Research Note
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High-Speed Internet, Financial Technology and Banking

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This research investigates the relationship between high-speed internet, financial technology, and banking. We exploit a unique natural experiment, the staggered arrival of fibre-optic submarine cables in Africa, to shed light on the effects of fast internet on banking. Our results indicate that fast internet promoted the role of banks in Africa with sizeable and persistent gains both in lending and deposits. We also provide evidence in line with high-speed internet promoting the adoption of novel financial technologies, transforming the size and liquidity of interbank markets.

Introduction

The arrival of high-speed Internet brought both a political and economic revolution in Africa by boosting employment and business opportunities and promoting information and communication technologies (ICT). At the same time, local financial markets have undergone an unprecedented change: banks, in particular, have reacted by restructuring their business model towards new financial technologies that make it possible to reduce financial frictions and information asymmetries. In this paper we shed light on the effect of high-speed internet on banking in Africa. To achieve this, we proceed in three steps.

First, we investigate whether and to what extent high-speed Internet has led to an expansion of banks and credit in Africa. In particular, we study how the arrival of fast internet affects some key banking variables: lending, government bonds, deposits and equity. In addition, we attempt to isolate the supply factors behind banking expansion by focusing on multinational banks.

Second, we explore a specific mechanism through which this technological progress may lower the marginal cost of bank funding and increase credit supply. Specifically, high-speed internet promotes the mass adoption of information and communication technologies (ICT), which foster the use of novel financial technologies like the real-time gross settlement system (RTGS). We provide robust evidence on the relevance of this channel and show that reduced transactions costs in the interbank market positively affect credit supply.

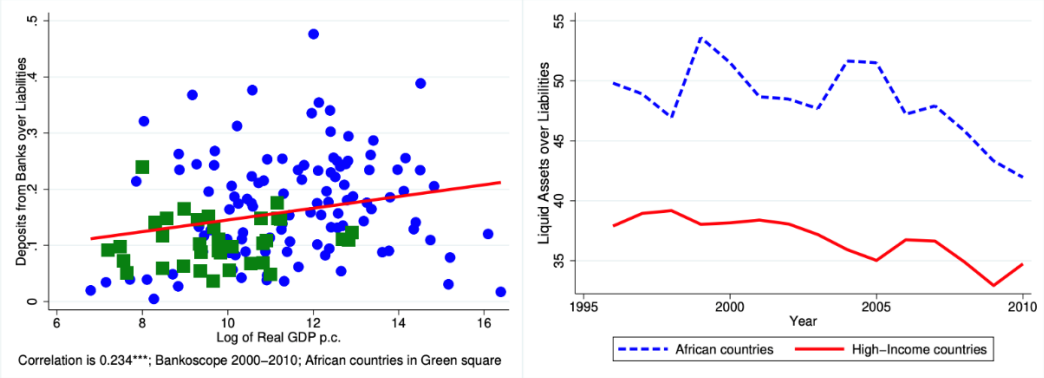
Third, we study the effects of high-speed Internet on firms and their relationship with banks. In particular, we verify whether firms in countries experiencing the arrival of the submarine cable exhibit an increase in some of their economic and financial variables.

Policy context

The installation of fibre-optic submarine cables in Africa offers the ideal context to study how high-speed internet affects banking and FinTech adoption. Indeed, this new technology represents a major shock to African banks as it brought a radical improvement in reliability and a 98% decline in the cost of operating fast internet compared to satellite technology, which were commonly used in the local financial sector.

In addition, African banking systems present considerable frictions in interbank markets, as illustrated in Figure 1. The left panel shows that poorer countries tend to have underdeveloped interbank markets, and this is particularly evident for African countries (indicated with a square). The right panel reports that African banks hoard vast amounts of liquid assets, in line with being endowed with dysfunctional interbank markets.

Figure 1: Interbank Markets and Liquid Assets



Notes: This figure reports information on interbank transactions and the holding of liquid assets by banks in Africa. The left panel uses data from Bankscope on deposits from banks and total liabilities, while data on GDP per capita are extracted from the World Bank's World Development Indicators. Each dot represents a country, while green squares indicate banks operating in sub-Saharan Africa. The right panel uses data from the World Bank Global Financial Development Database. The blue dashed line indicates liquid assets over liabilities for countries belonging to sub-Saharan Africa. The red line refers to the group of high-income countries according to the World Bank classification.

Methodology

In the first part of the empirical analysis, we examine the effects of high-speed Internet on banks. To this end, we integrated bank-level data with those on the arrival of fibre-optic submarine cables and information on bank ownership. Our final dataset includes 629 banks, located in more than 90 cities, distributed among 37 coastal countries in Africa, during the period 1997–2018.

We consider a bank treated when its country of operation becomes connected to a fibre-optic submarine cable and we explore how this treatment affects the following key banking variables: lending, government bonds, deposits and equity. To disentangle the effect of supply from that of demand, we focus on multi-country banks: for some banks, high-speed internet may be directly available to the headquarter but not to the subsidiary located in a different country. Therefore, we use the arrival of fast Internet in the country where the head office is located, which is immune to domestic demand factors.

To explore a specific mechanism that can partly explain the effect of high-speed internet on bank credit supply, we extract information from central banks websites and individual bank reports on RTGS adoption. We then investigate whether fast internet increases: 1) the probability that the country adopts the RTGS; 2) the number of banks participating in the RTGS; and 3) the probability of individual banks joining the platform.

