Digitalization and growth: an approach from the measurement of the impact of Banco Provincia's DNI Account on consumption

This article, prepared by the ***Economic Research Department of the Studies Division***, demonstrates the positive and significant impact on consumption and the economy of using digital payment systems as tools for accessing financial services, made available to Argentinians by Banco de la Provincia de Buenos Aires

The use of digital payments has expanded in advanced economies, as well as in emerging and developing markets. While the financial sector has capitalized on this transformation to attract and retain customers through discounts and rewards programs (Arango, Huynh & Sabetti, 2015), businesses have taken advantage of the data generated by these transactions to personalize their offers and improve customer experience. Moreover, proponents of these payment methods argue that their adoption contributes to economic growth and business productivity.

In this line, the BIS (2024) confirmed that the use of digital payments drives per capita income growth and reduces informality, thus supporting government policies that encourage their adoption. Nonetheless, the authors warn about certain methodological limitations. In particular, countries with a high penetration of digital payments could be more developed and productive due to other factors, which makes it

necessary to deepen the analysis with more detailed data to rule out spurious correlations and assess the causality of the phenomenon. In this sense, studies on the impact of policy interventions that promote the adoption of digital payments in specific jurisdictions, such as the one carried out in this analysis, turn out to be fundamental.

Banco Provincia's digital wallet, DNI Account (CDNI), was relaunched in April 2020 and played a key role in expanding access to financial services in the country, especially in the Province of Buenos Aires. Thanks to its simplified registration process, which allows users to register by validating their identity through biometric authentication in the database of the National Registry of Persons (RENAPER), it succeeded in incorporating millions of people, including those without prior access to the banking system, showing a resounding result in terms of banking penetration. Specifically, the tool went from having just over 46,600 users in February 2020 to almost 10 million in February 2025.

Subsequently, in November 2021, Banco Provincia's ecosystem of digital solutions was expanded with the launch of CDNI Business Account (CDNIC), an application for collections aimed at single-tax-payers and registered parties. This tool allows accepting payments from any digital wallet and today has more than 167,000 users. CDNIC is fully interoperable and offers the same benefits and promotions as CDNI. Thanks to its agile functioning, any local business with a smartphone can receive payments with immediate crediting, without the need for capture terminals, and pass on to its customers the discounts promoted by the institution to strengthen consumption and dynamize sales. With these two solutions, Banco Provincia consolidated its position as the first financial institution in Argentina to operate as an issuer and as a payment acceptor.

Unlike Valens (2024), the current analysis focuses on evaluating the impact of the DNI Account (CDNI) on individuals. To determine the causal impact on the consumption of Banco Provincia's digital wallet, a quasi-experimental approach was employed which simulates a random assignment. In particular, they sought to quantify the average impact of the use of CDNI on consumption during the first half of 2024, a period in which national and provincial consumption was strongly affected. With this in mind, the central question of the analysis was: what would CDNI users' consumption have been like if they had not used the tool (nor its promotions)? To give an answer, it was possible to observe the consumption of the treated users, but not their consumption without the (counterfactual) intervention. Hence, they resorted to constructing a control group composed of individuals who did not use CDNI but who shared observable characteristics similar to those of the treated users. In this way, any difference in the results can be attributable to the effect of the CDNI policy itself.

The database used comes from the information collected by the institution. It was provided by the Business Intelligence department and pertains to the personal characteristics and consumption made by its customers during 2023 and the first semester of 2024. To perform the analysis, the information was filtered to obtain two populations. On the one hand, individuals who were customers of the Bank throughout 2023 and began the treatment in January 2024 and, on the other hand, individuals who were also customers throughout 2023, but who as of July 1, 2024, had not been treated yet.

Although the wallet currently has approximately 10 million users, by carrying out the aforementioned filters and adding the conditionality that all individuals have a savings account with the Bank plus an additional product (Visa or Mastercard credit card), in order to be able to more adequately track the consumption that they make, the database consisted of a treated group of 45,903 individuals and a control group of 228,659 individuals, who were observed in different time periods. Following Rosenbaum and Rubin (1983), a matching was performed based on the propensity score, a method commonly known as Propensity Score Matching (PSM). To do this, the probability of being treated was calculated based on its observable characteristics and matched based on this using the algorithm of the nearest neighbor .

