2017).

and informal economic activity has been extensively studied in the literature.[5] Our paper is one of the first papers [along with Aaronson, Agarwal, and French (2012)] in the literature investigating the impact of minimum wages on spending and debt response of individuals. It should be noted that, due to the structure of the data at hand, we do not directly observe the spending response. Instead, we focus on the change in consumer loan flows; thus, our paper focuses on the consumer loan response, which directly shows the debt response but can only proxy the spending response.

There are only a few papers analyzing the impact of minimum wages in Turkey on certain economic outcomes. Papps (2012) compares an equal-sized social security tax increase and minimum wage increase. He finds that the former is associated with a larger job exit probability than the latter. By constructing and estimating a structural model, Ozturk (2012) shows that minimum wage regulation reduces low productivity workers' employment and results in shortage of part-time jobs. Pelek (2015) investigates the impact of minimum wages on formal and informal employment. Bakis, Hisarciklilar, and Filiztekin (2015) find that the 2004 minimum wage increase in Turkey reduces teenage employment and raises school enrollment rates. Gurcihan-Yunculer and Yunculer (2016) estimate the impact of minimum wages on labor market outcomes. Our paper is also the first to estimate the consumer loan response to minimum wage hikes in Turkey.

3 Data and Institutional Setting

To estimate the effect of minimum wage increase on the volume of consumer loan flows, we need to observe the labor income of individuals using consumer loans. Although we have access to consumer loan information at the individual level, we do not have wage and income data along with some other key observed characteristics of individual borrowers in Turkey. This means that, given the set of information at the time this paper is written, it may not be possible to directly estimate the impact of minimum wages on the consumer loan response of individuals in Turkey using individual- or household-level micro data.

[5] See, e.g., Brown (1999), Aaronson (2001), Addison, Blackburn, and Cotti (2009), Lemos (2009), Bosch and Manacorda (2010), Sabia and Burkhauser (2010), and Alainz, Gindling, and Terrell (2011).

To get around this data availability problem, we design an original identification strategy using two different data sources. At the first stage, we identify the share of low-income—defined as monthly income within a certain interval set around the minimum wage—loan customers for each bank. The Banks Association of Turkey (BAT) provides quarterly aggregate data for consumer credits with respect to income brackets of the customers for each bank. Using this data set, it is possible to identify the banks with a high share of low-income customers versus those with a low share of low-income customers. For each bank, we know the bank-specific ratio of loans extended to low-income customers. For example, if this ratio is 0.2 for Bank A, this means that Bank A has extended 20 percent of its consumer loans to low-income customers. These ratios exhibit significant stability over time and define the "identity" or "type" of each bank. Banks have long-term marketing strategies that do not frequently change over time. These strategies generate an identity for the banks in terms of the individual characteristics of their loan customers.

We identify the "bank type" using the share of low-income loan customers—i.e., customers within the minimum wage range—for each of the 33 Turkish banks averaged over the 2011–2015 period.[6] We define low-income customers as the ones, who have monthly income in the range of 0 and 1,000 TRY—corresponding to the minimum-wage range before the minimum wage increase in January 2016. Using this quarterly information, we calculate the share of low-income customers for each bank. Since this share is quite stable over time at the bank level, we take the quarterly average of this variable for each bank for the 2011–2015 period. This five-year average serves as a pre-determined "bank type," which is not affected by the minimum wage adjustment took place in January 2016.

In a second data source, we obtain weekly flow data of consumer credits for each bank in the 2012–2016 period using the Central Bank of the Republic of Turkey (CBRT) data set. Consumer credits in this data set include housing, vehicle, and general purpose credits with three different maturity categories as 0–12 months, 13–23 months, and 24 months and above. While the CBRT data set has 48 banks, the intersection of BAT and CBRT data sets has 32

[6]The type of a bank corresponds to the medium-term average of the share of consumer loans extended to low-income customers.

banks, with 5,932 observations.[7] Table (1) reports the descriptive statistics for different types of consumer credits in the sample. While housing and vehicle credits basically have longer maturities, general purpose credits have a more balanced number of observations in all three maturity categories.

Overall, we know the types of banks in terms of the share of their low-income customers and we also know the monthly flow data of consumer loans for each bank. We design an identification strategy setting January 2016 as the policy cutoff and estimating the differential impact of the minimum wage hike across the consumer loans of banks with respect to their low-income loan customer shares. This corresponds to a triple-difference empirical strategy, which we explain in detail in the next section.

4 Identification Strategy

Given the limitations of the data at hand, we develop an empirical strategy to estimate the effect of a permanent increase in labor income on consumer loans of low-income individuals. The naive approach would compare the borrowing behavior of low- versus high-income individuals to answer this question. However, such a comparison will be plagued with the classical selection problem as there will be considerable differences between the unobserved characteristics of low- versus high-income individuals that affect the borrowing behavior. In an ideal experiment, one would expect to have a setting in which there is an unanticipated permanent labor income shock that would allow the econometrician to compare the pre- versus post-shock borrowing outcomes of a set of randomly selected individuals.

