Timing matters: exploring the causal effect and potential mechanisms of a liquidity shock on delayed payments*

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Abstract

Late payment and arrears management are chronic issues in many markets, especially in public services, significantly affecting household welfare and firms' profitability. In Tucumán Province, Argentina, about 62% of electricity consumers pay their bills late, rising to 85% among low-income households. Previous research indicates that liquidity constraints and financial management challenges may be significant contributing factors. Using data from over 20,000 households receiving social security benefits between 2019 and 2022, we examine how mismatches between electricity bill due dates and social security paydays affect on-time payments. Our findings show that the likelihood of on-time payment drops by 4.5 percentage points when the payday falls just after the due date and by 3 percentage points when it falls after the disconnection date. Additionally, we find no significant effects on households using credit, likely because they do not experience a liquidity shock due to the timing mismatch. To the best of our knowledge, this is the first study to examine the impact of liquidity shocks on energy utility disconnection and the underlying mechanisms, thereby extending the literature on the poverty penalty.

Keywords: *Late Payment, Liquidity Shock, Poverty Penalty, Social Security, Consumer Finance*

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1 Introduction

Late payment of bills is a widespread issue across services, negatively impacting household welfare and firm profitability (Paul, Devi, and Teh, 2012). A report by Bureau of Consumer Financial Protection (2018) reveals that only 21% of individuals in the US consistently pay their bills on time.[1] This issue is especially acute in public utilities (e.g., water, gas, electricity), with studies worldwide highlighting this problem. For example, Aguilar-Benitez and Saphores (2008) found that only 50% of households in Nuevo Laredo, Mexico, pay their water bills on time, regardless of income. Similarly, Kertous and Zerzour (2015) shows that in Bejaia, Algeria, the average time-to-payment for water bills is 69 days, despite a 15-day deadline. In New England, USA, Barrage et al. (2020) found that households are more likely to miss payments if bills are not received shortly after income and that the problem is exacerbated for low-income households.

Previous literature has found that the non-payment of services stems more from an inability to pay rather than a lack of willingness to pay (Booysen, 2001). In households grappling with limited financial resources, financial management and economic decision-making can be hamstrung by the absence of immediately available funds. According to the Bureau of Consumer Financial Protection (2018), respondents often cited falling behind on bills due to a timing misalignment between income arrival and billing dates. This circumstance can engender liquidity constraints that impede the timely payment of public utility bills, generating substantial financial implications, such as late fees, interest charges, damaged credit scores, and, in extreme cases, service disconnection. Beyond the immediate financial impact, the consequences of delayed payments may extend to psychological stress that directly impacts well-being and quality of life. For instance, Bridges and Disney (2010) finds a positive correlation between financial and psychological well-being, a finding echoed by (Burgess et al., 2020).

This paper leverages a natural experiment to quantify the impact of mismatches between bills' due dates and paydays on the likelihood of households paying their bills on time. We hypothesize that these liquidity shocks significantly contribute to bill payment delays. We study this issue in the context of electricity bill payment behavior in the Province of Tucumán, Argentina. Two key features of our environment provide clean sources of identifying variation. First, bills' due dates vary both across households within a billing cycle and across billing cycles within a household due to human resource constraints and logistics. Second, the Social Security benefits payment day is determined by the last digit of the beneficiary ID and varies both across beneficiaries within a given month and across months within a given beneficiary. Our identification strategy thus leverages the fact that the same household experiences periods with both positive and negative mismatches.

[1] The Bureau collaborated with a private-sector bill payment processor serving telecom, wireless, cable, and utility operators in North America.

We combine three main sources of data to answer our research question. First, we use detailed, bill-level data on electricity consumption (in kWh); bill issue, due, and suspension dates; as well as payment date(s), amount(s) paid, and mode(s) of payment for each bill for the universe of residential energy users in the Province of Tucumán, Argentina, between January 2019 and July 2022. Second, we collect data on the social security beneficiary status of every residential electricity account holder present in our first data source. Third, we compile the list of pay dates by calendar year-month and last ID digit of the beneficiary for one of the major social security benefits programs in Argentina (AUH by its acronym in Spanish). We finally merge the bill-level data with the AUH beneficiary status and AUH benefits payment schedule using the electricity account holders' last ID digits. Using these matched data, we first document that 62% of the universe of residential energy users pay their bills after the due date and 20% after the service suspension date. These rates rise to 85% and 55% for social security benefit recipients, respectively.

In a developing country with persistently high inflation rates like Argentina, a natural question is whether paying the bills on time is the optimal action from the household viewpoint. In our particular context, the penalties associated with late payments follow a non-linear block-pricing scheme. For payments made up to 10 days after the due date, the company charges a late fee of 1.5% of the unpaid bill, while a late fee of 3% is charged for payments made between 11 and 20 days after the due date. If the user does not pay the bill in full after 20 days of the due date, the company proceeds to (1) suspend the service, (2) charge a lump sum reconnection fee for service suspension, regardless of whether it materializes or not, and (3) charge a late fee of 5% of the unpaid portion of the bill per month.[2] The interplay between the electricity bill late fees, the interest rates of alternative investment options, and the interest rates on other households' debts (e.g., credit card statements) will determine the optimal timing and amount of the electricity bill payment. Hence, whether it is optimal to pay the bill by the due date, by the disconnection date, or after the disconnection date is ultimately an empirical question.

Focusing on the subsample of over 600,000 unique bills from 23,000 households receiving one of the major social security benefits in the country, our findings indicate that the probability of paying the electricity bill by the due date decreases by 4 percentage points when households receive their social security benefits after the bill due date. This implies a nearly 30% reduction in on-time payments. Furthermore, the probability of paying the bill by the suspension date decreases by around 3 percentage points when the suspension date precedes the benefits collection date. This suggests that the likelihood of paying electricity bills before the suspension date decreases by nearly 7%.

[2]Even though the contract says the company proceeds to service disconnection if the user does not fully pay the bill after 20 days of the due date, in reality, those physical disconnections happen with low probability. This is partly driven by technological constraints, wherein an agent from the company has to visit the user's address in person to disconnect the service. However, regardless of whether the disconnection happens, the company does charge the reconnection fee.

To assess the robustness of our findings and explore the underlying potential mechanisms, we restrict our attention to the bills paid by credit card. We hypothesize that these users, by having access to credit, may not be as affected by liquidity constraints typical of low-income households. Therefore, experiencing a mismatch between the due date (or suspension date) and the income collection date may not significantly impact their probability of paying the bill on time. Our results validate this hypothesis and offer further support for our main conclusions.

A study closely related to ours is Dahan and Nisan (2022), which examines the probability of timely payment among low-income households in Jerusalem, Israel, where a liquidity shock occurs if social benefits are received one day after the water bill due date. A key difference between our study and Dahan and Nisan (2022) is that we observe variability in payment days, determined by the beneficiary's ID number, creating an environment more akin to a random assignment of payment days. Additionally, our study extends the analysis to include a crucial welfare date: the service cutoff date. Beyond the financial and psychological costs associated with debt and late payments, electricity service suspension further impacts households by reducing available light, which affects how time is allocated to various activities (Thompson, 2002).

The remainder of the paper is organized as follows. Section 2 presents background information regarding the electricity service in the Province of Tucumán, Argentina, and the nature and eligibility criteria for the Social Security benefit we use in this study. Section 3 describes the data and some relevant descriptive statistics. Section 4 describes the identification strategy. Section 5 presents the main results and explores potential mechanisms. Finally, section 6 concludes.

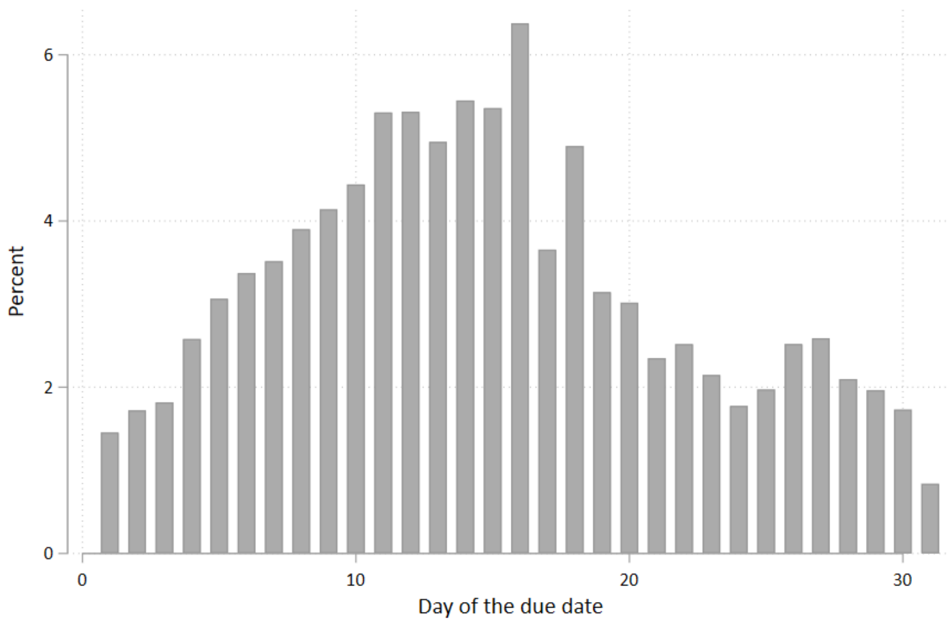
2 Background

2.1 Electricity Service in the Province of Tucumán, Argentina

The distribution and commercialization of electricity in Tucumán is carried out by a private company (EDET S.A.). The company is dedicated to providing reliable services to more than 530,000 customers, with a commitment to ensure seamless connections for 1.6 million inhabitants. Residential users are billed either monthly or bimonthly. Approximately 60% of users receive bimonthly billing, while 40% receive monthly billing.