The estimation of the PSM was carried out through a probit regression, where different variables were included to explain the use of CDNI. Table 1 shows the results of the model, all of which are statistically significant, with the probability of using CDNI being positively explained by being a woman, having education, the

TABLA 1. Marginal Effects of the Probabilistic Regression Model for PSM in 202312. Dependent variable: treatment in 202401

	Delta-method					
	dy/dx	std. err.	Z	P>|z|	[95% conf. interval]	
age	-0.0013172	0.0000335	-39.32	0.000	-0.0013829	-0.0012516
sex	-0.0155431	0.0010007	-15.53	0.000	-0.0175041	-0.0135821
studies	0.0116967	0.0004912	23.81	0.000	0.010734	0.0126594
number_children	0.0002989	0.0000936	3.19	0.001	0.0001156	0.0004822
delinquent_debtor	-0.0218429	0.0022618	-10.74	0.000	-0.0332572	-0.0229926
holder_savings_bank_dollars	0.0152174	0.0010693	14.23	0.000	0.0131216	0.0173131
pf_holder_pesos	0.01229	0.0013317	9.23	0.000	0.0096816	0.0148984
sum_purchases_debit	5.83e-08	2.73e-09	21.40	0.000	5.30e-08	6.37e-08
purchase_limit_visa	-2.24e-09	1.19e-10	-18.90	0.000	-2.47e-09	-2.01e-09
debit_card_holder	-0.1893196	0.0030766	-61.54	0.000	-0.1953496	-0.1832896
statutory_deposit	1.53e-08	1.19e-09	12.91	0.000	1.30e-08	1.76e-08
center	0.0002478	0.0001222	2.03	0.042	8.24e-06	0.0004874
average_balance_ca_pesos	-2.07e-09	6.41e-10	-3.23	0.001	-3.33e-09	-8.14e-10
average_balance_cc_pesos	-6.97e-09	1.17e-09	-5.98	0.000	-9.26e-09	-4.69e-09

Source: In-house calculations with information provided by the Business Intelligence department.

number of children, being the holder of a savings account in dollars, having a fixed term in pesos, greater purchases with debit, receiving a salary at the Bank and being located in a shopping center different from the region and home in Buenos Aires. Moreover, the probability of having the tool is negatively explained by age, being a delinquent debtor, having a higher purchase limit with the visa card, being a debit card holder, having a higher average balance in the savings account in pesos and having a higher average balance in the checking account in pesos. Also, as can be seen in Table 2, the quality of the matching achieved with this model is adequate , that is, the matching allows the construction of credible counterfactuals.

Although this method has been widely used to evaluate programs, its most adequate use is by combining it with other methods that allow accounting for unobservable characteristics that could also be affecting the results, generally with the Differences in Differences (DiD) method. That estimation allows controlling for any unobservable characteristics that are constant over time between the treatment group and the control group. To carry it out, once the control group has been selected, the impact of the program is calculated by

contrasting the differences in consumption between the previous and subsequent periods among individuals who use CDNI (treated) and those who do not use CDNI (controls), or in other words, a δ defined by:

