Digital Financial Services Reduce Transaction Costs and Improve Financial Inclusion

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Transaction costs are a significant barrier to the take-up and use of formal financial services. Account opening fees and minimum balance requirements prevent the poor from opening bank accounts (Dupas and Robinson, 2013), and small subsidies can lead to large increases in take-up (Cole, Sampson and Zia, 2011). Indirect transaction costs—such as travel time—are also a barrier: the distance to the nearest bank or mobile money agent is a key predictor of take-up of savings accounts (Dupas et al., forthcoming) and mobile money (Jack and Suri, 2014). In turn, increased access to financial services can reduce poverty and increase welfare (Burgess and Pande, 2005; Suri and Jack, 2016).

Digital financial services, such as ATMs, debit cards, mobile money, and digital credit, have the potential to reduce transaction costs. However, existing studies rarely measure indirect transaction costs.[1] We provide evidence on how a specific technology—a debit card—lowers indirect transaction costs by reducing travel distance and foregone activities.

We study a natural experiment in which debit cards tied to existing savings accounts were rolled out geographically over time to beneficiaries of the Mexican cash transfer program Oportunidades. Prior to receiving debit cards, beneficiaries received transfers directly into a savings account every two months. After receiving cards, beneficiaries continue to receive their benefits in the savings account, but can access their transfers and savings at *any* bank's ATM. They can also check their balances at any bank's ATM or use the card to make purchases at point of sale terminals.

We find that debit cards reduce the median road distance to access the account from 4.8 to 1.3 kilometers. As a result, the proportion of beneficiaries who walk to withdraw the transfer payments increases by 59%. Furthermore, prior to receiving debit cards, 84% of beneficiaries had to forgo housework, childcare, or work to travel to the bank and access their transfer; after receiving cards, only 25% do. Using administrative bank account data, we find that beneficiaries facing the largest reduction in indirect transaction costs (proxied by road distance) increase their financial activity the most: they increase both their number of withdrawals and their savings balance. In addition, beneficiaries who are closer to an ATM use the debit card to check their balance more often.

I. Debit Cards for Transfer Recipients

Cash transfer programs by governments and nongovernmental organizations around the world are increasingly digitized, automatically paying benefits into bank accounts tied to debit cards or mobile money accounts. These technologies are potentially scalable to millions of cash transfer recipients worldwide.

We examine the rollout of debit cards to urban beneficiaries of Mexico's conditional cash transfer program Oportunidades (re-

[1]An exception is Alvarez and Lippi (2009), who estimate a structural model in which transaction costs are proportional to the distance to an ATM or bank branch.

cently rebranded as Prospera), whose cash benefits were already being deposited directly into formal savings accounts without debit cards.[2] Almost all beneficiaries (97%) are women. The accounts are managed by Bansefi, a government bank created to increase savings and financial inclusion among underserved populations.

In 2009, the government started issuing debit cards to urban beneficiaries who were receiving their benefits directly into Bansefi accounts. Debit cards were provided to Oportunidades beneficiaries in different localities at different points in time, with the rollout lasting from January 2009 to April 2012. The cards enable account holders to withdraw cash and to check their account balance at any bank's ATM, as well as make electronic payments at stores accepting cards.

To evaluate the debit card program, we access administrative transaction data from Bansefi on 255,760 beneficiaries from January 2007 to October 2011.[3] We merge the bank data with administrative data from Oportunidades on the census block where each beneficiary lived, which is available for 70% of the beneficaries. Using road shapefiles and geo-coordinates of all ATMs and Bansefi branches, we measure road distance from the centroid of each census block. Beneficiaries in our data live on 74,710 unique blocks, implying an average of 2.4 beneficiary households per block. At the time of the debit card expansion, Bansefi had 505 branches in Mexico, while there were over 27,000 ATMs.

II. Cards Reduce Travel Distance

After receiving a debit card, a beneficiary can withdraw her benefits at any bank's ATM and not only at a Bansefi branch. Figure 1 shows the distribution of distance to the closest Bansefi bank branch and the closest ATM. The median distance a benefi-

ciary has to travel to access her account falls from 4.8 kilometers to 1.3 kilometers. The interquartile range of distances falls from 2.8–7.1 kilometers to 0.7–2.2 kilometers.

Figure 2 illustrates the gains in travel distance for beneficiairies of Cuernavaca, an example urban locality. The figure shows an example beneficiary household from our sample; prior to receiving debit cards, the beneficiary would need to travel to the only Bansefi branch in Cuernavaca. (Some urban localities do not have a Bansefi branch, which explains the right tail of the distribution of distances to the closest bank branch.) After receiving a card, the beneficiary is close to the median road distance (1.3 kilometers) from the nearest ATM.

