



Mobile Phone Data as the Key to Promoting Financial Inclusion

cignifi

The Challenge

Over 2 billion people across the world do not make use of financial services. The problem in reaching the underserved and “unbanked” is a lack of understanding regarding the needs and financial capacity of these individuals. The World Savings and Retail Banking Institute (WSBI) is committed to helping savings and socially committed retail banks in over ninety countries reach and serve these individuals through innovative technologies and partnerships, making particular use of mobile phones and networks.

WSBI and its member banks see tremendous potential for understanding, reaching, and serving an untapped low-income customer base through mobile phones. It is estimated that of the 2.5 billion unbanked, 80 percent own or use a mobile phone. The Call Detail Records (CDRs) held by mobile network operators represent a rich vein of detailed information that could help banks gain an understanding of mobile customers’ lifestyles, financial capacities, and potential interest in various forms of financial products and services.

To meet this challenge, WSBI engaged Cignifi to explore the feasibility of using CDRs and related data to develop and refine new customer segmentation models. Using its unique brand of behavioral analysis, Cignifi worked to provide WSBI with powerful new tools for achieving its mission of promoting financial inclusion.

The Project

For the Pilot project, WSBI and Cignifi partnered with two companies working in Ghana: HFC Bank, a universal bank and the leading mortgage provider in Ghana; and Airtel Ghana, a subsidiary of Bharti Airtel Limited, an Indian multinational telecommunications company operating in over twenty countries around the world.

The broad market segment under scrutiny consisted of both urban and rural communities within Ghana, a nation in which just over a quarter of the population lives below the poverty line. The goals of the pilot included:

- Demonstrating the feasibility of using CDRs to develop behavior and propensity models that banks can employ in the marketing of savings and life insurance products;
- Providing banks with data that assists them in refining market segmentation models;
- Understanding the collaborative processes between key stakeholders that will be critical for the successful delivery of mobile financial services to underserved communities;
- Providing sales and marketing opportunities and increased visibility to HFC and Airtel Ghana;
- Extracting lessons and developing tools for other WSBI member banks and partner mobile network operators across the globe.

Using Cignifi's proprietary behavior modeling process, the partners worked together to:

- Identify a "closed user group" of both pre-paid and post-paid Airtel customers who were simultaneously customers of HFC over a continuous three-month period;
- Create corresponding anonymized coded data sets at both Airtel and HFC for the closed user group;
- Compile data on how the customers in the user group at each company used their respective products over the three-month period;
- Create a distribution chart per variable at each company;
- Determine common criteria for segmenting the sample of customer data and create data records for each segment;
- Match the respective data records from each company against the codes per defined segment of the other company's data.

| Project Tasks and Deliverables | |
|--------------------------------|--|
| 1. Data Discovery | Review sample CDR data from Airtel Review sample customer data from HFC Clean and upload full CDR data from Airtel Clean and upload full customer data from HFC |
| 2. Model Design | Create customer profiles/clusters from HFC data Create lifestyle models from HFC data Match datasets and create cross sample |
| 3. Analysis | Create segments and score Model calibration Analysis and conclusions Discuss draft report with participants Deliver final report |

Figure 1: Project Tasks and Deliverables

Savings Behavior in Ghana

Ghana has a very young population, with a median age of 21 years for both males and females. The population is distributed fairly equally across urban and rural communities. The economy has grown at an annual rate of over 8 percent in recent years, which has helped encourage a strong culture of saving. Most of that saving, however, has been through informal means: traditional Susu collectors receive small sums from individuals on a daily basis and return the savings to the clients at the end of the month, minus one day's contribution. This suggests that Ghanaians will save even at a relatively high negative interest rate, presenting a substantial opportunity for financial institutions able to reach and qualify potential customers.

Savings behavior in Ghana follows variables of age, education, income, and location in predictable ways.