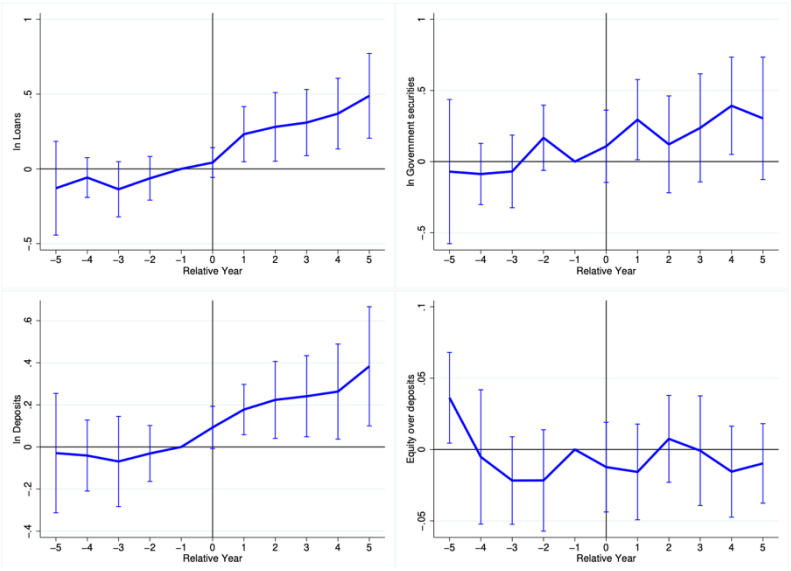
Finally, we employ firm-level data to investigate the effect of high-speed internet on access to finance, the probability for a firm to take loans from banks, loan maturities, the number of permanent and temporary full-time employees and the number of annual sales.

Main Results

The analysis carried out through this project provides evidence that investing in new technologies can foster capital market integration and help the convergence of underdeveloped countries. Specifically, this investigation yielded three major findings:

First, banks tend to expand upon the cable arrival. Figure 2 shows the effect of high-speed internet on banking in Africa. The four event studies refer respectively to bank loans (top left panel), investments in government securities (top right panel), banks' deposits (bottom left panel) and share of equity over deposits (bottom right panel). The patterns are almost flat before the cable's arrival, with point estimates close to zero and non-statistically significant, for all variables. After the arrival of fibre-optic cable, we observe a small jump at year zero, followed by a sizeable and gradual increase after year one for loans and deposits (the point estimates of the other two variables are close to zero, and none of them are statistically significant).

Figure 2: High-Speed Internet and Banking



Notes: This figure shows the event study for the period five years before to five years after the arrival of the first submarine cable in country c. The y-axis reports the coefficients for the dependent variables: ln Loans (the natural logarithm of net loans (in millions of US dollars)), ln Government securities (the natural logarithm of government securities (in millions of US dollars)), ln Deposits (the natural logarithm of customer deposits (in millions of US dollars)) and Equity over DST (the share of total equity over deposits and short-term funding). The x-axis reports the relative time from the cable's arrival. The blue (solid) line connects point estimates relative to the base year (-1). Standard errors are clustered at country level, and 95% confidence intervals are reported.

Moreover, our estimation exploiting multi-national banks to isolate the supply-driven component suggests that 62% of the effect of fast internet on bank loans comes from supply-related factors.

A second important result is that high-speed internet fosters countries' adoption of the RTGS. Specifically, upon the cable's arrival, countries increase their probability of adopting this technology by 16 percentage points. Fast connection is also associated with a considerable increase in the number of banks participating in the platform and higher probability that a single bank joins the RTGS once its country adopts it. Furthermore, we find that the introduction of high-speed internet increases the amount of loans that banks provide to other banks by 30% and the number of deposits from banks by 63%. These results support the idea that high-speed internet reduces transaction costs for interbank operations, allowing interbank markets to be effective in smoothing for liquidity shocks and leading banks to substitute unprofitable hoarding of liquid assets with real-time interbank transactions.

Finally, the analysis offers some evidence of real effects of high-speed internet on firms, through the banking channel. Our investigation demonstrates that arrival of fast internet is associated with 26 percentage points increase in access to finance, a higher likelihood of receiving a bank loan, a doubling in loan maturities, a sizeable expansion in yearly sales and an increase in workforce.

Policy Impact

According to local sources, the International Monetary Fund and the World Bank, African interbank markets are very small or non-existent, forcing local banks to rely on the hoarding of reserves and liquid assets to cushion themselves from liquidity shocks. Our research shows that fast internet is a possible solution to overcome this problem as, through the introduction of RTGS, it can reduce the costs of interbank markets and significantly affect the activity of banks. In this way, we highlight the benefits of new technologies in terms of risk sharing, banking efficiency, credit supply and economic growth.

Moving Forward

As a follow-up, we plan to continue investigating the effects of high-speed Internet on the African banking system. In this project we have explored how fast internet fosters productivity through the adoption of effective financial technology (in this specific case RTGS). However, it is also essential to investigate other channels through which the availability of faster internet may affect access to credit. In a new project, we are exploring the potential benefits of information and communication technology (ICT) upgrades on bank management. In fact, high-speed Internet can increase the internal efficiency of branches and make it easier for managers to examine the various investment opportunities. This can be especially important where infrastructure constraints or other institutional barriers limit a bank's ability to reach new geographic areas.

This note is based on research conducted as a part of PEDL ERG 8491.