A recent reform generated an abrupt increase in the level of minimum wage by roughly 30 percent—from approximately 1,000 TRY to 1,300 TRY per month—in Turkey starting from January 1st, 2016. Following Aaronson, Agarwal, and French (2012), we use this substantial minimum wage increase to estimate the impact of a permanent increase in labor income on

[7] These banks are Akbank, Aktif Yatirim Bankasi, Alternatifbank, Anadolubank, Arap Turk Bankasi, Bank Mellat, Bank Pozitif Kredi ve Kalkinma Bankasi, Birlesik Fon Bankasi, Burgan Bank, Denizbank, Fibabanka, Finans Bank, GSD Yatirim Bankasi, HSBC Bank, ING Bank, Iller Bankasi, Nurol Yatirim Bankasi, Odea Bank, Sekerbank, Tekstil Bankasi, The Royal Bank of Scotland Plc., Turkish Bank, Turk Ekonomi Bankasi, Turk Eximbank, Ziraat Bankasi, Garanti Bankasi, Halk Bankasi, Is Bankasi, Turkiye Kalkinma Bankasi, Turkiye Sinai Kalkinma Bankasi, Vakiflar Bankasi, and Yapi ve Kredi Bankasi.

the borrowing behavior of low-income individuals.

Our empirical design relies on a triple-difference exercise, which we describe as follows. As we mention in Section 3, we have bank-level loan data in weekly frequency. We start our analysis by setting a four-month window (from November 2015 to February 2016) centered around the date of the minimum wage hike, which is January 1st, 2016. So, the first difference is defined by a simple before and after comparison. Such a comparison would be insufficient to identify the impact of the minimum wage hike on consumer loans, since we do not have a counterfactual basis establishing how consumer loans would change after January 1st, 2016 absent the minimum wage hike. To establish such a basis, we take data from the previous year (from November 2014 to February 2015) and construct the second difference. There was no significant change in the Turkish minimum wage on January 2015; thus, data from the previous year could characterize how consumer loans would evolve before and after January 1st, absent a minimum wage hike. The second difference describes how the change in consumer loans between January-February and November-December periods differs across two consecutive years.

It will perhaps be useful to emphasize at this stage that such a setting will focus on the short-term response of consumer loans to the minimum wage hike as the analysis window covers only two months before and after the minimum wage reform. Although it is possible to extend this window, we would like to highlight that choosing a shorter versus a longer window is subject to certain tradeoffs. Setting a tight window comes with the cost of missing longer-term effects. Setting larger windows, on the other hand, entails the risk of capturing other confounding effects as the loan data is very sensitive to other economic and financial developments. Given these costs and risks, we believe that focusing on a shorter observation window would be a safer option and we design our empirical analysis accordingly. Consequently, our estimates should be interpreted as short-term effects rather than long-term ones.[8]

Although this simple difference-in-differences exercise roughly characterizes how total consumer loans change following the minimum wage reform, it doesn't say anything on whether

[8]Note that we perform our analysis using longer and even shorter observation windows for robustness purposes.

or not the borrowing behavior of those individuals who actually earn minimum wage is altered following the minimum wage hike. Ideally, a matched individual-bank data set with realistic information on labor market earnings would be enough to observe the impact of the minimum wage hike on the borrowing behavior of the minimum wage earners. However, the existing individual-level data do not provide accurate information on earnings. Using bank-level loan data, we develop an alternative strategy to address this issue. We have access to bank-level information on the historical share of loan customers within the minimum-wage range. In the rest of the paper, we call this variable as the share of low-wage loan customers. The share of low-wage loan customers exhibits substantial variation across banks, but it is also quite stable over time at the bank level. This means that it is possible to characterize banks in terms of their low-wage loan customers. This variable is formulated in a pre-determined fashion so as to make sure that it does not respond to the minimum wage reform.

Using this additional information, we include a third dimension into the difference-in-differences setting described above. More specifically, we introduce the share of low-wage loan customers into our analysis to isolate the effect coming from the borrowing behavior of minimum-wage earners following the minimum wage hike. Given this description, our triple-difference equation can be formally stated as follows:

$$\begin{aligned}\ln(L_{b,m,w}) = \alpha_0 + \alpha_1 \cdot (A_m \times P \times Z_b) + \alpha_2 \cdot (A_m \times Z_b) + \alpha_3 \cdot (P \times Z_b) \\ + \alpha_4 \cdot (A_m \times P) + \alpha_5 \cdot P + f_b + f_m + f_w + \varepsilon_{b,m,w},\end{aligned} \tag{4.1}$$

where b, m, and w index banks, months, and weeks, respectively. The rest of the variables can be defined as follows. L is the dependent variable describing bank-level loans, A is a dummy variable taking 1 if the month of observation is January or February and 0 if the month of observation is November or December, P is a dummy variable taking 1 if the period of observation is November 2015 – February 2016 and 0 if the period of observation is November 2014 – February 2015, and $Z \in [0, 1]$ is a continuous bank-level variable describing the time-invariant share of low-wage (i.e., in the minimum-wage range) loan customers. Note that this is a pre-determined variable, i.e., it is calculated as of the third quarter of 2015, which suggests

that the composition of the low-wage loan customers is not endogenous to the minimum wage hike. The variables f_b, f_m, and f_w describe bank, month, and week fixed effects, respectively, while ε is a usual error term.