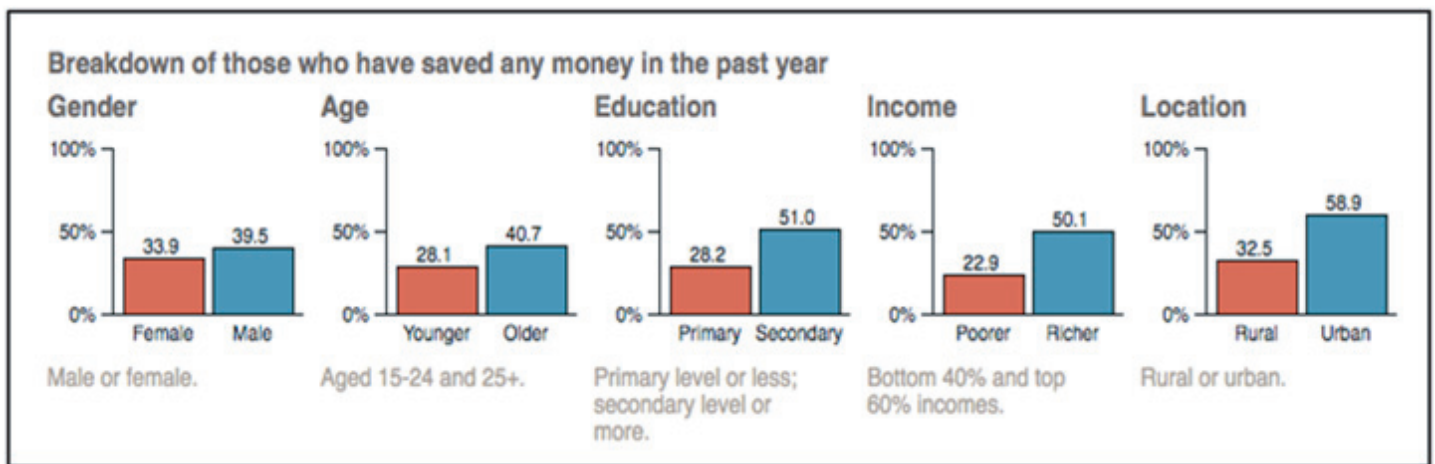


Figure 2: Breakdown of Informal and Formal Savings done Ghana in 2011-2012¹

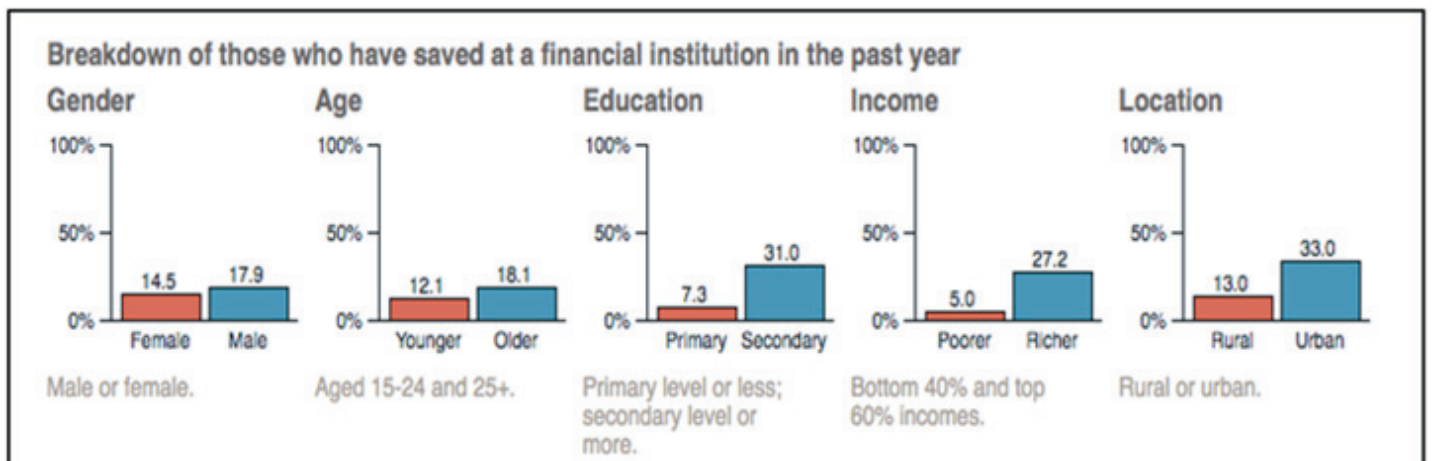


Figure 3: Breakdown of Ghanaians who saved at a Financial Institution in 2011-2012²

The top 60 percent of earners are three times more likely to have a bank account than the bottom 40 percent. Among all those who have a bank account, only two thirds of top earners and one third of bottom earners save money at a financial institution.

¹ Source: Center for Financial Inclusion / ² Source: Center for Financial Inclusion

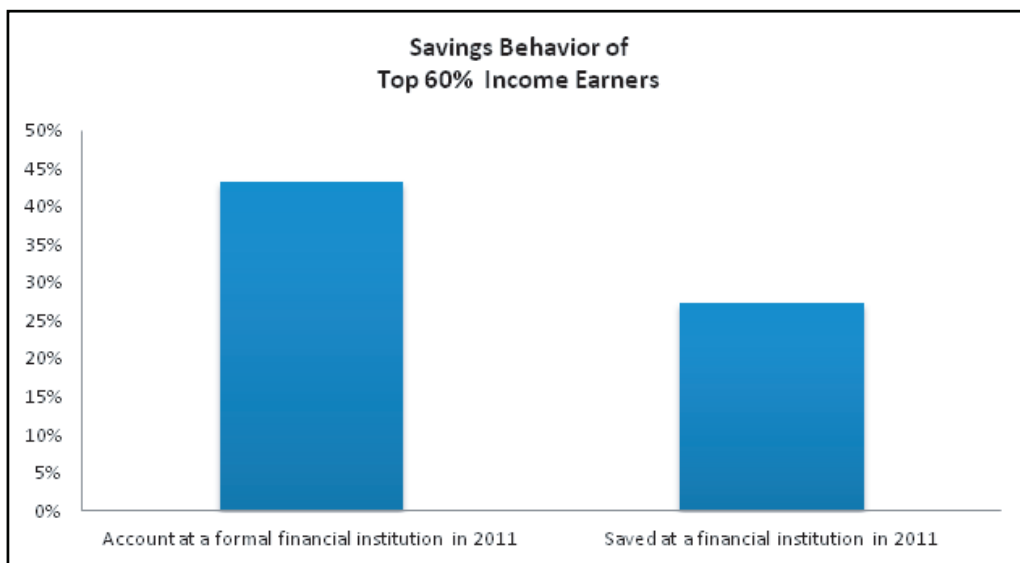


Figure 4: Top 60% income earners, 50% save, 43% have bank accounts, and 27% use banks to save