Due to technological and human resources constraints, EDET S.A. employees manually read the meters of only a portion of the households each business day throughout the billing cycle. The bill is issued two to three days after the reading date, and the due date is set 10 to 14 days after the issue date. Therefore, the bill issue date depends on when the electricity meters are read, which in turn determines the bill due date. As a consequence, households face some uncertainty regarding their meter reading day in each billing cycle. However, once the bill is issued, it includes both the current bill due date and the next bill due date.[3] Figure 1 displays a histogram of the frequency of the bill due dates by calendar day of the month.

Figure 1: Distribution of due dates by day of month



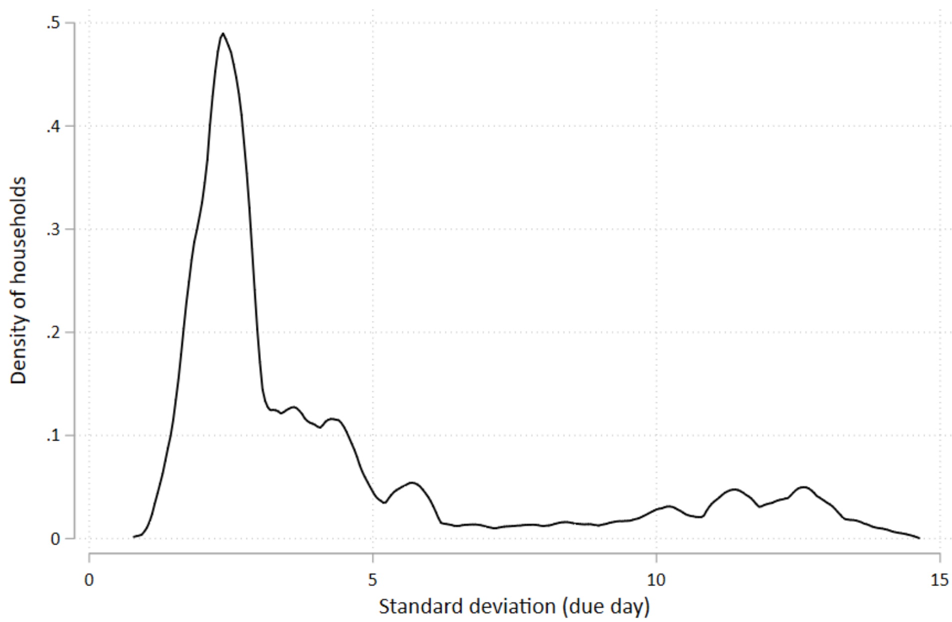
This meter reading system generates bill due date variation not only across households within the same billing cycle but also within households across billing cycles. Figure 2 shows the distribution of the standard deviation of the due date within household during our analysis period. Notably, all households exhibit variation in the due date as evidenced by their non-zero standard deviations.

According to EDET S.A.'s regulations, a late payment incurs an interest charge on the billed amount. This nominal interest rate is 1.5% if the delay is up to 10 days, 3% if the delay is between 10 and 20 days, and 5% if the delay reaches 30 days. Moreover, after twenty days past the due date, a rehabilitation fee is added and EDET S.A. is authorized to suspend the service. Figure 3 shows that EDET S.A.'s interest rate is higher than the lending rate and the deposit rate after March 2020, which would indicate that paying the electricity bill on time is financially convenient in that period.[4] We do not consider the financial exercise for more than 20 days after the due date, since the penalty in this case would not only include the interest charge, but also the rehabilitation

[3] An example bill is included in Appendix Figure 14.

[4] For the lending rate, we consider the interest rate from credit cards, and for the deposit rate, we consider the interest rate from a fixed-term deposit. Source: Central Bank of Argentina.

Figure 2: Distribution of the standard deviation of due day



fee, and other costs associated with the probability of the service being suspended. In July 2022, the rehabilitation fee charged to residential users was $870.23 (around $7 US dollars, at the official exchange rate, and 27% of the average bill for low-income AUH users). Note that the suspension fee must be paid whether or not the suspension is actually carried out.

2.2 AUH: A Major Social Security Program in Argentina

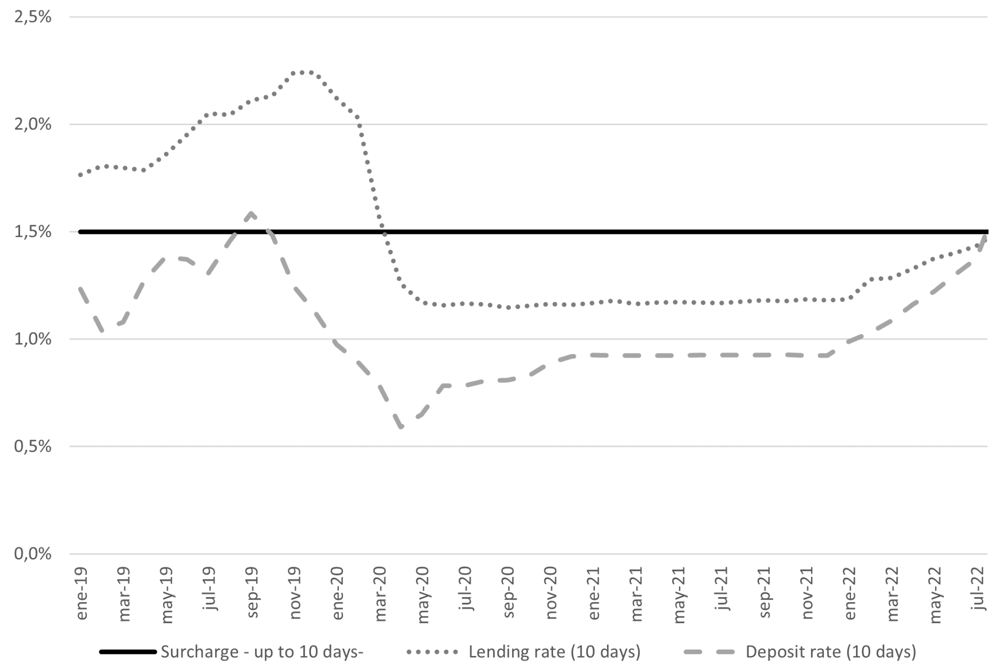
The Universal Child Allowance (hereinafter AUH, for its Spanish acronym) is a federal conditional cash transfer program implemented in 2009 and run by the Argentinean Social Security Administration (ANSES by its acronym in Spanish). It consists of a monthly payment made for each child under 18 years old when their parents are unemployed, have informal jobs, or work in domestic service.[5] The amount of the transfers, the budget, and the coverage of this program position it as one of the most relevant child assistance programs in Latin America (García Domench and Gasparini, 2017). For many households, the AUH plays a crucial role by providing essential income to meet basic family needs (Bustos and Villafañe, 2011). In June 2022, the AUH amounted to $7,332 (approximately $60 USD), which represents 17% of the minimum wage.[6]

The allowance is collected monthly on specific dates, determined by the last ID digit of the beneficiary. Figure 4 shows a histogram of the frequency of AUH payment by calendar day of the

[5]Source: Argentina.gob.ar.

[6]The minimum wage in June 2022 was $42,240.

Figure 3: EDET interest rate fee vs. lending and deposit rates



month. The AUH payment date is equally distributed between the 10th and 20th of the month, with fewer or no observations on the first and last days. One key feature of the AUH payment schedule is that the calendar day of the month in which the payment is made varies both across beneficiaries within a month (due to the last ID digit) and also across months within a beneficiary (mostly due to weekends and holidays). Figure 5 displays the distribution of the standard deviation of the AUH payment day for each household. This figure shows exogenous variation between and within households, although the AUH payment date depends on the beneficiary ID number, which does not change.