The main coefficient of interest is α_1, which describes the percentage change in consumer loans—as a consequence of the minimum wage hike—in response to a percentage point change in the share of low-wage customers. Note that the variables A and Z are redundant [and, therefore, excluded from Equation (4.1)] as they are already captured by month and bank fixed effects, respectively. One key assumption behind this triple-difference design is that banks with historically low versus high share of low-wage loan customers exhibit parallel trends in their loans prior to the minimum wage reform. The parallel trends assumption mainly implies that the groups compared in the triple-difference analysis are similar in the sense that they demonstrate a similar behavior before the treatment date. If this assumption does not hold, the triple-difference will not be a credible identification strategy because the regression outcomes may then reflect the inherent behavioral differences between the comparison groups rather than the impact of the treatment. Figure (1) shows that the parallel trends assumption holds without much doubt. The sub-figures can be read as follows. Suppose that there is a cutoff level Z_{cutoff}, below (above) which the corresponding bank is labeled as a bank mainly serving to low-income (high-income) loan customers. Figure (1) demonstrates that the prior trends are consistent with the parallel trends assumption for a wide range of reasonable cutoff values, Z_{cutoff}. What happens after the minimum wage hike is explained in the next section, where we discuss our empirical results.

5 Results and Discussion

In this section, we provide a systematic presentation of our empirical results and discuss their implications. To set the stage, we start with a plain documentation of visual evidence. Figure (2) shows, on average, how the loans extended by banks serving to low-income customers changed relative to those serving to high-income customers following the minimum wage hike. Clearly, for all reasonable Z_{cutoff} levels, there is a jump right after January 2016. The numbers

should be interpreted as follows. For example, for a cutoff value of 0.25, the difference between the monthly growth rates of consumer loans extended by banks serving to low-income versus high-income customers is 7.29 percentage points in January and 0.91 percentage points in February. Overall, Figure (2) provides a rough visual evidence that the minimum wage hike generated an increase in consumer loans extended to low-income individuals. However, this visual evidence is not conclusive, because it may be the case that a jump occurs [as Figure (2) demonstrates] in consumer loans on every January. The triple-difference strategy that we outline in the previous section removes this possibility along with other alternative threats to econometric identification.

Table (2) documents the results of our baseline analysis. The estimates for our main parameter of interest, α_1, are reported in the first row. The first column reports the results for total consumer loans, while columns two, three, and four report the specific results with respect to loan maturity. Clearly, there is a positive and statistically significant increase in consumer loans extended to low-income customers following the minimum wage hike. The increase comes from very short-term (less than 12 months) and longer-term loans (above 24 months), while the medium-term loans (13–23 months) do not change. The short-term loans mostly consist of need-based (or general purpose) loans, so the average magnitude of those loans should not be too large. The longer-term loans are generally in the form of vehicle or housing loans of larger average magnitude. Table (1) gives an idea of the distribution of maturities across loan types. Our baseline results suggest that low-income customers increased their debt/spending following a permanent labor income shock, which relaxed their borrowing constraints to some extent.

Note that the coefficients of the regressions are not immediately interpretable. The main coefficient in our baseline estimates is 0.9, which suggests that a 10 percentage point increase in the share of low-income loan customers in a bank's portfolio is associated with a 9 percentage point increase in flow consumer loans as a consequence of the minimum wage hike. We perform some back-of-the-envelope calculations to convert the coefficient estimates into meaningful numbers. We find that the consumer loans (in Turkish lira monthly flow terms) increased by

10–15 percent following the minimum wage hike. Thinking that low-income individuals are credit constrained—therefore, they potentially have delayed need-based consumption—and also accounting for the fact that we are dealing with flow data, this increase can be labeled as a small/moderate one.

The next step is to repeat the same analysis for different consumer loan types to understand the content of this increase. We have three basic consumer loan types: need-based (or general-purpose) loans, vehicle loans, and housing loans. Table (3) shows the results for need-based loans. The results are quite similar to the results reported in Table (2). There is an overall increase in need-based loans and the increase comes from both short- and long-term loans. Note that the coefficient for the short-term loans looks statistically insignificant [see column 2 in Table (3)], but we can interpret this coefficient to be marginally significant as the corresponding p-value is very close to 0.10. As our descriptive statistics suggest [see Table (1)], around 90 percent of all general purpose loans are either short- or long-term in nature. We can conclude that the overall results are mostly driven by the effect coming from need-based loans. So, the delayed consumption interpretation is strongly supported by this finding.