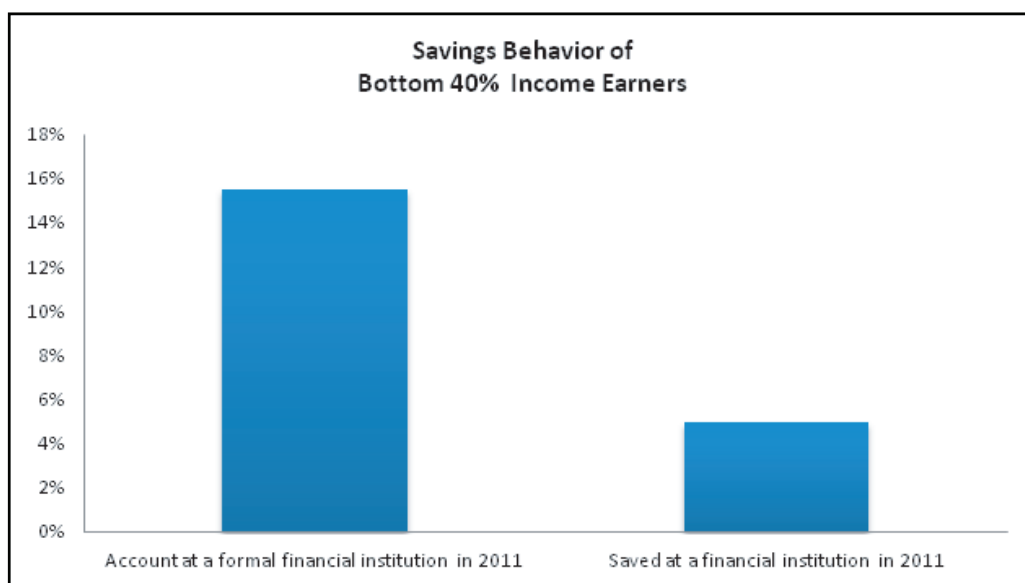


Figure 5: Bottom 40% income earners, 23% save, 15% have bank accounts, and only 5% using banks to save

These figures suggest there are broad opportunities to promote financial inclusion in Ghana by (1) attracting the large number of unbanked individuals in the bottom 40 percent of earners and (2) convincing more of the top 60 percent of earners to use financial institutions for savings.

The Data: HFC

Cignifi analyzed the transaction history and savings behavior of 180,000 HFC customers holding 194,000 savings accounts (7 percent of customers had two or more accounts). Over a five-month period, from January to May of 2013, these accounts saw 2.3 million total transactions, including deposits, automated interest payments, withdrawals, fees, commission, reimbursement of commission, and debit interest. There were 750,000 deposits in 77,000 accounts totaling 3.8 billion cedis (\$1.79 billion) and 870,000 withdrawals in 96,000 accounts totaling 3.7 billion cedis (\$1.74 billion). Thirty-seven percent of the accounts in the data set remained dormant during the study period and were excluded from segmentation analysis. These accounts represent an opportunity to re-engage the account holders and encourage them to become active savers.

The HFC accountholder data was broken down according to accountholder age, marital status, account age, account balance, and transaction activity. Three quarters of accountholders were under 45 years old, indicating that age may be a significant variable in the analysis with mobile usage.