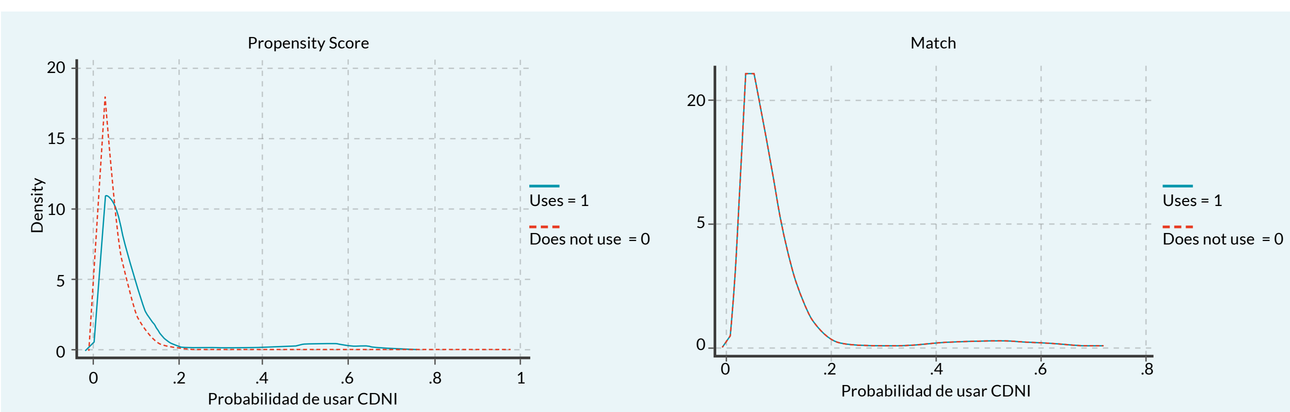
$$\delta = (\bar{y}_{\text{treated, t2}} - \bar{y}_{\text{control, t2}}) - (\bar{y}_{\text{treated, t1}} - \bar{y}_{\text{control, t1}})$$

Which will be estimated by means of the following model:

$$Y_{it} = \alpha_i + \delta DiD_{it} + \gamma' X_{it} + e_{it}$$

Where Yit is the total consumption of individual i in period t; αi are all the constant factors over time that affect the result in consumption and are specific to the level of the individual; DiDit is a binary variable that indicates which individuals received the treatment in period t and, therefore, δ is the parameter of interest given that it reflects the impact of using the tool; Xit is the control variables that vary over time and eit is the error term that is assumed not correlated with DiDit. Standard errors are clustered at the individual level so that the statistical inference is robust.

TABLA 2. Graphical Match Evidence



Source: In-house calculations with information provided by the Business Intelligence department.

Table 3 presents the result of the aforementioned specified model, calculated by means of fixed effects in a strongly balanced panel of 18 periods for the model that presented good performance when testing the match. The estimation indicates that the use of CDNI had a positive and significant impact on consumption of 18.7%, thus demonstrating the effect on the activity of this tool developed by the Buenos Aires public banking. It is also worth mentioning that, in order to evaluate the robustness of this result, it was analyzed whether in the period prior to treatment (202301 to 202312) the trends between the control group and the treatment group were similar, concluding that the assumption of parallel trends is satisfactorily fulfilled. Moreover, a placebo test was carried out using a false treatment group, resulting in a coefficient that is not statistically significant in the DiD model, which allows us to assure that the identification strategy to isolate the effect attributable to the use of the wallet was correct.

TABLA 3. Impact of CDNI on Consumption. Dependent variable: total consumption

Treatment and time information

Time variable:	Cod_Anio_Mes
Control:	did = 0
Treatment:	did = 1

	Control	Treatment
Group		
Id_d_Cliente	11596	12525
Time		
Minimum	202301	202401
Maximum	202406	202406

Difference-in-differences regression — Number of obs = 374,079

Data type: Longitudinal

(Std. err. adjusted for 24,121 clusters in Id_d_Cliente)

1consumo	Coefficient	Robust std. err.	t	P>|t|	[95% conf. interval]	
ATET						
did (1 vs 0)	.1872227	.009702	19.30	0.000	.1682061	.2062393

Note: ATET estimate adjusted for covariates, papel effects, and time effecs, and time effects.

Source: In-house calculations with information provided by the Business Intelligence department.

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1. Coinciding with the beginning of the Preventive and Mandatory Social Isolation (ASPO) due to the COVID-19 pandemic.
2. Registration of the CDNI wallet.
3. Only 1 neighbor, given that it is a more demanding criterion that makes the analysis more robust.
4. It was also verified that there is common support and that in the mean tests the null hypothesis that they are equal between treated and untreated in all variables cannot be rejected.
5. At June 2024 prices.