

The Future of EU ATM Markets

Impacts of digitalisation and pricing
policies on business models



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EXECUTIVE SUMMARY

ATMs constitute a critical component in today's infrastructure for facilitating cash payments. However, ongoing digitalisation (cashless payments, e-commerce and online banking) is challenging the role of ATMs and putting pressure on the cash infrastructure in the EU. The shift from cash to cashless payments reduces the need for cash withdrawals and the rise of online banking challenges the bank branch as the traditionally most prevalent location for ATMs. Moreover, the introduction of pricing policies might also change the dynamics in EU ATM markets. Transparency and price caps on the so-called dynamic currency conversion (DCC) as well as potential reductions in interchange fees will put pressure on the revenues of certain ATMs.

Against this background, this report assesses the sensitivity of EU ATM markets to ongoing digitalisation and pricing policies. The impact of these developments is assessed across business models in Belgium, France, Germany, Greece, Poland, Portugal, Spain and Sweden, which are representative of the ATM markets in all EU member states. Location characteristics are determined and costs and revenues estimated for the 146,821 ATM locations across these eight EU member states in mid-2018.

Business models

ATM markets in the EU are highly heterogeneous. In this report, three business models are differentiated: bank branch ATMs, bank remote ATMs and independent ATMs.

Bank branches are traditionally the main location for ATMs, which is still the case in Belgium, France, Spain and Germany. These countries have in common that they have more stringent security requirements for remote ATMs (Belgium and France) or a practise of charging surcharges for domestic withdrawals (Germany and Spain).

Bank remote locations are gradually becoming more important with bank branches being closed and partially replaced by remote locations. In Greece, Portugal and Sweden, roughly half of bank ATMs locations are remote. In these countries, banks rationalised their ATM networks to save costs, either through choice or under the pressure of the economic and financial crisis.

Independent ATMs only constitute a small proportion in most countries, with the exception of Poland where independents operate more than half of ATMs. Independents are defined as operators that can have a banking license, but do not offer banking services such as accounts or cards.

Locations and characteristics

There are large differences in the number of ATM locations per country. The total number of ATM locations per country varies from 2,542 in Sweden to 38,317 in Germany. The difference in population only partially explains this large disparity. The number of ATM locations per 100,000 people ranges from 26 in Sweden to 89 in Portugal.

The location as well as the services that the ATM machine provides has a strong influence on the costs and revenues. Moreover, location information is also important for assessing the accessibility of ATM services. In general, there are more ATMs in urban areas than in intermediate and rural areas.

Bank branches almost exclusively target domestic customers, but also constitute a relatively more significant proportion of ATM locations in intermediate and rural areas.

Bank remote ATMs mostly target domestic customers and are placed in more populated urban areas to generate numerous transactions, in order to compensate for higher costs (rent, communications, etc.). That said, bank remote ATMs in Greece and Portugal are more often in less densely populated areas.

Independents are involved in either predominantly targeting international card holders (Belgium and France), domestic card holders (Germany, Poland and Sweden) or a combination of domestic and international card holders (Spain and Portugal). This is reflected in their choice of locations.

Costs and Revenues

ATM revenues are largely variable in nature, whereas the costs are a combination of fixed and variable factors. The costs and revenues of the various business models have been estimated based on location information, official statistics, and other public and private information for averagely efficient ATM providers. According to these estimations, variable revenues are greater than the associated variable costs, which means that ATMs need to process a certain number of transactions to be viable.

The number of transactions for independents relative to other models largely depends on the location and pricing of cash withdrawals. In countries with disloyalty or surcharges, the number of transactions is lower, whereas in countries where ATMs are primarily located at transport locations such as airports, the number of transactions is higher.

Interchange and own customer withdrawals constitute the majority of transactions for each of the ATM business models in all of the selected countries. Surcharged transactions make up an important share of the transactions of all business models in Germany and Spain. The share of DCC transactions ranges from well under 1% to around 8% of total transactions, and independent ATMs have a higher share of DCC transactions than bank branch and bank remote ATMs.

The margins per transaction depend mainly on the type of revenues. DCC transactions generate the highest fees per transaction, followed by surcharges and interchange fees. DCC is a source of revenue for all business models and countries. Surcharge fees are set by the providers and represent a considerable source of revenues in Germany and Spain. Interchange fees on cash withdrawals are set by the card schemes and in most cases not publicly disclosed. Other variable revenues are relatively limited, except for non-cash transaction revenues in Portugal.

The majority of costs and revenues are variable, depending on the total number and value of transactions. If transactions are assumed equal, bank branch ATMs have the lowest operating costs, as many costs required to operate ATMs are provided thanks to their location on bank premises, which results in lower real estate, cash filling, cash processing and communication costs.

Overall, most ATMs are currently still profitable, except for bank branch and bank remote ATMs in France, bank remote ATMs in Portugal and independent ATMs in Poland, Portugal and Sweden. There are, however, differences in profitability. In general, ATMs in countries relying almost exclusively on interchange fees (Belgium, France, Poland, Portugal and Sweden) are less profitable than ATMs relying more on DCC or surcharges (Germany, Greece and Spain).