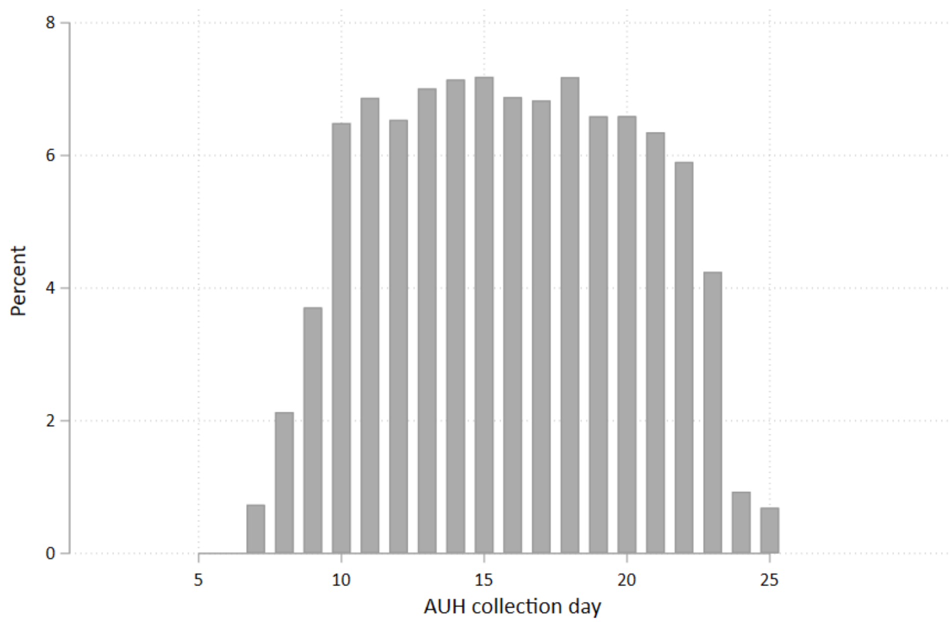
3 Data

We use proprietary, de-identified, electricity bill-level data from over 500,000 households with both monthly and bimonthly billing cycles in the Province of Tucumán, Argentina, covering the period from January 2019 to July 2022. This database includes detailed information on electricity consumption, bill amounts, due dates, suspension dates, payment dates, and payment methods used.[7]

In March 2020, amid the COVID-19 global health emergency, the federal government imple-

[7]Utility companies typically do not make extensive information about users' bill payments publicly available. It is important to note that the data supporting this research is not accessible to the public or research community due to a confidentiality agreement.

Figure 4: Distribution of day of payment of the AUH by day of month



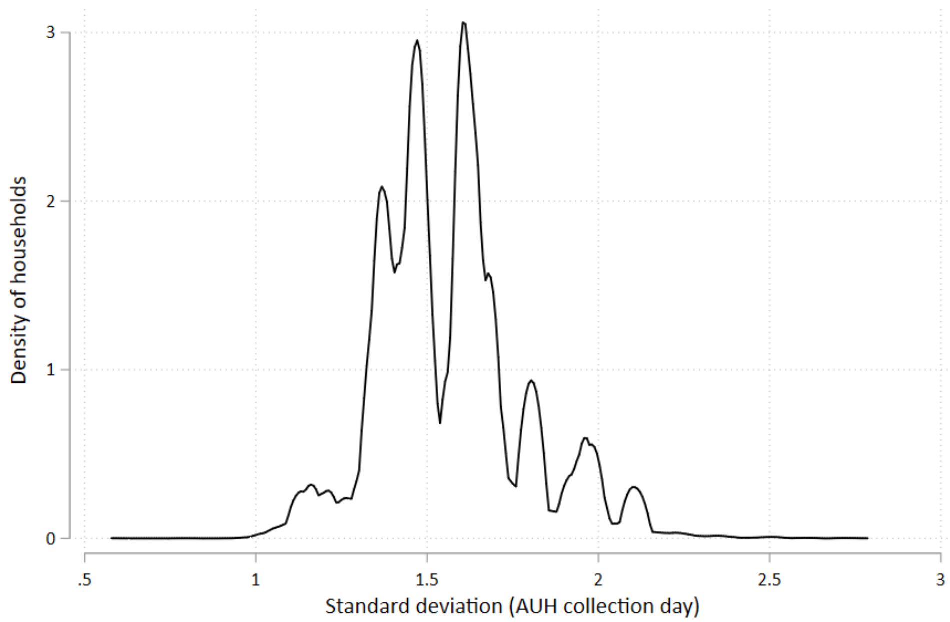
mented a decree suspending utility service disconnections triggered by late payments of bills for residential electricity account holders receiving AUH benefits.[8] To facilitate the implementation of the decree, the federal government compiled a list of AUH beneficiaries as of March 2020 and shared this list with all provincial utility service regulators.

Thanks to an institutional agreement with the electricity service regulator of the Province of Tucumán (ERSEPT), they merged the identifiable electricity bill-level data with information on the AUH beneficiary status of every residential electricity account holder as of March 2020. Finally, they provided us with the de-identified version of the electricity bill-level data including two additional variables: (1) AUH recipient status as of March 2020, and (2) the last ID digit of the electricity primary account holder. At this point, our augmented data allow us to classify households into two groups: households whose electricity primary account holder receives AUH as of March 2020, and the complement.

The data have two limitations though. First, the Decree list only contains information on AUH beneficiaries as of March 2020. In principle, the AUH beneficiary list changes with new entries and exits every month. Due to data limitations, we assume that the beneficiaries receive the AUH during our entire study period. Second, we cannot rule out that other household members (different from the electricity account holder) are AUH beneficiaries.

[8]Decree 311/2020. This policy was in effect from March 2020 to December 2020. You can refer to the decree here.

Figure 5: Distribution of standard deviation of AUH payday



We combine these augmented data with our third and final source of information. We hand collected information about the specific day of the month when each household receives AUH payment, determined by the last ID number of the holder, through the information from the National Social Security Administration (ANSES) website. We examine the archives of the primary newspapers where the ANSES calendar is published each month, including Pagina 12 and La Nación. We create a supplementary dataset with the payment date determined by the last ID number, month, and year, which is then combined with the main database. To provide an example, in the appendix, we display a screenshot of the website in Figure 15.

The dataset initially contains 13,084,628 observations, representing 518,844 users, for the period 2019-2022. Of these, 57% correspond to bimonthly users and 43% to monthly users. Prior to conducting the empirical analysis, we impose two restrictions on the data set to create the sample. Firstly, we only include households where the account holder receives AUH, which are mostly low income households (Garganta, Gasparini, and Marchionni, 2017). Secondly, we exclude inactive service users from the analysis, identified as those with zero consumption for 12 consecutive months. After applying the restrictions we have data on 22,898 households (699,938 observations). Table 1 displays descriptive statistics related to the number of observations, households, consumption, amount billed and the percentage of payments that are made after the due date and after the date of suspension of service.

Table 1: Descriptive statistics

	2019	2020	2021	2022	All
Comsuption (kWh)	223.23	234.65	227.19	252.69	232.49
	(178.61)	(204.05)	(198.72)	(221.55)	(199.58)
Bill amount ($)	1,356.28	1,690.67	1,870.70	2,254.56	1,707.62
	(1,061.20)	(1,426.36)	(1,511.39)	(1,782.43)	(1,429.22)
Late payments, at due date (%)	86.22	84.33	84.77	84.87	85.03
	(34.47)	(36.35)	(35.93)	(35.84)	(35.68)
Late payments, at suspension date (%)	49.17	55.36	56.51	60.04	54.88
	(49.99)	(49.71)	(49.57)	(48.98)	(49.76)
Observations	178,601	202,510	204,867	113,960	699,938
Users	21,903	22,892	22, 881	22,830	22,898

Mean coefficients; standard deviations in parentheses

The year 2022 encompasses January to June.

To ensure comparability with monthly users, the bill amount and consumption of bimonthly users are halved.

4 Empirical Strategy

4.1 Late payments

The outcome variable is a binary variable assigned set to 0 if the user pays the bill on time, and 1 if the payment is made after the due date. The user is considerate to pay their bill on time ($latepay = 0$) if they pay 95% or more of the bill before the due date. If a user's initial payment is made after the due date or if, despite making one or more payments before the due date, these payments do not add up to 95% of the total amount billed, then the user is deemed to have paid their bill late ($latepay = 1$).

$$Late\ pay = \begin{cases} 1 & \text{if due date} \leq \text{payment date}_1\text{, or} \\ & \text{if due date} \geq \text{payment date}_i \wedge \text{share of the bill paid}_i < 0.95 \\ 0 & \text{if due date} \geq \text{payment date}_i \wedge \text{share of the bill paid}_i \geq 0.95 \end{cases} \quad (1)$$

Based on this approach, for our universe, the payment of electricity bills is delayed in 85% of instances in the province of Tucumán. Specifically looking at low-income households, who are beneficiaries of AUH.

The bill stipulates that late payments will result in additional late fees, and if the bill remains unpaid 20 days after the due date, EDET can suspend the service and the corresponding rehabilitation fee will be due. Then, we generate a secondary outcome variable that considers the relevance of the service suspension date. This dummy variable is assigned a value of 0 if the user pays the bill before the suspension date, and 1 if the payment is made after that date. The methodology mirrors the earlier instance, except replacing the due date with the suspension date.

On-time payment of bills increases when we consider the second variable. In total, 55% of electricity users pay their bills after the suspension date, for low-income households.

4.2 The mismatch

The mismatch is the key variable of the analysis. Initially, we define it as the number of days between the bill's due date and the income receipt date. If it is positive, it implies that the due date happened before the income receipt, resulting in a household's negative liquidity shock. Alternatively, if it is negative, the income is received before the due date of the bill.

$$Mismatch = AUH\ Pay\ day\ \text{-}\ Electricity\ Bill\ Due\ date \tag{2}$$

To identify the mismatch, We compare every due date with the corresponding month's collection date, as well as with the collection dates of the previous and following months. We select the AUH collection date that is closest to the due date based on the minimum absolute difference in days. This is the assumed income that can be utilized to pay the bill regardless of its arrival before or after the due date.