It is also important to know how vehicle and housing loans changed as a response to the minimum wage hike. This would be a crucial thing to know, because vehicle and/or home ownership further increases the borrowing capacity of the owner through the collateral channel. Tables (4) and (5) document the results for vehicle and housing loans, respectively. We find that vehicle loans increased in a statistically-significant way, while there is no change in housing loans. The increase in vehicle loans comes from loans of maturity 24 months and above, which is not surprising based on our descriptive statistics table [Table (1)]. Although we see a statistically significant increase in medium-term (13–23 months) housing loans, the volume of medium-term housing loans is extremely small by definition and this result does not have any economic significance. Overall, we see that vehicle loans increase as a consequence of the minimum wage hike, while there is no meaningful increase in housing loans.

These findings exhibit some similarities and differences with those reported by Aaronson,

Agarwal, and French (2012). In their study, Aaronson, Agarwal, and French (2012) find that following the various minimum wage hikes in the United States spanning the period of 1982–2006, higher spending is observed among households with minimum wage workers. In particular, they show that the spending response is due to the increase in debt mostly in the form of vehicle loans. Higher demand for vehicles has increased collateralized borrowing capacity of the low-wage households and, therefore, increased the spending potential further. They also find that the spending response comes from a small number of households. Similar to their analysis, we document that there is a statistically significant response in the form of increased consumer loans. Different from their study, we argue that the increase mostly comes from the general purpose loans and the increase in vehicle loans is not as strong as Aaronson, Agarwal, and French (2012) report. These patterns suggest that the a visible delayed consumption effect operates along with a less effective collateralized debt effect (through increased durable goods consumption) proposed by Aaronson, Agarwal, and French (2012).

One would expect to observe a positive correlation between consumer loans and overdrafts. Thus, as a robustness check, we test whether there is also an increase in overdrafts following the minimum wage hike. Using our baseline empirical methodology, we use overdrafts as the outcome variable to perform this task. Second column in Table (6) reports the results. We find a statistically significant increase in overdrafts right after the minimum wage hike, which supports the results pertaining to the consumer loan response. The first column, on the other hand, documents the estimated impact on revolving credit card usage, i.e., credit card debt stock for those customers who pay at least the minimum required amount each month. We find no effect of the minimum wage hike on revolving credit card usage.

We perform various additional estimates to test the robustness of our empirical results under alternative settings. First, we try alternative observation window sizes—the original window of observation is 4 months. For shorter windows, the results have not changed in a meaningful way. For longer windows, on the other hand, we find that the coefficient of interest declines monotonically as the size of the observation window goes up. Although, for larger windows, it becomes harder to interpret the coefficient to characterize a causal effect in our setting (due

to potential confounding factors that kick in), the decline in the magnitude of the estimated coefficients as the window size goes up can be interpreted as an evidence of transitory consumer loan response. To be precise, we find that the effect becomes statistically indistinguishable from zero after 4–5 months following the minimum wage hike. Second, we change our control period—which was originally November 2014–February 2015—as November 2013–February 2014.[9] We find that, although the magnitudes change to some extent, the qualitative nature of our coefficient estimates is not altered under the alternative control period.

One fundamental question regarding the mechanism behind our results is whether the consumer loan response is driven by demand- or supply-side forces. Although the data at hand do not allow us to perform a formal test to separately identify demand- versus supply-side forces, it is possible to comment on the hints provided by the empirical results. A thirty percent permanent increase in labor income is a huge jump to get in the short run and it is natural to expect a change in the borrowing and spending behavior of the individuals earning labor income in the close neighborhood of the minimum wage range. Banks have credit standards and they may also have changed their attitudes toward these customers. We mainly observe an increase in general purpose loans following the minimum wage hike, which suggests that there was a certain volume of delayed consumption. This observations suggest that the demand-side forces have operated in the background. We also do not observe a decline in interest rates following the minimum wage hike. While this observation is not enough to make conclusive statements about the banks' credit standards, it suggests that the supply-side forces had not been dominant, i.e., we did not observe a change in bank behavior in terms of their willingness to extend credits to low-income households. Thus, we conjecture that demand-side forces have been more effective in shaping the consumer loan response following the minimum wage hike.

6 Concluding Remarks

In this paper, we estimate the impact of a permanent labor income shock on consumer loan response of low-wage individuals—i.e., the ones within the minimum wage range. From Jan-

[9]The minimum wage hike on January 1st, 2014 was also small in percentage terms.

uary 2016 on, the minimum wage increased significantly (around 30 percent) in Turkey, which is well above historical averages and the CPI expectations/realizations. Using this substantial minimum wage adjustment, we design a quasi-experimental setup for the purpose of estimating the consumer loan response of low-wage individuals. This is an interesting question, because there is little evidence on the spending response of low-income individuals to permanent income transfers and our setting renders an original empirical design.

We find that the flow of consumer loans have increased moderately mostly due to the increase in general-purpose loans. We also report that vehicle loans have increased, but housing loans have not changed in a statistically significant way. Back of the envelope calculations yield the result that consumer loan flows have increased by 10–15 percent following the minimum wage hike. Our results also suggest that the estimates exhibit a transitory nature (i.e., the effect tend to diminish over time), which can be interpreted as a delayed consumption effect. Overall, we can say that the increase in consumer loans after the minimum wage adjustment has generated a partial increases in demand for durables—i.e., in the form of vehicles. From a financial-stability perspective, we can argue that the increase in consumer loans has been manageable and has not distorted the ongoing trends.