Sensitivity and trends

The impact of ongoing digitalisation as well as potential changes in pricing regulations is likely to vary significantly across business models and countries.

In Germany, Greece and Portugal cash is still preferred for point of sale payments, whereas in Belgium, France, Poland, Spain and especially Sweden, cashless payments have become the main method for point of sale payments. These countries may therefore be relatively less affected by a shift to cashless payments, which is likely to result in a similar drop in cash withdrawals.

The closure of bank branches will probably have an impact primarily on countries where most ATMs are established in bank branches (Belgium, France, Germany and Spain). With the increasing popularity of online banking, many of these branches are likely to be closed in the coming years. Although this may well lead to a drop in the number of ATMs, some might be replaced by ATMs in bank remote locations. These locations in general require a higher number of transactions than bank branch ATMs to break even. However, the closure of some bank branches is likely to increase the number of cash withdrawals at the remaining ATMs.

Dynamic currency conversion

In March 2018, the European Commission proposed amending Regulation (EC) No 924/2009 and including provisions to make currency conversion fees more transparent and comparable as well as imposing maximum fee limits. When withdrawing cash in EU member states with another local currency, customers have the option to be charged for the cash in the local currency or in their own currency (i.e. dynamic currency conversion – DCC).

The introduction of a cap on currency conversion fees would have a different impact on the three business models. For most business models in the selected countries, DCC fees only constitute a small proportion of revenues, but there are some exceptions. DCC revenues are most significant in countries with many withdrawals by international card holders (Greece and Spain), but they are also important for the viability of bank remote and independent ATMs in some countries with few international withdrawals (Belgium and France). The introduction of a cap on DCC fees is likely to affect bank remote and independent ATMs in countries where interchange fees are the main source of revenues (Belgium, France, Greece, Poland, Portugal, Spain and Sweden).

The estimations have been based on the fees and fee structures in July 2018. ATM providers might change their fees and fee structures as a consequence of the legislation being introduced.

Policy implications

This report has found that the ATM markets in the EU are highly heterogeneous. New legislation should take this heterogeneity in cash and bank branch dependency as well as revenue and cost structures into account when designing new legislation addressing the ATM markets. Based on the estimations, countries depending on relatively low interchange fees and a high level of cashless payments might be particularly susceptible to this development. More rural areas in these countries are most likely to be confronted with limited accessibility to ATMs. In France and Sweden, government initiatives to safeguard a minimum availability of ATMs are already underway or under consideration.

In order to incentivise ATM providers to locate ATMs in rural areas and, in the longer term, potentially also more urbanised areas, it is recommended that besides a cap on DCC fees, some other policy measures are also considered, including:

- Extension of the **interchange fees** legislation to cash withdrawals. For example, the fees in rural areas could be increased to incentivise ATM providers to operate ATMs in underserved areas;
- Ban **disloyalty fees** so as to lower barriers to entry, but also ensure that the fees for ATM withdrawals benefit the ATM infrastructure;
- Allow **surcharging** under certain conditions, so as to lower the number of transactions required for break-even. This should, however, be accompanied with measures to protect consumers (transparency and comparability);
- Assess whether **security requirements**, which increase the costs in countries such as Belgium, France and Germany, are still necessary.

Finally, there is a need for additional monitoring of EU ATM markets, now that some of the ATMs are likely to come under threat due to gradual digitalisation and given the importance of ATMs for the facilitation of cash payments.

1. INTRODUCTION

EU ATM markets are likely to undergo significant changes in the next few years due to gradual digitalisation. In particular, the shift to cashless transactions and shift to online banking and the consequential reduction in bank branches will challenge existing business models for operating ATM machines.

ATMs form an important element of the infrastructure facilitating cash payments. This means of payment is becoming less important with the increase in cashless payments. Credit cards, debit cards, credit transfers and direct debits have been around for decades and are becoming standard means of payment in place of traditional cash transactions. More recently, new digital payment methods such as digital wallets and the use of mobile phone apps have added to the variety of payment choices for consumers and businesses. The emergence of these cashless payments provides an overall advantage to society. Indeed, due to more transparency and less physical handling, the alternatives to cash often contribute to the efficiency of the payment systems and make tax fraud, an underground economy and financing terrorism more difficult.

However, there are also potential costs and disadvantages which explain, aside from psychological reasons and habits, why cash is still important today. First, consumers cherish the anonymity of cash as consumer preferences and purchases are not tracked as they could be via name-linked cards or digital methods. Second, the transactions can be concluded immediately, whereas in most cases digital payments currently still require up to a couple of hours to clear, even if that time is gradually reducing to immediate or close to immediate with the introduction of instant payment technologies. Third, cash transactions do not necessarily require electronic devices such as smartphones for consumers or card readers for retailers. Fourth, cash is still essential for unbanked people, since almost all card and digital methods require a bank account, an issue in particular among homeless and migrant populations. Fifth, customers may retain cash when they lack trust in the security of the banking system (skimming, electronic theft, bank failure, etc.). Sixth, parts of society cling to cash simply out of routine and lack of experience with other methods and technologies; this is particularly the case for older generations. Seventh, cash is physical, allowing payments to be settled without devices and thereby offering resilience to outages or security breaches such as the Visa and MasterCard outages in respectively June and July 2018.