Using survey data from the Payment Methods Survey conducted by Oportunidades, we explore how the reduction in transaction costs affects transport methods and the opportunity cost of time.[4] The results are shown in Figure 3. Prior to receiving the card, 22% of beneficiaries walk to access their transfer payment, while 69% take the bus. After receiving the card, the percent who walk increases to 35%, while the percent who take the bus decreases to 57%. In addition, waiting time to withdraw money at the bank branch is likely to be higher than at an ATM, a dimension which we do not capture here. Indeed, close to half of beneficiaries report complaints about withdrawing money at the bank branch: common reasons include long wait times and low service quality.

Another survey question directly asks about the opportunity cost of withdrawing the transfer payment. Receiving debit cards drastically reduces the percent of beneficiaries who had to miss housework or childcare (from 64% to 21%) and the percent who had to miss work (from 20% to 3%). With the card, 74% report not having to forgo any important activity to withdraw

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[2]As the program expanded to urban areas in 2002–2005, Oportunidades opened savings accounts in banks for beneficiaries in a portion of urban localities, and began depositing the transfers directly into those accounts.

[3]Our total sample is 348,802 beneficiaries, but some receive debit cards after the end of our sample period.

[4]The survey asks questions about the beneficiary's current use of the account, and asks retrospectively about her use of the account prior to receiving a debit card. $N = 1,253$ beneficiaries, which is the subsample of the 1,617 beneficiaries with debit cards in the survey who respond to both the retrospective and current questions.

their transfer using the debit card (up from 14% before the card).

III. Increased Use of Accounts

The effect of debit cards on transportation and activities foregone to withdraw the transfer suggest that debit cards led to a change in behavior; in this section we explore how the change in transaction costs is correlated with financial activities. Specifically, we observe the correlation between a beneficiary's reduction in road distance to access her account and the change in her number of withdrawals or net savings.

We use administrative transactions-level data from Bansefi from 180,204 beneficiaries who had received debit cards by October 2011 (when the transactions data end). Since Oportunidades payments are paid every two months, we measure the change in number of withdrawals in the payment period immediately after receiving cards relative to the period exactly one year before.[5] Note that before getting the card, 90% of beneficiaries made a single withdrawal per period and withdrew, on average, 100% of their transfer. As a result, most beneficiaries had only limited interactions with the bank before receiving a debit card.

To explore how the change in distance is associated with the change in the number of withdrawals, we estimate a nonparametric local linear regression. The results are shown in Figure 4: regardless of their distance to the bank, beneficiaries increase their number of withdrawals after getting the card. Furthermore, the increase in withdrawals is strongly correlated with the reduction in road distance to access the account. A 1 kilometer reduction in road distance is associated with an increase of 0.06 withdrawals per period (based on a linear regression). Given that the median household's travel distance is reduced by 3.5 kilometers, this corresponds to 0.22 more withdrawals per payment period on average. For the 85% of the distribution whose travel distance is reduced by 7 kilo-

meters or less, the change in the number of withdrawals is increasing in road distance.

Next, we observe the correlation between the reduction in road distance and the change in net savings in the account, measured in pesos. We again measure net savings in the period immediately after receiving cards, and measure the change relative to one year prior. A 1 kilometer reduction in road distance to access the account corresponds to a 28 peso increase in net savings. Since the median household's travel distance is reduced by 3.5 kilometers, this corresponds to an increase in net savings of 98 pesos (US$8) on average. Using a nonparametric regression, we again see that the change in savings is increasing almost everywhere with the reduction in transaction costs (Figure 5).

Finally, we explore the change in balance checks, which can be used by beneficiaries to monitor their accounts. Since balance checks can be made with the debit card at ATMs but were not possible prior to receiving cards, we regress the number of balance checks on road distance to the closest ATM. We find that being 1 kilometer closer to an ATM correlates to 0.04 more balance checks per payment period. Since the median household is 1.3 kilometers away from the closest ATM, this corresponds to 0.05 more withdrawals per period on average. A non-parametric regression shows that the number of balance checks is decreasing in road distance to the closest ATM up to about 2.7 kilometers, then for distances above 2.7 kilometers the relationship is flat (Figure 6).

IV. Conclusion

Debit cards lower transaction costs by reducing the distance to access bank accounts. We find that account holders respond to this reduction in transaction costs by changing the method of transport they use to access their account (with a decrease in transportation by bus and an increase in walking); furthermore, we find a decrease in the proportion who forgo important activities—such as work or childcare—to withdraw their transfer.

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[5]We compare to the period one year prior to avoid allowing seasonal variation to affect our estimates.

The reduction in indirect transaction costs could also improve financial inclusion: we observe that use of the account and savings are correlated with the change in travel distance to access the account. These effects could be particularly important in the context of a developing country with low financial inclusion: 61% of the adult population in Mexico has no bank or mobile money account, and 74% of those in the poorest fifth of the population have no account (Demirgüç-Kunt et al., 2015). While the relationship between financial activity and the change in travel distance is correlational, in Bachas et al. (2018) we exploit the staggered rollout of cards over time to causally estimate how debit cards affect account use and savings.