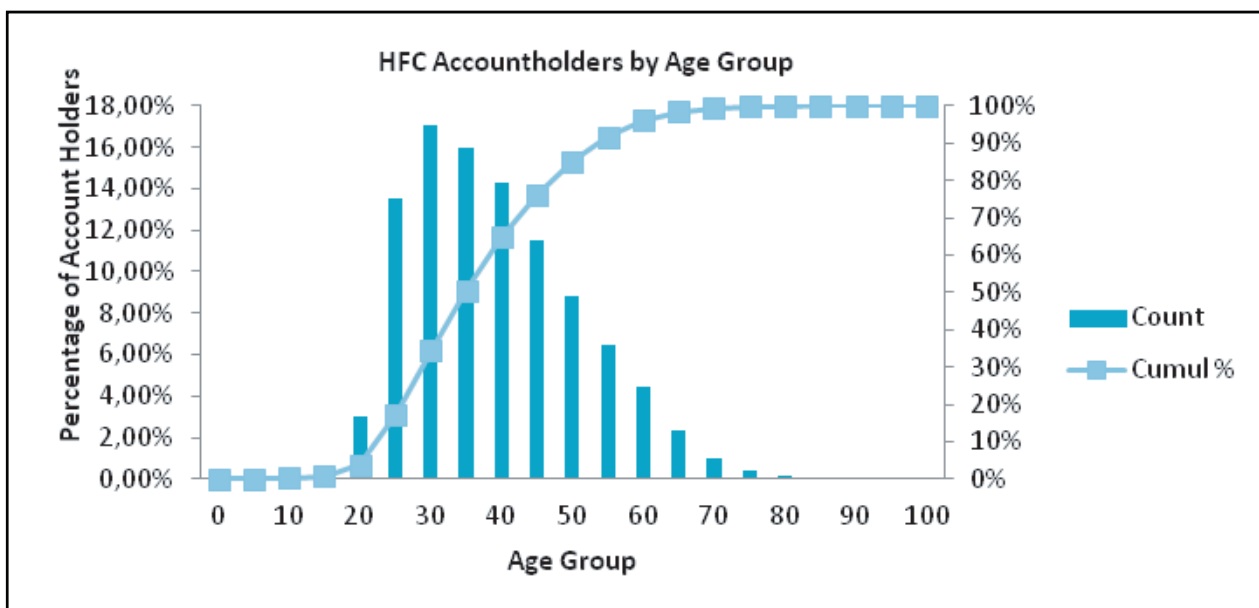


Figure 6: Age Distribution of HFC Accountholders³

Just over half of accountholders were married, and married accountholders had, on average, about 2.5 times as much money in their accounts as unmarried accountholders (a median balance of 29 cedis for single savers versus 79 cedis for married savers).

³Source: Cignifi/HFC/⁵Source: Cignifi/HFC

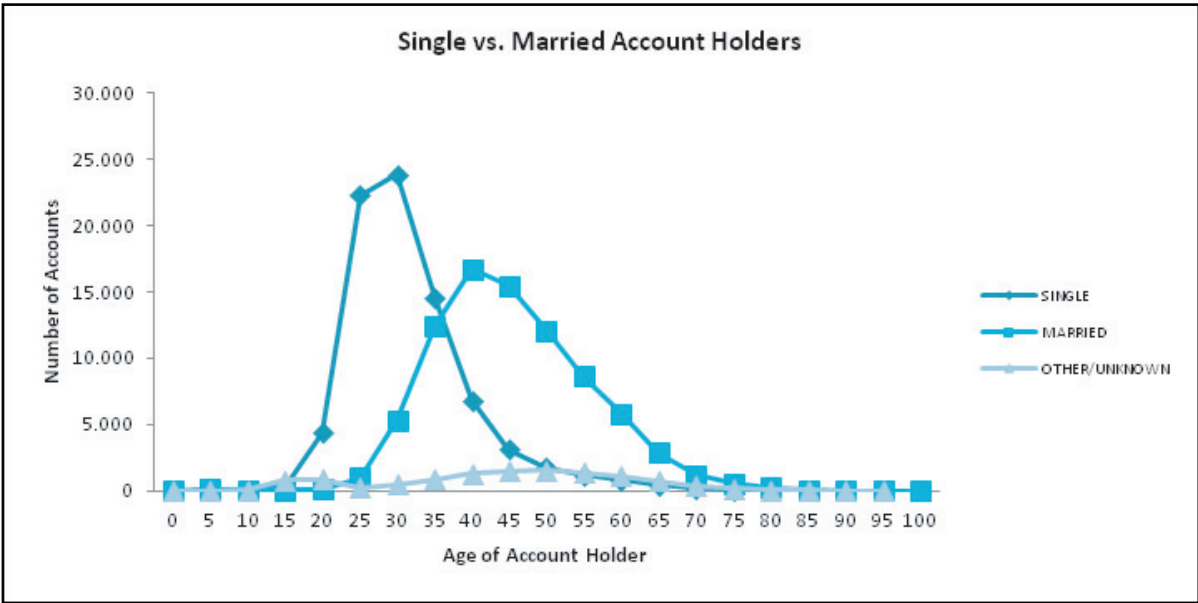


Figure 7: Distribution of HFC Accountholders by Marital Status⁴

The total number of savings accounts has grown steadily over the past 8 years, with linear growth in accounts among single people and a strong period of growth in accounts among married people that has leveled off in more recent years.