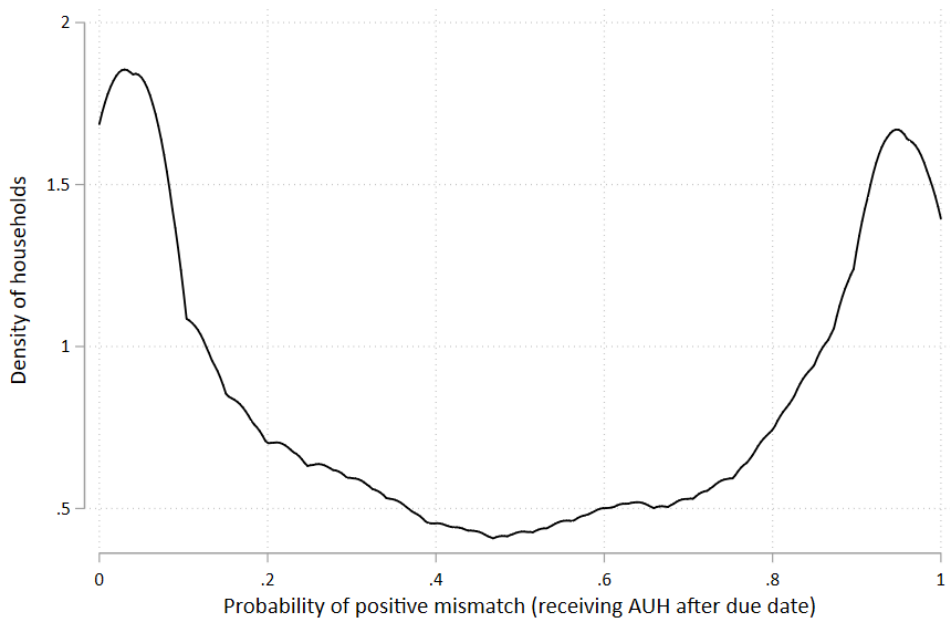
Figure 6 displays the distribution of user's probability of having a positive mismatch. Some households experience only positive mismatch in all billing cycles ($probability = 1$), while others consistently experience a negative mismatch in all cycles ($probability = 0$). However, 80% of households display variability in the sign of the mismatch between billing cycles, indicating a probability different from zero or one. This serves as our identification strategy. On average, low-income households experience negative liquidity shocks due to the mismatch in 53% of cases, meaning that the due date for the electricity bill falls after the day they receive their AUH income ($mismatch > 0$).

For a subsequent analysis, we consider the date of service suspension, as was done for the outcome variable. The mismatch is calculated by replacing the due date with the suspension date and comparing the difference to the payday. For every suspension date, the nearest income collection date was selected, as in the previous calculation.

$$Mismatch = AUH\ Pay\ day\ \text{-}\ Electricity\ Bill\ Suspension\ date \tag{3}$$

This mismatch generates a negative liquidity shock for households in 51% of the cases. As in the

Figure 6: Distribution of the probability of having a positive mismatch



previous scenario, it is noted that households display varying signs of discrepancies between billing cycles, with 80% of households affected (Figure 12).

4.3 Model

Our main goal is to investigate how the mismatch affects the probability of paying the bill on time, so we employ the following model:

$$P_{i,t} = \beta_1 Z_{i,t} + \beta_2 X_{i,t} + ID_{i,t} + D_{i,t} + M_{i,t} + Y_{i,t} + \varepsilon_{i,t} \tag{4}$$

where the dependent variable P takes the value 1 if user i paid the bill on time at due date t. The explanatory variable $Z_{i,t}$ takes the value 1 if the user i receives the AUH payment after the due date. Notice we analyzed various combinations of treatment and control groups by adjusting the mismatch intervals. $X_{i,t}$ denotes the logarithm of the total bill amount, ID_i is a fixed effect by household and while $D_{i,t}$, $M_{i,t}$, and $Y_{i,t}$ represent fixed effects for the day of the week, month, and year of the bill's due date, respectively.

To ensure comparability between the treatment and control groups, Figure 7 shows that the distributions of the bill amounts and the consumption for the treatment and control groups are very similar. Additionally, Table 2 ensures a balance between the treatment and control groups for average monthly consumption and bill amount.

Figure 7: Distribution of monthly billing amounts ($) and consumption (kWh)

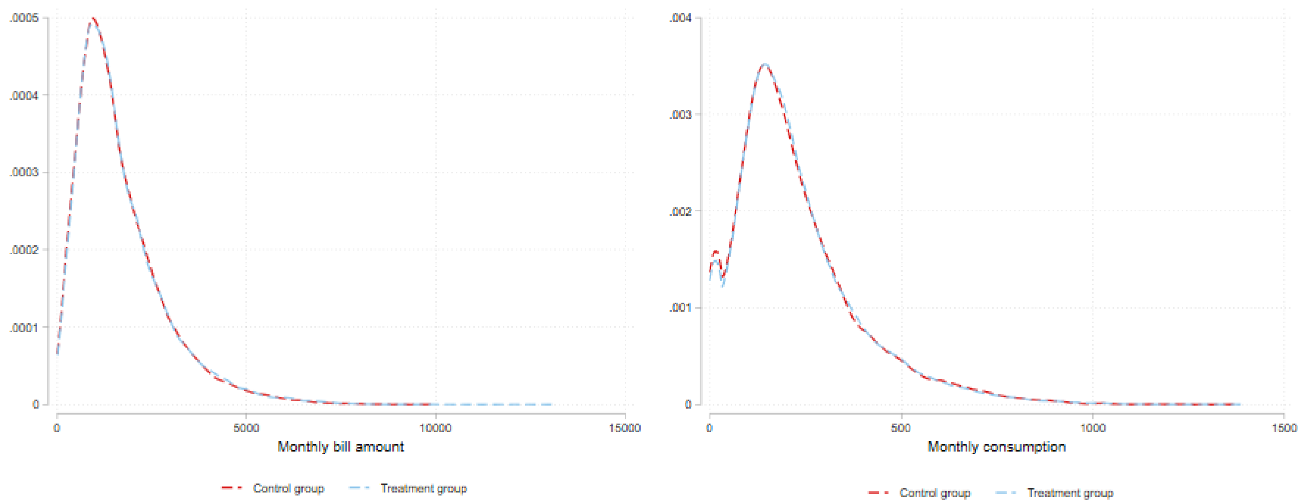


Table 2: Balance between treatment and control groups

	Difference	
Consumption (kWh)	-1.694	(-1.24)
Bill amount ($)	-21.61*	(-2.08)
Observations	81,499	

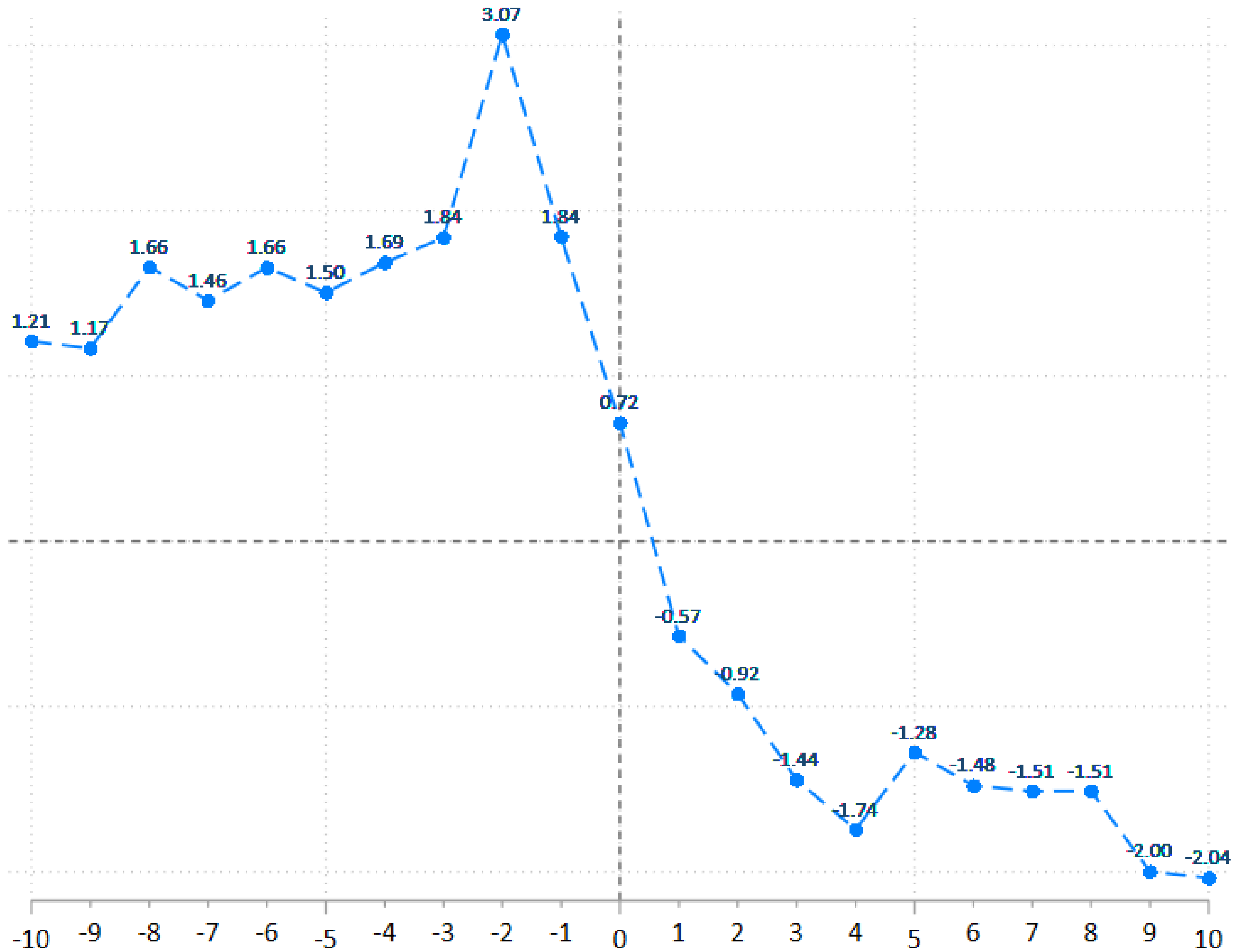
t statistics in parenthesis
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Treated group comprises users who received AUH one day after the due date.Control group consists of users who received AUH a day before.
To ensure comparability with monthly users, the bill amount and consumption of bimonthly users are halved