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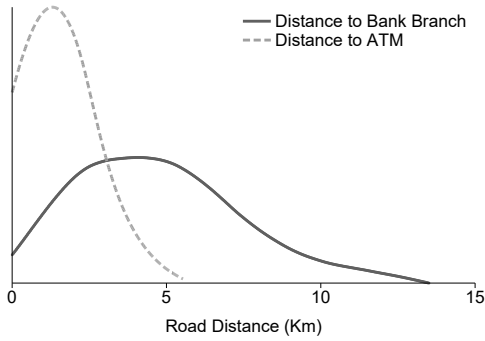
FIGURE 1. DISTANCE TO ACCESS ACCOUNT

Note: This figure shows kernel density estimates of the distances between Oportunidades beneficiaries and the nearest ATM or Bansefi bank branch. For legibility, the top 10% of distances are excluded.
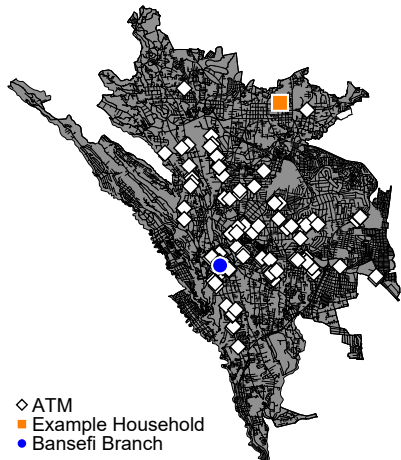

FIGURE 2. EXAMPLE LOCALITY

Note: This figure shows the locations of an example household, the Bansefi branch, all ATMs, and all roads in Cuernavaca.
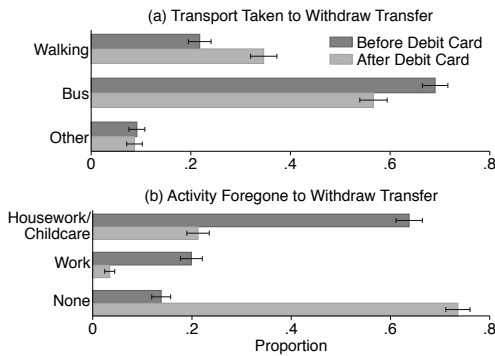

FIGURE 3. TRANSPORT AND OPPORTUNITY COST

Note: This figure shows results from the Payment Method Survey on transport that beneficiaries take and activities they forgo to withdraw their transfer.
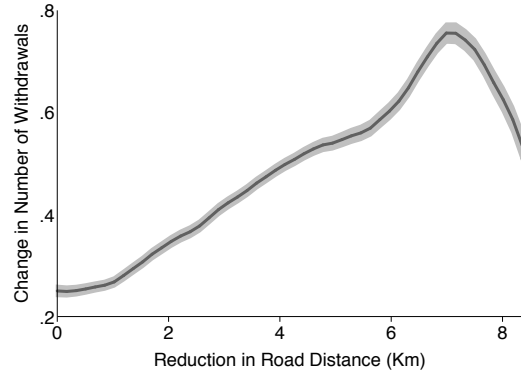

FIGURE 4. CHANGE IN WITHDRAWALS

Note: This figure shows a non-parametric local linear regression between the change in number of withdrawals and the reduction in road distance to access the account. For legibility, the top 10% of reductions in distances are excluded.
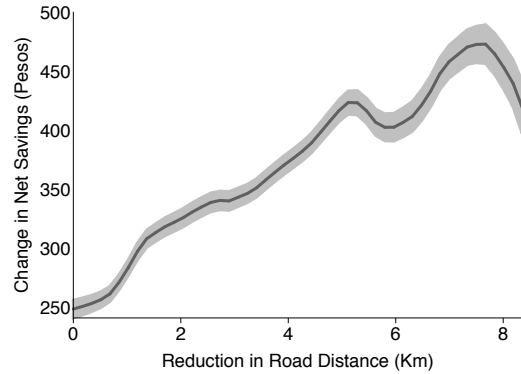

FIGURE 5. CHANGE IN NET SAVINGS

Note: This figure shows a non-parametric local linear regression between the change in net savings and the reduction in road distance to access the account. For legibility, the top 10% of reductions in distances are excluded.
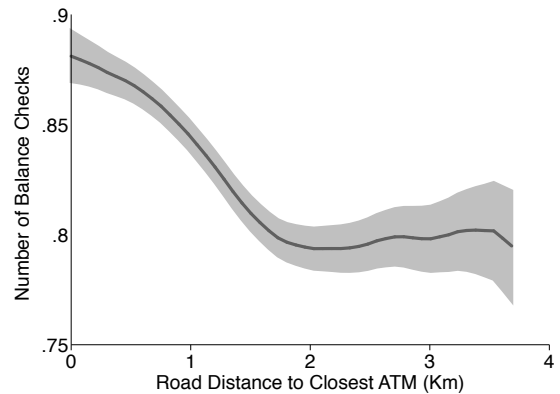

FIGURE 6. BALANCE CHECKS ON DISTANCE TO ATM

Note: This figure shows a non-parametric local linear regression between the number of balance checks and the road distance to the nearest ATM.