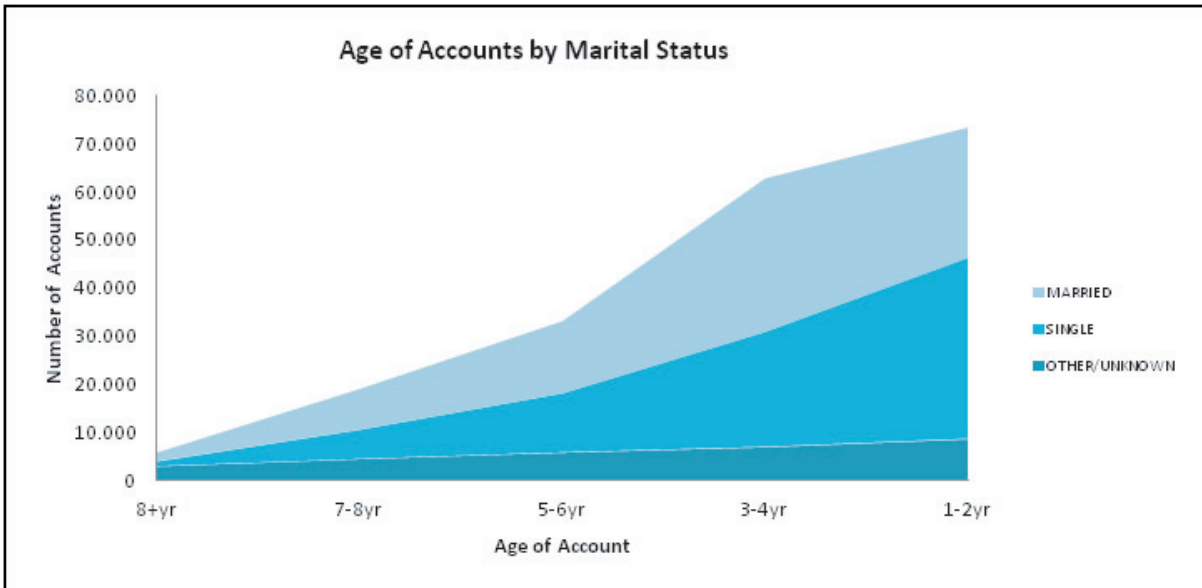


Figure 8: Adoption of Savings Accounts during over an 8-year period⁵

⁴Source: Cignifi/HFC/⁵Source: Cignifi/HFC/

Cignifi compared transaction activity against average account balances over the five-month period. Accounts with larger balances tended to have a large number of deposits: about one quarter of accounts that saw over 20 deposits during the five months had balances over 2,000 cedis. A large number of deposits was also correlated with accounts with average balances between 500 and 2,000 cedis. For accounts with smaller balances, however, no correlation was found between number of transactions and account balance.

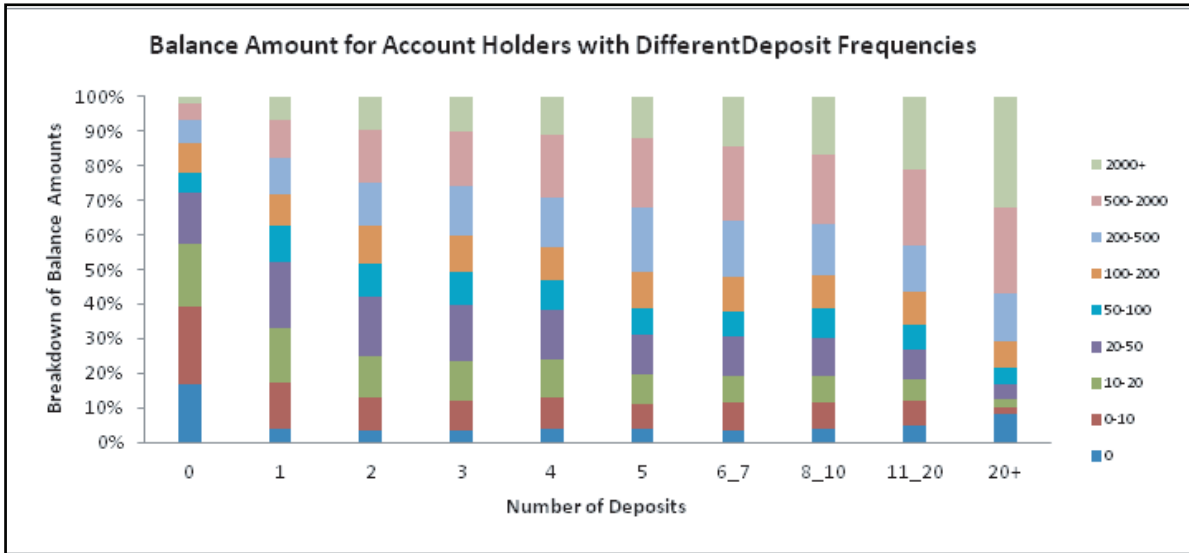


Figure 9: Snapshot of Account Holder Behavior⁶

⁶ Source: Cignifi/HFC

Analysis: Uncovering Customer Segments

To define customer segments at HFC, Cignifi used statistically significant k-means clustering to arrive at five mutually exclusive and distinct clusters based on three factors:

1. Account balance
2. Deposit frequency
3. Customer age

The figure below describes the clusters and shows their relative size:

| Cluster | Name | Description | Number of Accountholders | Percentage of Overall Accountholders |
|----------------------|----------------------|------------------------------------|--------------------------|--------------------------------------|
| 1 | Wealthy & Engaged | Older, high balance, active savers | 20,421 | 19% |
| 2 | Wealthy but Inactive | Older, high balance, non-savers | 20,673 | 19% |
| 3 | Youth Accounts | Young, some balance & activity | 20,297 | 19% |
| 4 | High Utilization | Low balance, active savers | 14,816 | 14% |
| 5 | High Churn Risk | Low balance, non-savers | 30,016 | 28% |
| TOTAL AVERAGE | | | 106,223 | 100% |

Figure 10: Description of Five Accountholder Clusters⁷

On average, the Wealthy and Engaged cluster had held their HFC accounts for 2.7 years, maintained a balance over 2,450 cedis, made 12.6 deposits and 10.6 withdrawals, were 37 years old, and were equally as likely to be married as unmarried. They represent HFC's highest-value customers.

The Wealthy but Inactive cluster had held their accounts for 3.1 years, maintained an average balance over 546 cedis, made 0.7 deposits and 1.9 withdrawals, were 41 years old, and 60 percent were married. Though they have relatively high balances, they are among the least active.

⁷ Source: Cignifi/HFC

Those in the Youth Accounts cluster had held accounts for 1.6 years, maintained a balance over 86 cedis, made 2.2 deposits and 5.5 withdrawals, were 20 years old, and 100 percent unmarried. They have relatively low account balances, but remain moderately active.

Accountholders in the High Utilization cluster had held accounts for an average of 2.4 years, maintained a balance over 47 cedis, made 8.5 deposits and 10.8 withdrawals, were 37 years old, and 50 percent unmarried. This is the smallest cluster, and customers in it retain among the lowest balances, but their high level of engagement suggests they could be encouraged to save more.