5 Results

An initial estimation of how mismatches between payday and due date affect the probability of on-time payments is presented in the Figure 8. This was achieved by calculating the actual probability of timely payments relative to the average probability across mismatches ranging from -10 to +10 days. The figure illustrates how AUH beneficiaries are more likely to pay their electricity bills on time when the receipt date of the allowance precedes the due date.

Figure 9 illustrates the same analysis, but using the alternative mismatch calculated by the difference between the suspension date and the AUH payment date. The probability of payment before service suspension tends to decrease if the suspension date falls before the date of payment

Figure 8: Probability of paying on time (considering due date) by mismatch relative to the average probability



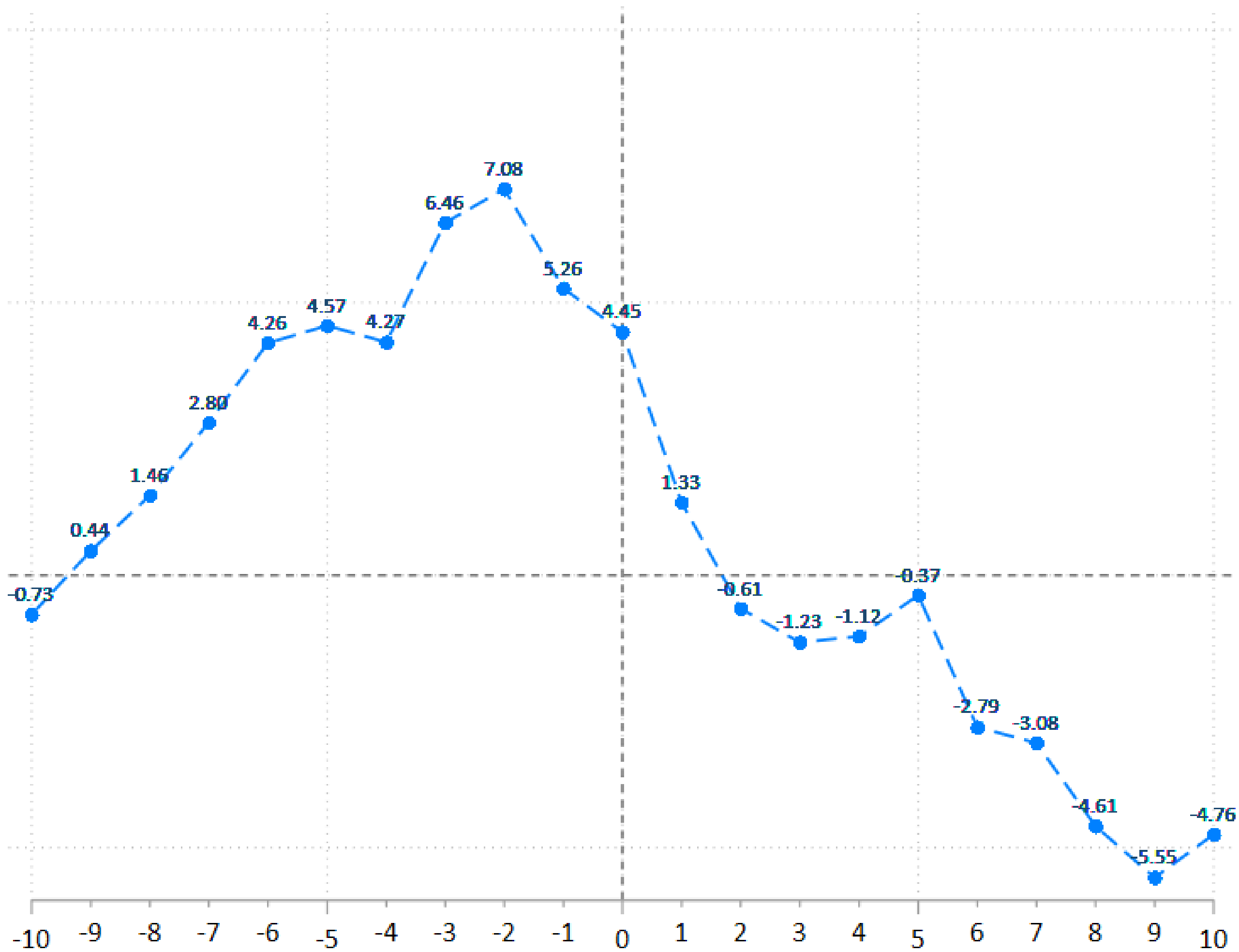
for AUH, much like the previous scenario.

While the computations shown in the preceding figures communicate the main finding, they fail to take into account time-fixed effects and additional factors analyzed in the estimated regressions. The results of the regressions in equation 5 and the corresponding robustness tests are presented in following subsections.

5.1 Main results

First results are presented in Table 3, which shows the effect of mismatch on the probability of paying the bill on time - defined here as the probability of paying before the due date. It takes into

Figure 9: Probability of paying on time (considering suspension date) by mismatch (between suspenssion date and pay day) relative to the average probability



account different time gaps between the payday and the due date.

In column 1, the treated group comprises income support recipients who received their benefits one day after the bill due date, while the control group consists of households who received their social security payment a day before. In column 2, larger date gaps start to be taken into account. In this case, the treated group includes households where the AUH payment is received one to three days after the bill due date, while the control group includes households where the payment is received either one to three days before or exactly on the due date. In columns 3-5, we follow the same logic for longer time gaps.

The negative sign of the mismatch coefficient in all columns indicates that households are less likely to pay the electricity bill on time when the due date precedes the AUH payment date. Notably, as we move from column 1 to column 5, the number of observations increases, which enhances the reliability of the estimations. Notice the coefficient are very similar, and not statistically differente from column 3 to 5. The likelihood of paying electricity bills on time decreases by aproximately 4 percentage points when users receive AUH benefits after the due date. This implies a nearly 30% reduction in on-time payments.

Table 3: The effect of receiving AUH after due date on probability of pay on time

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after due date (=1)	-0.0345***	-0.0401***	-0.0442***	-0.0467***	-0.0413***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Bill amount (log)	-0.0440***	-0.0412***	-0.0396***	-0.0378***	-0.0384***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Bimonthly user (=1)	0.3397	0.2054	0.1594	0.2001	0.0413
	(0.325)	(0.237)	(0.202)	(0.205)	(0.140)
Observations	69,561	139,332	220,848	337,988	435,748
Users	12,746	15,936	18,155	21,061	22,741
On time payments	0.16	0.16	0.16	0.15	0.15

Standard errors in parentheses
Users with consumption above the 99th percentile per billing period are excluded.
Fixed effects are included for household, day of the week, month, and year of the bill's due date
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4 conducted the analysis to assess the probability of paying the bill on time, but defined as the probability of paying before the service suspension date. The treatment and control groups were formed using the same methodology outlined in the previous table, but taking into account the mismatch between the AUH collection date and the service suspension date.

The mismatch between these two dates has a negative impact on the likelihood of paying on time for all the specifications, as in the previous analysis. The the probability of paying the bill on time decreases by 3.2% points when the suspension date precedes the AUH collection date by, for instance, 5 days. The likelihood of paying electricity bills previous to suspension date, decreases nearly 7% reduction in on-time payments.