Taking at face value, our results mean that permanent labor income shocks for low-income individuals trigger a likely transitory increase in borrowing. This extra borrowing is mostly in the form of delayed general-purpose consumption. A relatively smaller part of the extra borrowing goes to durables (i.e., vehicles). The relatively small volume of increase in vehicle credits suggests that the collateralized-debt channel mentioned in Aaronson, Agarwal, and French (2012) exists in a weaker manner in our case. So, in the big picture, we see only a mild and transitory increase in consumer loans extended to low-income individuals after a significant minimum wage adjustment. We conclude that the minimum wage hike has generated a transitory relaxation in the borrowing constraints of low-income individuals.

It should be noted that 2016 was a year in which economic activity recorded a sluggish course. It may be the case that the small/moderate consumer loan response to a major minimum wage

shock has been generated by low economic activity levels, which implies that the response may be a bit higher during boom periods than slowdowns. In other words, the consumer loan response of low-income individuals to permanent labor income shocks may exhibit a cyclical nature, which can be an interesting future research question.

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Descriptive Statistics (Thousand TL)			
Loans	**0–12 months**	**13–23 months**	**$\geq$ 24 months**
General purpose	19,829	10,786	64,495
Housing	341	818	50,475
Vehicle	243	929	4,564

Table 1: **Descriptive Statistics:** The numbers are stated as bank-level weekly averages calculated using flow credit data. For example, the weekly average of general purpose loans for each bank is around 20 million TL in our sample period. Clearly, housing and vehicles loans are mostly long-term loans, while the general purpose loans have a more balanced maturity distribution.