High Churn Risk customers had held accounts the longest (3.7 years), maintained balances over 11 cedis, made 0.3 deposits and 1.5 withdrawals, were 36 years old, and 50 percent unmarried. This is the largest cluster, and these accounts, with the lowest balances and the least engaged accountholders, are most likely to become dormant.

Cignifi concluded that the effort to increase financial inclusion should focus on customers with the following characteristics:

- A high level of engagement (i.e., those who demonstrate the importance of financial services in their lives)
- A low balance (i.e., those who are most likely to be financially excluded)

Customers in the Youth Accounts and High Utilization clusters match these two criteria most closely.

Mobile Communications in Ghana

Six mobile network operators, of which Airtel is the fourth largest, share the mobile communications market in Ghana. It is a fast-growing market with 100.4 percent mobile phone penetration. Just under 3 million of the estimated 19 million unique mobile phone customers are registered customers of mobile banking services, but relatively few of those registered actively use those services. Despite these disappointing utilization rates, the large number of mobile phone users and strong savings culture suggest that mobile banking remains a promising vehicle for increased financial inclusion in Ghana.

The Data: Airtel

Using Call Detail Records (CDRs) from 1,551 Airtel customers over a three-month period (July-September 2013), Cignifi was able to conduct a behavioral analysis and uncover distinct behavioral clusters of mobile users with particular propensities, risk characteristics, etc. based on attributes such as:

- Number of calls/text messages (SMS) made per day
- Number of calls/SMS received per day
- Total duration of outgoing calls per day
- Total duration of incoming calls per day
- Number and duration of calls sorted by time of day
- Daily number calls sorted by duration

Using transaction data from the same 180,000 HFC customers over the corresponding three-month period, Cignifi created a “closed group” of 994 common HFC-Airtel customers for analysis, focusing particularly on customers meeting the “low balance” or “high utilization” criteria.

Analysis: Correlating Banking Behavior to Mobile Phone Usage

Multi-dimensional, behavior-based modeling of a large number of mobile phone usage attributes showed clear correlations between mobile phone habits and banking behavior. For example, Cignifi was able to divide the closed group into four quartiles based on the quantity of text messages (SMS) sent per month. The bottom 25 percent quartile represents the user group sending the fewest texts and the top 100 percent quartile represents the user group sending the most.

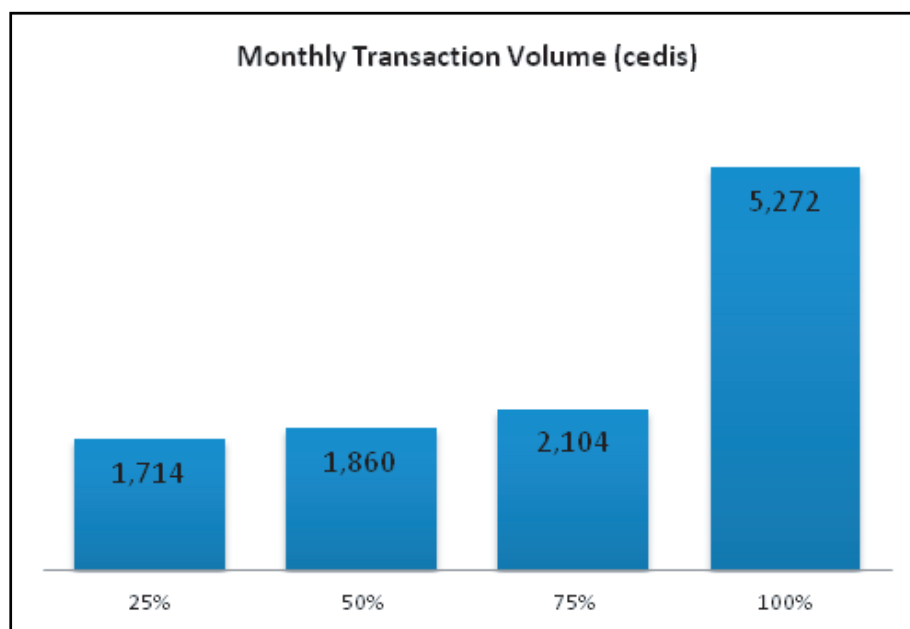


Figure 11: Top SMS users are more active HFC account users

Airtel customers using SMS heavily tended to have more frequent, higher-value transactions in their HFC accounts; the value of monthly banking transactions was three times higher for those in the top quartile than for those in the bottom. This points to the potential value of SMS usage as a proxy for an individual's discretionary income, as well as a powerful marketing avenue through which to reach high-utilization customers.

Similar analysis performed on a large number of CDR-based attributes allowed Cignifi to build a multi-dimensional model to infer the probability that a given mobile phone user has discretionary income that may be available for saving.

"High-income" customers were defined as those whose sum total of positive banking transactions was greater than that of 60 percent of the other customers in the closed group. Cignifi divided mobile phone customers into five behavioral segments. Those in group five had the highest probability of being high-income individuals (and being interested in savings and other financial services), and those in group one had the lowest.