5.2 Robustness tests and channel discussion

Our data base allows us to identify users payment method, particularly we can identify users that pay their bills using credit card. We expect these users have higher access to credit market and liquidity shocks impact may be much less important. This implies that a liquidity shock caused by

Table 4: The effect of receiving AUH after suspension date on probability of pay on time

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after susp. date (=1)	-0.030***	-0.032***	-0.032***	-0.033***	-0.024***
	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)
Bill amount (log)	-0.062***	-0.060***	-0.059***	-0.059***	-0.059***
	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)
Bimonthly user (=1)	-0.023	-0.028	-0.090	-0.185**	-0.161
	(0.014)	(0.036)	(0.082)	(0.090)	(0.118)
Observations	40,598	85,835	141,059	247,338	369,485
Users	11,215	15,030	17,412	21,074	22,817
On time payments	0.49	0.49	0.48	0.47	0.46

Standard errors in parentheses

Users with consumption above the 99th percentile per billing period are excluded.

Fixed effects are included for household, day of the week, month, and year of the bill's suspension date

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

a mismatch between the due date (or suspension date) and the date of income collection may not have a substantial impact on their capacity to make timely payments.

Tables 5 and 6 presents the main results. As anticipated, the value of the mismatch coefficient is insignificant for this group of users. These findings support the proposed hypothesis and provide further evidence for the main conclusions. In the appendix, tables 9 and 10 show the analysis for beneficiaries who do not make payments by credit card.

6 Concluding Remarks

This paper examines how a random liquidity shock affects the likelihood of low-income households paying their electricity bills on time, specifically before the due date and suspension date. This liquidity shock arises from a mismatch between the dates of receiving income from the Universal Child Allowance (AUH) and the bill's due dates. We hypothesize that due to these mismatches, low-income households facing liquidity constraints are less likely to pay their bills on time.

We define the mismatch as the number of days between the bill's due date and the AUH payday. A positive number indicates that the due date occurred before the income was received, resulting in a negative liquidity shock for the household. Our identification strategy is based on observing that users experience periods with both positive and negative mismatch values due to variability in both the due date and the AUH collection date. We estimate a fixed-effects model to capture the impact of experiencing a positive mismatch on the probability of paying the bill on time.

Table 5: The effect of receiving AUH after due date on probability of pay on time: users who pay their bill by credit card

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after due date (=1)	-0.0343	-0.0191	-0.0285	-0.0205	-0.0152
	(0.032)	(0.025)	(0.018)	(0.016)	(0.015)
Bill amount (log)	-0.1397***	-0.0934***	-0.0728***	-0.0594***	-0.0604***
	(0.027)	(0.020)	(0.015)	(0.011)	(0.010)
Bimonthly user (=1)	0.0000	0.0000	0.0000	0.0000	0.0000
	(.)	(.)	(.)	(.)	(.)
Observations	1479	3013	4866	7662	10165
Users	780	1324	1766	2443	3045
On time payments	0.21	0.21	0.21	0.21	0.21

Standard errors in parentheses
Users with consumption above the 99th percentile per billing period are excluded.
Fixed effects are included for household, day of the week, month, and year of the bill's due/susp. date
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: The effect of receiving AUH after suspension date on probability of pay on time: users who pay their bill by credit card

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after susp. date (=1)	-0.0366	-0.0129	0.0161	0.0071	0.0154
	(0.049)	(0.035)	(0.029)	(0.024)	(0.021)
Bill amount (log)	-0.0091	-0.0618**	-0.0442**	-0.0485***	-0.0592***
	(0.041)	(0.028)	(0.022)	(0.017)	(0.015)
Bimonthly user (=1)	0.0000	0.0000	0.0000	0.0000	0.0000
	(.)	(.)	(.)	(.)	(.)
Observations	1060	2184	3596	6162	8999
Users	719	1191	1619	2378	3079
On time payments	0.60	0.60	0.59	0.59	0.57

Standard errors in parentheses
Users with consumption above the 99th percentile per billing period are excluded.
Fixed effects are included for household, day of the week, month, and year of the bill's due/susp. date
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Our results indicate that the probability of paying the electricity bill on time decreases by 4 percentage points when AUH recipients receive their benefits after the due date. This implies a nearly 30% reduction in on-time payments. Furthermore, the probability of paying the bill before the suspension date decreases by around 3 percentage points when the suspension date precedes the AUH collection date. This suggests that the likelihood of paying electricity bills before the suspension date decreases by nearly 7%.

To assess the robustness of our findings and explore possible channels, we focused our primary analyses on users who used credit cards for bill payments. Our hypothesis is that these users, despite being AUH beneficiaries, may not be as affected by the liquidity constraints typical of low-income households. Therefore, experiencing a mismatch between the due date (or suspension date) and the income collection date may not significantly impact their probability of paying the bill on time. The results confirm our hypothesis and provide additional support for our main conclusions.

Our research shows that a liquidity shock due to a mismatch increases the likelihood of delayed payments. Falling behind on payments imposes both psychological and financial burdens, including late payment interest charges and, in some countries, restricted access to credit. This burden is especially heavy for low-income households, forcing them to allocate more of their income to bill payments, leaving less for other essentials such as food. Consequently, their already limited capacity for savings is further diminished (Orhun and Palazzolo, 2018), exacerbating their poverty status, commonly referred to as the poverty penalty.

The discrepancy between billing due dates and paycheck cycles, and its relation to late payments, is an issue that policymakers often overlook. These findings call for a reevaluation of the payment system, given its negative impact on equity.

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A Tables

Table 7: The effect of receiving AUH after due date on probability of pay on time, not excluding consumptions above the 99th percentile

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after due date (=1)	-0.035***	-0.040***	-0.044***	-0.047***	-0.041***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Bill amount (log)	-0.044***	-0.041***	-0.039***	-0.037***	-0.038***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Bimonthly user (=1)	0.340	0.154	0.123	0.180	0.036
	(0.325)	(0.195)	(0.167)	(0.193)	(0.133)
Observations	70250	140698	223017	341392	440214
Users	12794	15979	18194	21098	22758
On time payments	0.16	0.16	0.16	0.15	0.15

Standard errors in parentheses

Fixed effects are included for household, day of the week, month, and year of the bill's due date

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: The effect of receiving AUH after suspension date on probability of pay on time, not excluding consumptions above the 99th percentile

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after susp. date (=1)	-0.029***	-0.031***	-0.032***	-0.032***	-0.024***
	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)
Bill amount (log)	-0.062***	-0.061***	-0.060***	-0.059***	-0.060***
	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)
Bimonthly user (=1)	-0.022	-0.008	-0.060	-0.163*	-0.160
	(0.014)	(0.033)	(0.068)	(0.085)	(0.120)
Observations	41031	86725	142534	249830	373207
Users	11249	15067	17455	21103	22830
On time payments	0.49	0.49	0.48	0.47	0.46

Standard errors in parentheses

Fixed effects are included for household, day of the week, month, and year of the bill's suspension date

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: The effect of receiving AUH after due date on probability of pay on time: users who do not pay their bill by credit card

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after due date (=1)	-0.0349***	-0.0410***	-0.0450***	-0.0474***	-0.0420***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Bill amount (log)	-0.0432***	-0.0411***	-0.0392***	-0.0378***	-0.0382***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Bimonthly user (=1)	0.3406	0.2060	0.1605	0.2005	0.0412
	(0.323)	(0.236)	(0.201)	(0.204)	(0.139)
Observations	68082	136319	215982	330326	425583
Users	12665	15861	18106	21024	22729
On time payments	0.21	0.21	0.21	0.21	0.21

Standard errors in parentheses

Users with consumption above the 99th percentile per billing period are excluded.

Fixed effects are included for household, day of the week, month, and year of the bill's due/susp. date

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: The effect of receiving AUH after susp date on probability of pay on time: users who do not pay their bill by credit card

	(1) 1 After vs 1 before	(2) 1-3 after vs 1-3 before	(3) 1-5 after vs 1-5 before	(4) 1-7 after vs 1-7 before	(5) 1-10 after vs 1-10 before
AUH payday after susp. date (=1)	-0.0301***	-0.0326***	-0.0334***	-0.0335***	-0.0249***
	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)
Bill amount (log)	-0.0620***	-0.0600***	-0.0588***	-0.0589***	-0.0593***
	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)
Bimonthly user (=1)	-0.0256*	-0.0324	-0.0914	-0.1761**	-0.1438
	(0.014)	(0.038)	(0.081)	(0.084)	(0.106)
Observations	39538	83651	137463	241176	360486
Users	11114	14941	17331	21023	22811
On time payments	0.60	0.60	0.59	0.59	0.57

Standard errors in parentheses

Users with consumption above the 99th percentile per billing period are excluded.