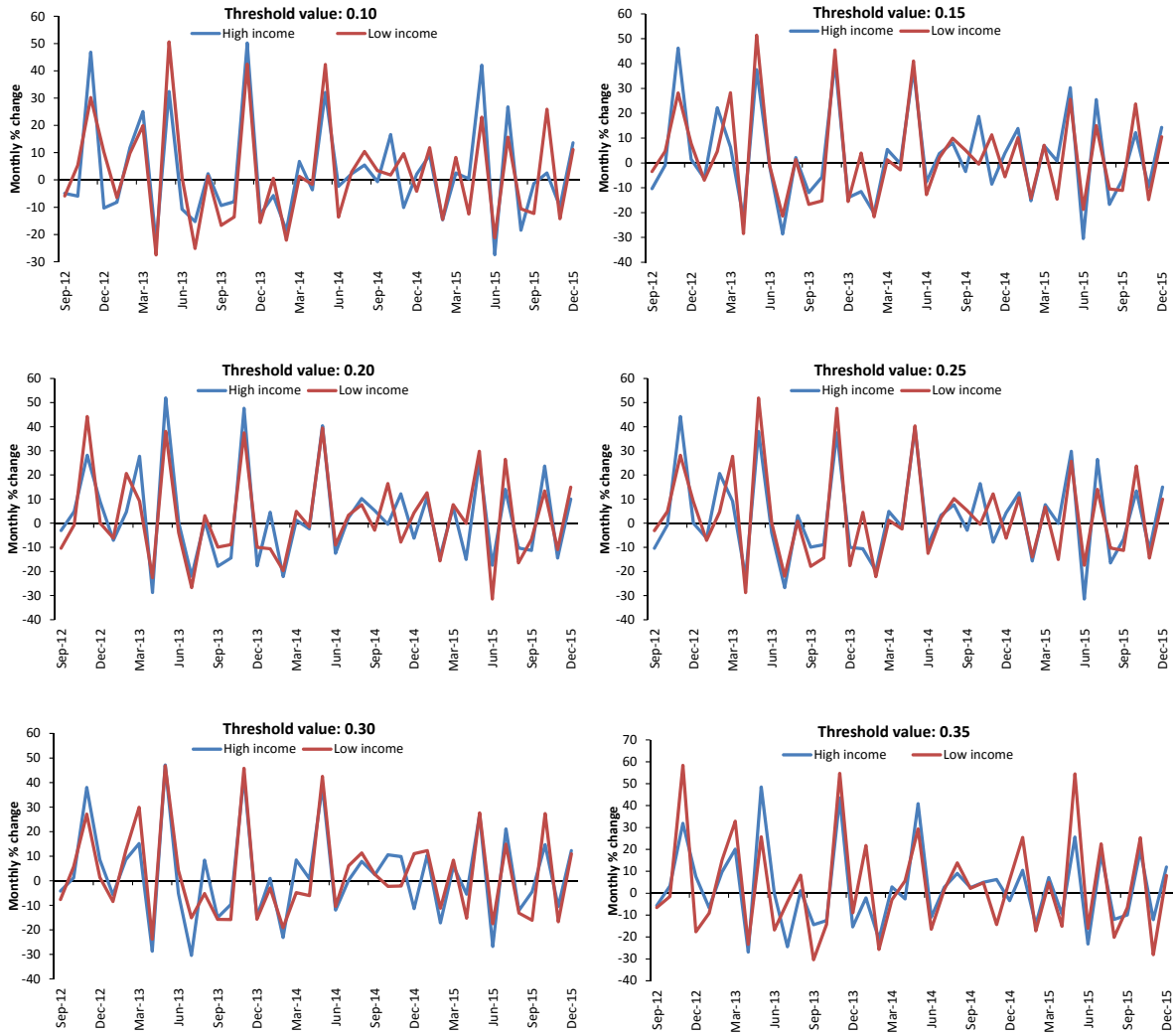

Figure 1: **Prior trends in consumer loans.** Prior trends for loans extended to low- versus high-income loan customers are plotted in monthly frequency for the period September 2012 – December 2015. Different threshold levels (in the range of 0.10–0.30) are defined to identify the banks with low- and high-income customers. The vertical axis describes the monthly change in consumer loans in percentage terms. Overall, the figures confirm that the parallel trends assumption holds.

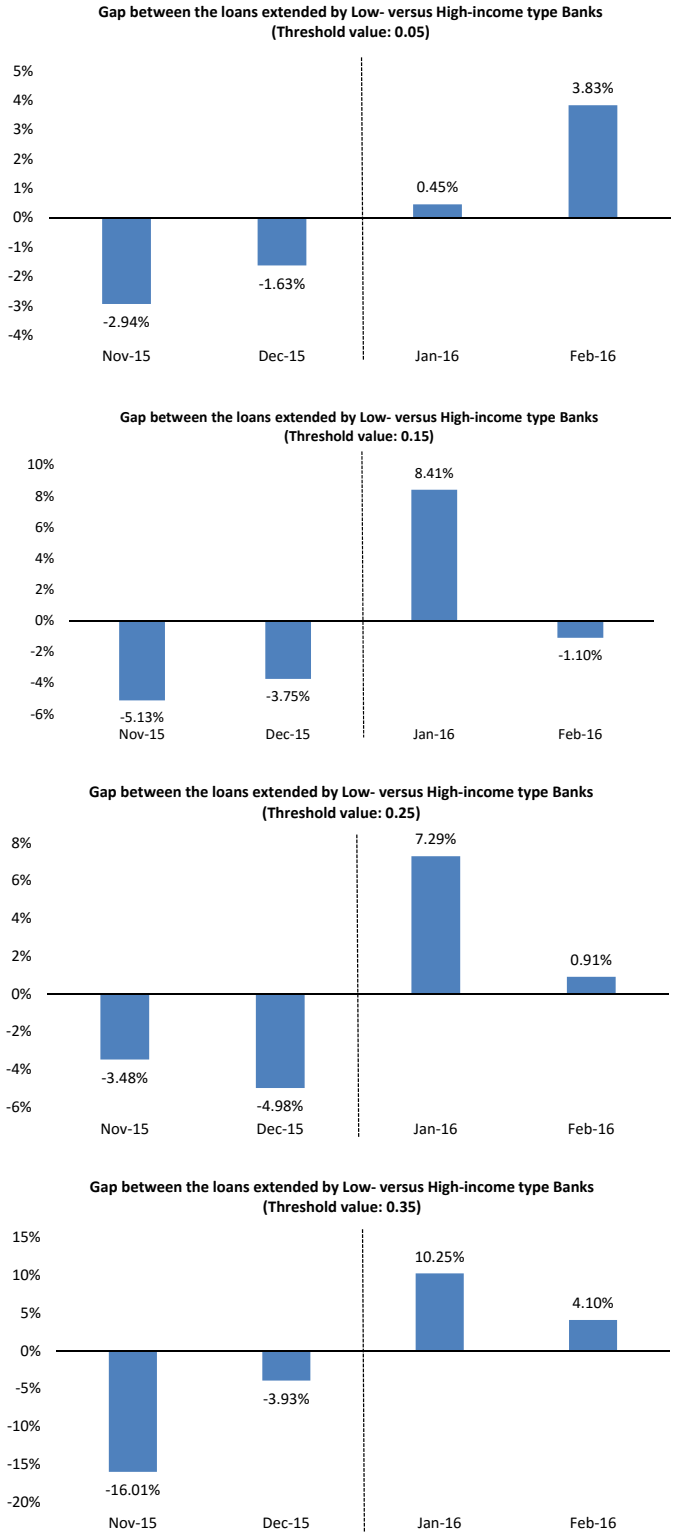

Figure 2: **Visual evidence.** The figures roughly show that the consumer loans extended to low-income individuals have increased in absolute terms following the policy cutoff date—January 1st, 2016. Different threshold levels (in the range of 0.05–0.35) are defined to identify the banks with low- and high-income customers. The vertical axis describes the monthly growth rate of consumer loans.