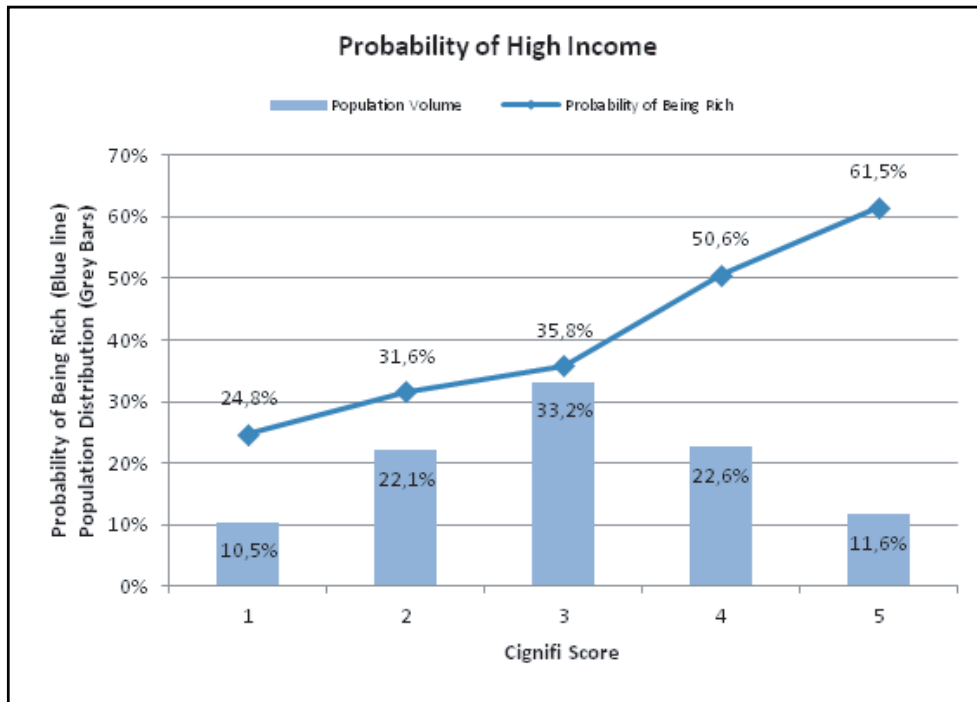


Figure 12: Relative Savings Capacity of Closed Group Users based on Telco Usage

Further analysis of voice calling behavior among the five score groups revealed a point of interest: after group 5, the Airtel subscribers making the most (and longest) phone calls were those in group 1.

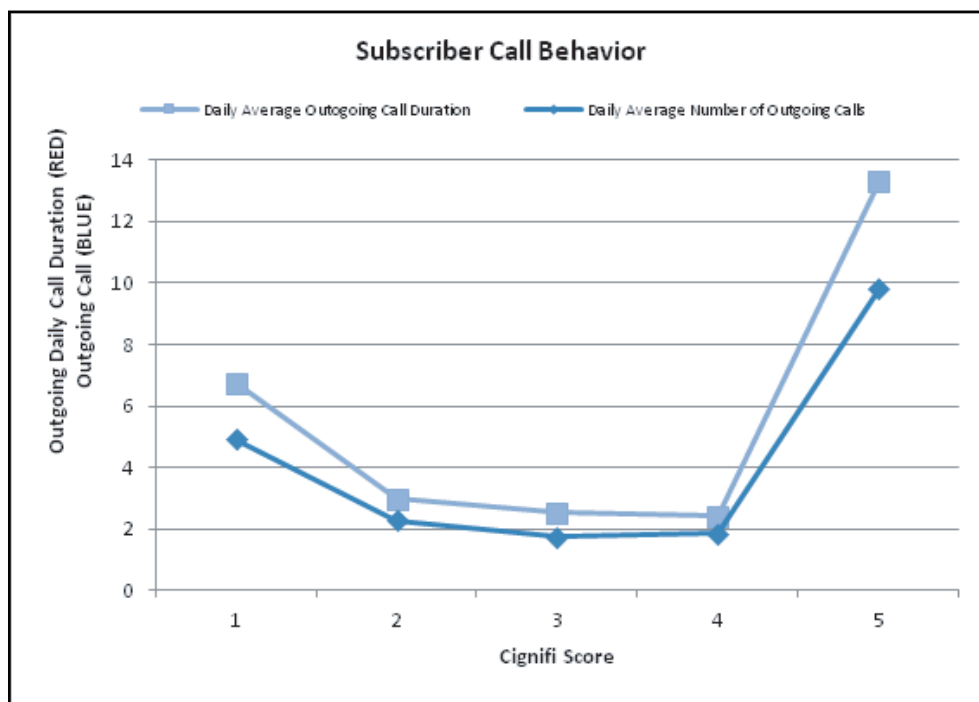


Figure 13: CDR Behavior for each Cignifi Group. High Call volumes at group 1 may indicate capacity to save in the poorest group.

This indicates that Airtel subscribers with the lowest incomes were spending a higher proportion of their disposable income on mobile usage, and thus may be using their savings precisely for mobile phone communications. Reaching out to these customers could mean developing savings products delivered through the mobile phone, perhaps bundled with mobile services.

Finally, Cignifi built a score to predict the probability that Airtel customers in each score group belonged in one of the two HFC clusters targeted for financial inclusion (“High Utilization” and “Youth Accounts”).