Fixed effects are included for household, day of the week, month, and year of the bill's due/susp. date

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B Figures

Figure 10: Distribution of suspension dates by day of month

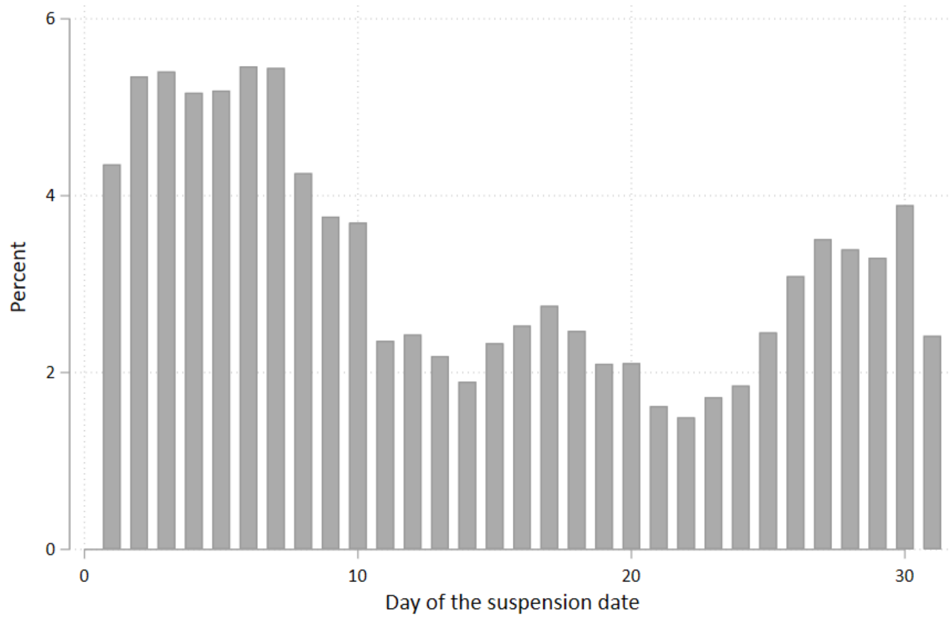


Figure 11: Distribution of the standard deviation of suspension day

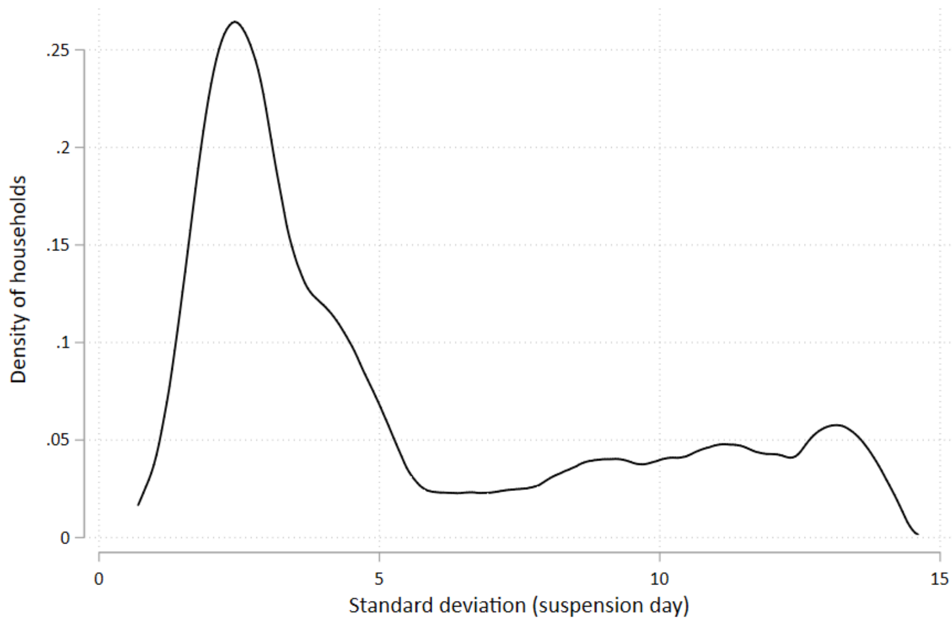


Figure 12: Distribution of the probability of having a positive mismatch, considering suspension date

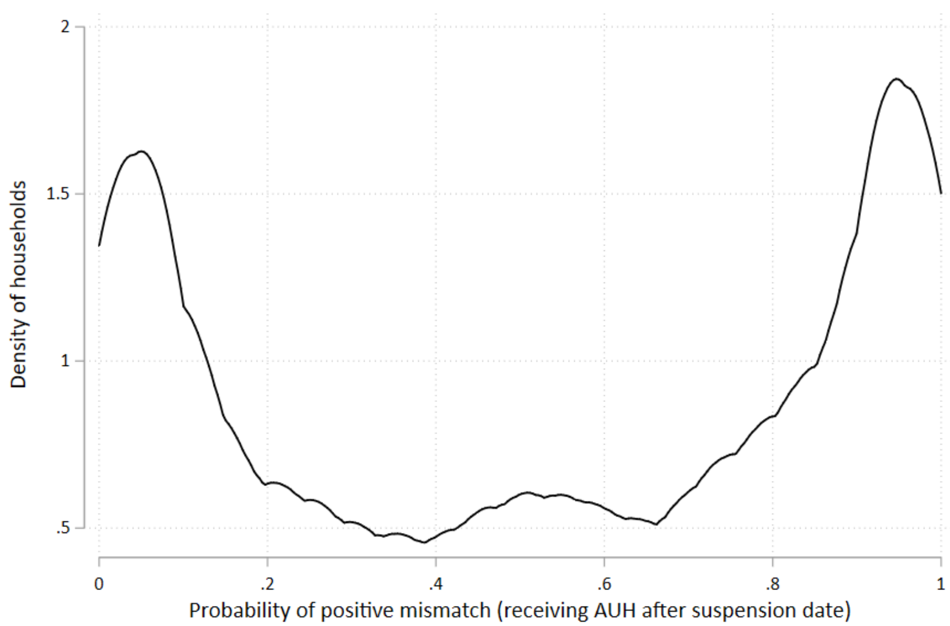


Figure 13: Distribution of day of payment of the AUH by day of month, by last digit of DNI

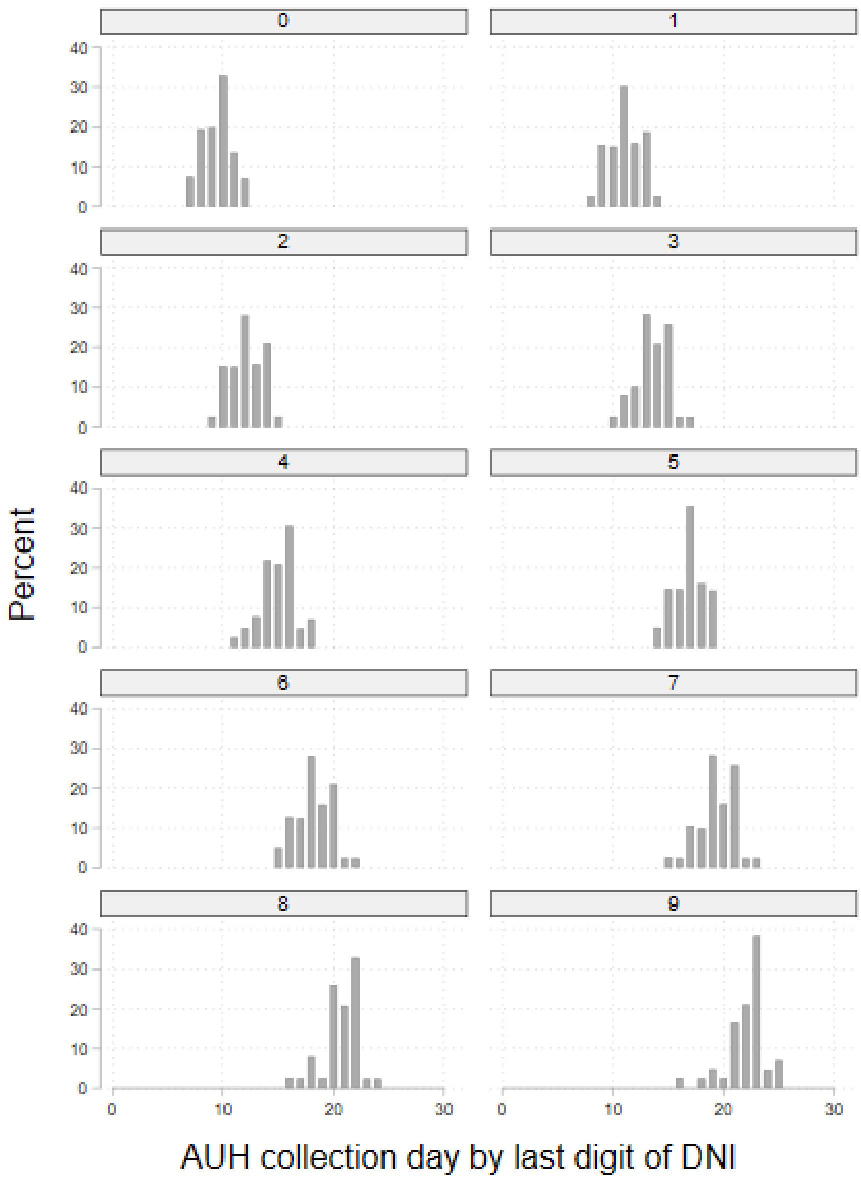
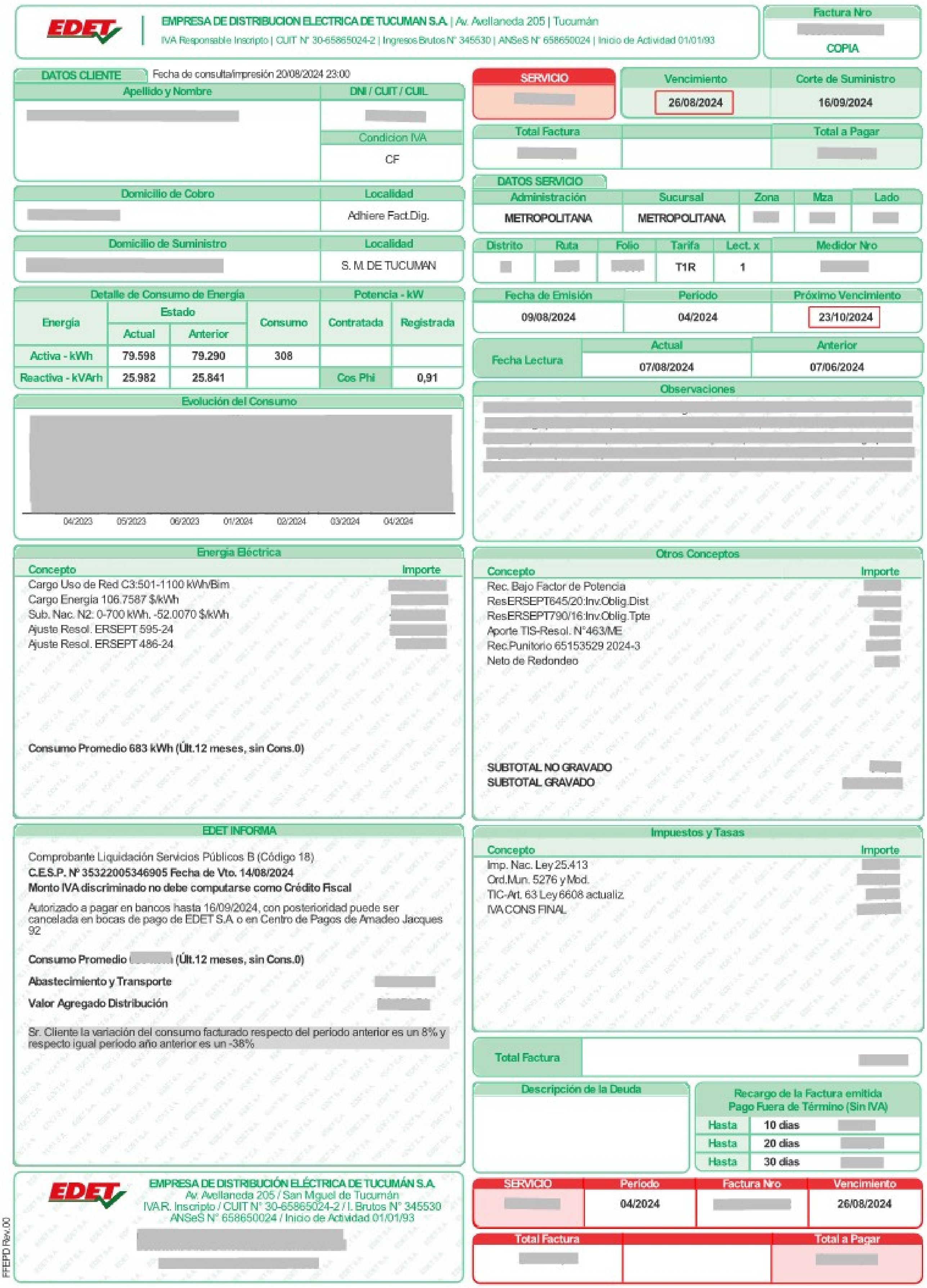