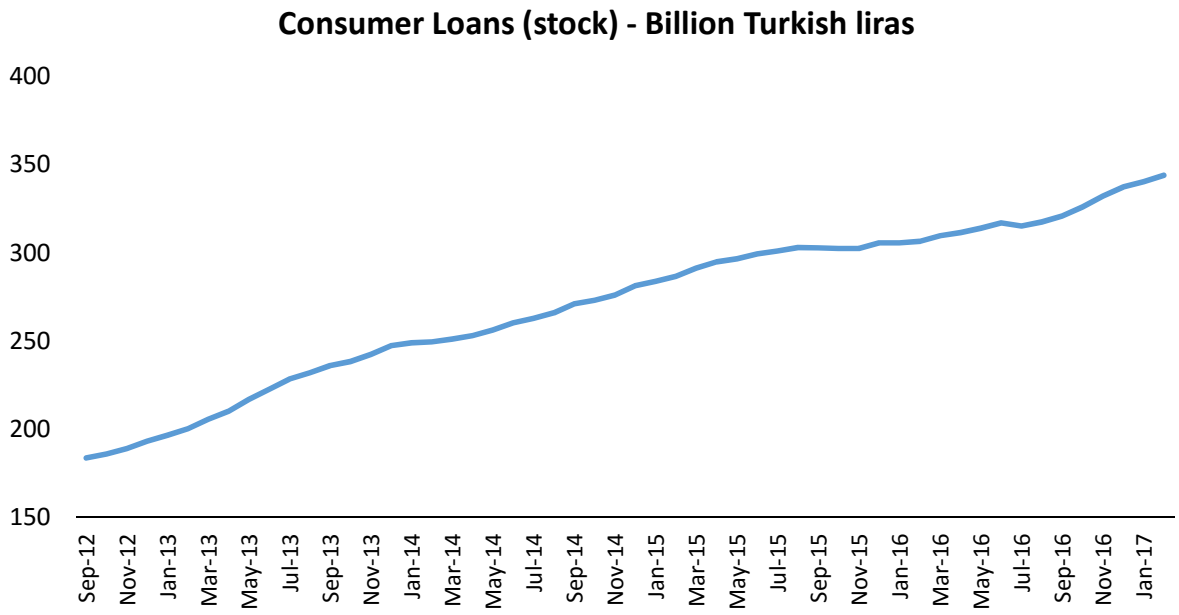

Figure 3: **Consumer loans (stock).** Aggregate trends in consumer loans are plotted in monthly frequency for the period September 2012 – February 2017. Apparently, there is no visible break in the underlying trends of the stock of consumer loans after the minimum wage hike date—January 1st, 2016.

Dependent Variable: Natural Logarithm of Consumer Loans				
Variable	**Total**	**0–12 months**	**13–23 months**	**$\geq$ 24 months**
Effect ($A \times P \times Z$)	0.90**	1.05*	-0.31	0.72**
	(0.27)	(0.41)	(0.36)	(0.18)
$A \times P$	-0.13*	-0.33**	0.14	-0.04
	(0.06)	(0.09)	(0.11)	(0.06)
$A \times Z$	-1.33**	-1.00**	-0.37*	-0.96***
	(0.35)	(0.31)	(0.15)	(0.12)
$P \times Z$	-0.55*	-0.33	-0.31	-0.26
	(0.24)	(0.22)	(0.37)	(0.16)
P	0.002	0.17***	0.001	-0.24**
	(0.08)	(0.03)	(0.09)	(0.05)
Mean of Z	0.129	0.137	0.141	0.148
Month fixed effects	Yes	Yes	Yes	Yes
Week fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
# of Observations	913	863	837	795
R-squared	0.97	0.96	0.95	0.96

Table 2: **Consumer Loans – Triple Difference:** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the week level. A is a dummy variable taking value 1 if the month of observation is January or February and 0 if November or December. P is a dummy variable taking 1 for observations belonging to the period November 2015 – February 2016 and 0 if November 2014 – February 2015. Z is a time-invariant continuous variable describing the share of low-income individuals (0–1000 Turkish lira—the minimum wage range) within a given bank's loan customers. Note that variables A and Z are redundant as they are captured by the month and bank fixed effects, respectively.

Dependent Variable: Natural Logarithm of Need-Based Loans				
Variable	**Total**	**0–12 months**	**13–23 months**	**$\geq$ 24 months**
Effect ($A \times P \times Z$)	0.82***	0.82	-0.54	0.68***
	(0.17)	(0.54)	(0.31)	(0.08)
$A \times P$	-0.51***	-0.56*	-0.23*	-0.41***
	(0.04)	(0.21)	(0.10)	(0.05)
$A \times Z$	-0.49**	-0.52	0.09	-0.31
	(0.11)	(0.31)	(0.14)	(0.16)
$P \times Z$	-0.12	0.56	0.11	0.51**
	(0.28)	(0.36)	(0.36)	(0.11)
P	0.64***	1.74***	0.25*	-0.05
	(0.10)	(0.20)	(0.10)	(0.05)
Mean of Z	0.148	0.153	0.158	0.158
Month fixed effects	Yes	Yes	Yes	Yes
Week fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
# of Observations	795	770	741	742
R-squared	0.94	0.85	0.89	0.92

Table 3: **Need-Based Loans – Triple Difference:** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the week level. A is a dummy variable taking value 1 if the month of observation is January or February and 0 if November or December. P is a dummy variable taking 1 for observations belonging to the period November 2015 – February 2016 and 0 if November 2014 – February 2015. Z is a time-invariant continuous variable describing the share of low-income individuals (0–1000 Turkish lira—the minimum wage range) within a given bank's loan customers. Note that variables A and Z are redundant as they are captured by the month and bank fixed effects, respectively. The terms "need-based loans" and "general purpose loans" are used interchangeably throughout the paper.