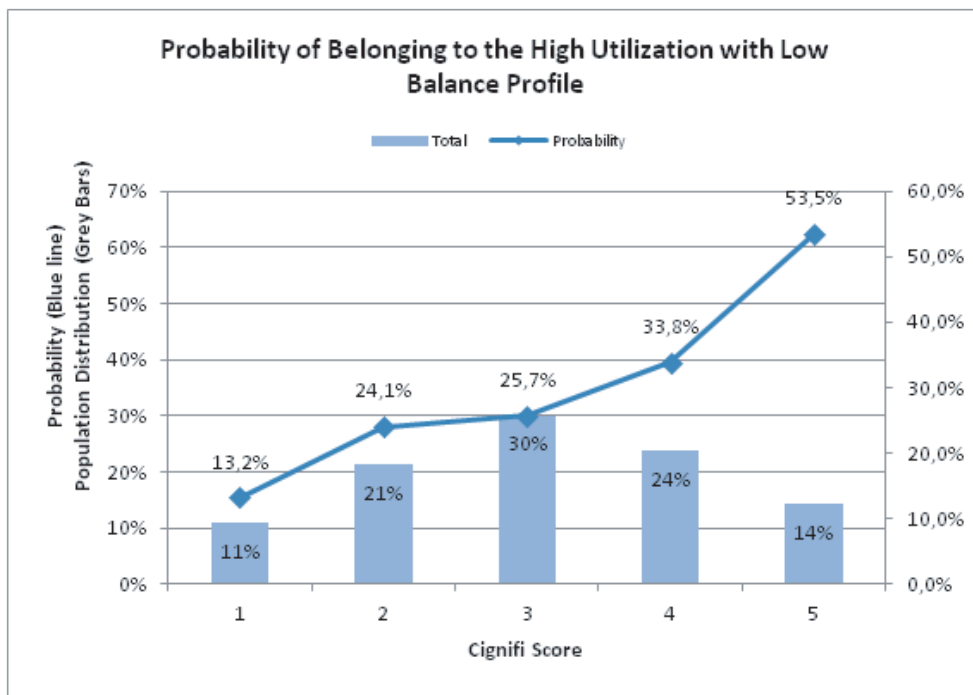


Figure 14: Probability distribution of AIRTEL customers belonging to HFC clusters 1 and 4

Conclusion

The correlations between savings account usage and mobile phone behavior revealed in Cignifi's analysis create powerful tools for WSBI and its member banks. Mobile phone usage data could allow banks to qualify and target under-served customers for financial inclusion, potentially unlocking a vast new customer base. Specific relevant insights from the Pilot project include the following:

- In emerging markets, where we know that close to 100 percent of individuals use mobile phones and only some 35 percent utilize financial services, mobile usage behavior opens up a new data-driven way to identify the unbanked and who among them is most likely to accept and use financial products.
- The proportion of funds that mobile subscribers with the lowest incomes devote to mobile services challenges the myth that these individuals are not interested in financial services, and opens up an opportunity for financial institutions to use the mobile channel to market low-cost savings products that provide value to a customer group many believed was unreachable.
- Analyzing mobile usage behavior will provide valuable insights into the types of products most likely to appeal to different customers. For example, savings products linked to mobile consumption could allow customers to “save” for future mobile spending, or to purchase insurance at a price that fits within the typical monthly mobile budget.
- Because each score group has different assumed income characteristics and propensities to use particular financial services, optimizing financial inclusion will require a variety of marketing messages, channels, pricing, and promotions, rather than the current one-size-fits-all approach.
- The new paradigm of correlating financial services behavior and mobile usage sets up a data management cycle: as customers take advantage of new products that come on the market, additional data sets will provide a deeper understanding of customers and their interest in and usage of financial products, creating a virtuous cycle based on rich data.

About WSBI

WSBI (www.wsbi.org) brings together savings and retail banks from 90 countries, representing the interests of approximately 7,000 banks in all continents. As a global organization, WSBI focuses on issues of global importance affecting the banking industry. It supports the aims of the G20 in achieving sustainable, inclusive, and balanced growth and job creation around the world, whether in the industrialized or less developed countries. WSBI favors an inclusive form of globalization that is just and fair, supporting international efforts to advance financial access and financial usage for everyone. It supports a diversified range of financial services that responsibly meet customers' transaction, saving, and borrowing needs. To these ends, WSBI recognizes that there are always lessons to be learned from saving and retail banks from different environments and economic circumstances. It therefore fosters the exchange of experience and best practices among its members and supports their advancement as sound, well-governed and inclusive financial institutions.



About Cignifi

Cignifi (www.cignifi.com) is revolutionizing the way financial service companies meet the needs of an estimated 2 billion people worldwide who have mobile phones but limited access to formal financial services.

The company has developed the first proven analytic platform to deliver credit and marketing scores for consumers using mobile phone behavior data. The Cignifi platform enables banks, insurers and retailers to qualify and contact millions of underserved consumers who lack traditional credit histories, unlocking a massive opportunity to serve these customers at scale. Cignifi, based in Cambridge, Massachusetts, is led by a management team with proven expertise in big data analytics, consumer scoring and mobile financial services.



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¹CGAP Technology Program Country Note: Ghana 2011.

²Findings based on The World Bank, Global Financial Inclusion (Global Findex) Database, 2012

³CGAP Technology Program Country Note: Ghana 2011.