Figure 14: Bill issued by EDET



EMPRESA DE DISTRIBUCION ELECTRICA DE TUCUMAN S.A | Av. Avellaneda 205 | Tucumán
IVA Responsable Inscripto | CUIT N° 30-65865024-2 | Ingresos Brutos N° 345530 | ANSeS N° 658650024 | Inicio de Actividad 01/01/93

Factura Nro [redacted]
COPIA

DATOS CLIENTE — Fecha de consulta/impresión 20/08/2024 23:00

Apellido y Nombre	DNI / CUIT / CUIL
[redacted]	[redacted]
	Condicion IVA: CF

SERVICIO	Vencimiento	Corte de Suministro
[redacted]	26/08/2024	16/09/2024

Total Factura		Total a Pagar
[redacted]		[redacted]

Domicilio de Cobro	Localidad
[redacted]	Adhiere Fact.Dig.

Domicilio de Suministro	Localidad
[redacted]	S. M. DE TUCUMAN

DATOS SERVICIO

Administración	Sucursal	Zona	Mza	Lado
METROPOLITANA	METROPOLITANA	[redacted]	[redacted]	[redacted]

Distrito	Ruta	Folio	Tarifa	Lect. x	Medidor Nro
[redacted]	[redacted]	[redacted]	T1R	1	[redacted]

Fecha de Emisión	Periodo	Próximo Vencimiento
09/08/2024	04/2024	23/10/2024

Fecha Lectura	Actual	Anterior
	07/08/2024	07/06/2024

Detalle de Consumo de Energía / Potencia - kW

Energía	Estado Actual	Estado Anterior	Consumo	Contratada	Registrada
Activa - kWh	79.598	79.290	308		
Reactiva - kVArh	25.982	25.841		Cos Phi	0,91

Evolución del Consumo

[redacted]

04/2023 05/2023 06/2023 01/2024 02/2024 03/2024 04/2024

Observaciones

[redacted]

Energía Eléctrica

Concepto	Importe
Cargo Uso de Red C3:501-1100 kWh/Bim	[redacted]
Cargo Energía 106.7587 $/kWh	[redacted]
Sub. Nac. N2: 0-700 kWh. -52.0070 $/kWh	[redacted]
Ajuste Resol. ERSEPT 595-24	[redacted]
Ajuste Resol. ERSEPT 486-24	[redacted]

Consumo Promedio 683 kWh (Últ.12 meses, sin Cons.0)

Otros Conceptos

Concepto	Importe
Rec. Bajo Factor de Potencia	[redacted]
ResERSEPT645/20:Inv.Oblig.Dist	[redacted]
ResERSEPT790/16:Inv.Oblig.Tpte	[redacted]
Aporte TIS-Resol. N°463/ME	[redacted]
Rec.Punitorio 65153529 2024-3	[redacted]
Neto de Redondeo	[redacted]
SUBTOTAL NO GRAVADO	[redacted]
SUBTOTAL GRAVADO	[redacted]

EDET INFORMA

Comprobante Liquidación Servicios Públicos B (Código 18)
C.E.S.P. N° 35322005346905 Fecha de Vto. 14/08/2024
Monto IVA discriminado no debe computarse como Crédito Fiscal

Autorizado a pagar en bancos hasta 16/09/2024, con posterioridad puede ser cancelada en bocas de pago de EDET S.A o en Centro de Pagos de Amadeo Jacques 92

Consumo Promedio [redacted] (Últ.12 meses, sin Cons.0)

Abastecimiento y Transporte [redacted]

Valor Agregado Distribución [redacted]

Sr. Cliente la variación del consumo facturado respecto del periodo anterior es un 8% y respecto igual periodo año anterior es un -38%

Impuestos y Tasas

Concepto	Importe
Imp. Nac. Ley 25.413	[redacted]
Ord.Mun. 5276 y Mod.	[redacted]
TIC-Art. 63 Ley 6608 actualiz	[redacted]
IVA CONS FINAL	[redacted]

Total Factura [redacted]

Descripción de la Deuda

Recargo de la Factura emitida Pago Fuera de Término (Sin IVA)

Hasta	10 días	[redacted]
Hasta	20 días	[redacted]
Hasta	30 días	[redacted]

EMPRESA DE DISTRIBUCIÓN ELÉCTRICA DE TUCUMÁN S.A
Av. Avellaneda 205 / San Miguel de Tucumán
IVA R. Inscripto / CUIT N° 30-65865024-2 / I. Brutos N° 345530
ANSeS N° 658650024 / Inicio de Actividad 01/01/93

[redacted]

SERVICIO	Periodo	Factura Nro	Vencimiento
[redacted]	04/2024	[redacted]	26/08/2024

Total Factura		Total a Pagar
[redacted]		[redacted]

FFEPD Rev.00

Figure 15: ANSES payment schedule for January 2022

El cronograma de pago completo de AUH

DNI terminados en 0: martes 11 de enero

DNI terminados en 1: miércoles 12 de enero

DNI terminados en 2: jueves 13 de enero

DNI terminados en 3: viernes 14 de enero

DNI terminados en 4: lunes 17 de enero

DNI terminados en 5: martes 18 de enero

DNI terminados en 6: miércoles 19 de enero

DNI terminados en 7: jueves 20 de enero

DNI terminados en 9: lunes 24 de enero

DNI terminados en 8: viernes 21 de enero

Asignación Universal por Hijo y Asignación Familiar por Hijo ANSES

MES A COBRAR	DOCUMENTOS TERMINADOS EN									
	0	1	2	3	4	5	6	7	8	9
ENERO	11/01	12/01	13/01	14/01	17/01	18/01	19/01	20/01	21/01	24/01

Source: Pagina 12