Dependent Variable: Natural Logarithm of Vehicle Loans				
Variable	**Total**	**0–12 months**	**13–23 months**	**$\geq$ 24 months**
Effect ($A \times P \times Z$)	1.25**	1.53	-0.17	1.01*
	(0.40)	(2.41)	(1.33)	(0.37)
$A \times P$	-0.27	-0.25	0.14	-0.24*
	(0.15)	(0.62)	(0.25)	(0.11)
$A \times Z$	-0.82	-0.95	0.32	-0.91
	(0.40)	(1.05)	(0.49)	(0.50)
$P \times Z$	-1.53***	-2.73*	-1.09	-1.16***
	(0.24)	(1.22)	(1.16)	(0.16)
P	0.45**	0.45	0.67***	0.37***
	(0.11)	(0.32)	(0.14)	(0.06)
Mean of Z	0.169	0.182	0.186	0.169
Month fixed effects	Yes	Yes	Yes	Yes
Week fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
# of Observations	556	334	440	547
R-squared	0.92	0.55	0.75	0.92

Table 4: **Vehicle Loans – Triple Difference:** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the week level. A is a dummy variable taking value 1 if the month of observation is January or February and 0 if November or December. P is a dummy variable taking 1 for observations belonging to the period November 2015 – February 2016 and 0 if November 2014 – February 2015. Z is a time-invariant continuous variable describing the share of low-income individuals (0–1000 Turkish lira—the minimum wage range) within a given bank's loan customers. Note that variables A and Z are redundant as they are captured by the month and bank fixed effects, respectively.

Dependent Variable: Natural Logarithm of Housing Loans				
Variable	**Total**	**0–12 months**	**13–23 months**	**$\geq$ 24 months**
Effect ($A \times P \times Z$)	0.05	-0.70	4.13*	-0.02
	(0.50)	(3.00)	(1.57)	(0.51)
$A \times P$	0.09	0.09	-0.64	0.12
	(0.12)	(0.53)	(0.33)	(0.12)
$A \times Z$	0.17	0.64	-1.95	0.18*
	(0.07)	(1.28)	(1.65)	(0.07)
$P \times Z$	-1.30*	-0.25	-2.30	-1.26*
	(0.50)	(0.99)	(1.57)	(0.48)
P	0.08	-0.14	0.58*	0.06
	(0.10)	(0.18)	(0.23)	(0.09)
Mean of Z	0.149	0.205	0.191	0.149
Month fixed effects	Yes	Yes	Yes	Yes
Week fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
# of Observations	631	237	410	630
R-squared	0.91	0.37	0.52	0.91

Table 5: **Housing Loans – Triple Difference:** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the week level. A is a dummy variable taking value 1 if the month of observation is January or February and 0 if November or December. P is a dummy variable taking 1 for observations belonging to the period November 2015 – February 2016 and 0 if November 2014 – February 2015. Z is a time-invariant continuous variable describing the share of low-income individuals (0–1000 Turkish lira—the minimum wage range) within a given bank's loan customers. Note that variables A and Z are redundant as they are captured by the month and bank fixed effects, respectively.

Dependent Variable: Natural Logarithm of Credit Cards and Overdrafts		
Variable	**Credit Cards**	**Overdrafts**
Effect ($A \times P \times Z$)	-0.47	1.46*
	(0.38)	(0.55)
$A \times P$	0.14	-0.37**
	(0.13)	(0.10)
$A \times Z$	0.53**	-0.49
	(0.12)	(0.32)
$P \times Z$	0.59	-1.53***
	(0.31)	(0.31)
P	-0.02	0.77***
	(0.09)	(0.07)
Mean of Z	0.172	0.152
Month fixed effects	Yes	Yes
Week fixed effects	Yes	Yes
Bank fixed effects	Yes	Yes
# of Observations	620	737
R-squared	0.94	0.94

Table 6: **Credit Cards and Overdrafts – Triple Difference:** ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the week level. A is a dummy variable taking value 1 if the month of observation is January or February and 0 if November or December. P is a dummy variable taking 1 for observations belonging to the period November 2015 – February 2016 and 0 if November 2014 – February 2015. Z is a time-invariant continuous variable describing the share of low-income individuals (0–1000 Turkish lira—the minimum wage range) within a given bank's loan customers. Note that variables A and Z are redundant as they are captured by the month and bank fixed effects, respectively.