Cash is thus likely to continue to play an important role in European societies for the time being. However, the trend is clearly pointing towards a society that is less reliant on cash. In some countries, cash is no longer the dominant form of payment, while others remain heavily reliant on cash especially for smaller transactions. In fact, contrary to the prediction that cash transactions will become less prominent, the number of banknotes in circulation has continued to rise over the past decade in most countries. The Nordic block of Denmark, Finland, Norway

and Sweden have partially transitioned to a cashless society, whereas some countries such as Greece, Italy or Germany rely very little on card payments.

The move towards cashless payments and online banking is putting pressure on the infrastructure facilitating cash transactions, notably storage, transport and handling. Regarding the latter, with the enhanced popularity of online banking, the number of bank branches offering ATMs or manual cash services is decreasing in many EU member states. Moreover, with the number of ATM transactions declining, there is also pressure on the networks of stand-alone ATMs operated by banks and non-banks. There are some alternatives for cash handling such as in-store withdrawals, but these are often less convenient (require purchase and limited availability).

Against this background, the objective of this report is to assess the current situation for business models across the EU and vulnerability to ongoing digitalisation. First, the various business models in the EU ATM market are identified, focusing on eight EU member states in particular, including Belgium, France, Germany, Greece, Poland, Portugal, Spain and Sweden. Second, for each of the business models the ATM locations are identified and the characteristics of these locations. Third, the revenue streams and cost structures of the various business models and their drivers across the eight EU member states are estimated. Fourth, it assesses the sensitivity of costs and revenues to ongoing digitalisation and pricing policies.

In this report, three business models are distinguished: bank branch, bank remote and independent. Bank branches are traditionally the main location for ATMs, while bank remote locations are gradually becoming more prevalent with bank branches being closed and partially replaced by remote locations. In most countries, independents operate only a small proportion of ATMs. However, their presence is gradually growing. The number of ATMs ranges widely in the selected countries, from approximately 26 to 89 ATM locations per 100,000 people. This can be largely explained by the number of withdrawals per person and fee structure. Interchange and own customer withdrawals form the majority of transactions for each ATM business model in each country. But interchange fees per transaction are in general lower than surcharges and DCC fees. The countries with many international transactions (more DCC transactions) and surcharges seem also less affected by the shift to cashless payments and closure of bank branches. However, ATMs relying on interchange fees and DCC fees for their viability are especially vulnerable to changes in pricing.

The second chapter of this study will provide a brief overview of the methodology used to identify the business models, locations of ATMs, revenue streams and cost factors, and select representative member states in the EU ATM market. In the third to tenth chapters, the information on the location, costs and revenues, and sensitivity of the costs and revenues to drops in transactions are presented for respectively Belgium, France, Germany, Greece, Poland, Portugal, Spain and Sweden. The eleventh chapter contains a comparison of the main developments across the eight selected EU member states. The twelfth and final chapter offers the conclusions that can be drawn.

2. METHODOLOGY

This chapter provides an overview of the main methodology used in the report to identify business models, retrieve ATM locations, estimate the costs and revenues as well as select the EU member states.

2.1 Business models

The report assesses the costs and revenues across the three main business models to operate ATMs in the EU, taking the costs and revenues of operating ATMs into account. Indeed, banks operate ATMs primarily to serve their own card and account holders or with the aim of attracting customers of others. The additional costs for operating an ATM in a bank branch are substantially cheaper than for operating a remote ATM. In addition, there are independent providers that operate ATMs as a self-standing service.

Find the specific definitions of the business models below:

- **Bank branch:** ATM machines located in or outside of the establishment of the provider, where the ATM provider offers additional (financial) services. This type of ATM is operated by bank or group of banks located at a bank branch, postal office, supermarket, etc.
- **Bank remote:** Besides those at branches, banks or groups of banks also operate remote ATM machines. These non-branch located ATMs are operated on the street or in the establishments of (other) merchants (e.g. gas stations, supermarkets, hotels, casinos, etc.).
- **Independent:** There are also ATM machines operated by non-banks. These independent providers operate ATMs without offering other retail financial services for consumers. Indeed, they can possess a banking license, but do not use this license to offer retail financial services (e.g. current accounts, card services, savings accounts).

Within each of these business models there might be more specific sub-models, for instance ATMs at airports primarily targeted at foreigners.¹ These ATMs are likely to generate more revenues from dynamic currency conversion (DCC)² than bank branch ATMs located in more residential areas. These types of differences are addressed by the identification of the characteristics of the locations and in the model to estimate the costs and revenues for the ATMs.

¹ In this report only ATMs that dispense local currency notes are considered. In some countries there are also some ATMs that dispense foreign currency.

² Defined in the Glossary.

2.2 Locations and characteristics

The information on ATM locations in the selected EU member states was gathered from around 40 public websites. Most of the information was obtained from the websites of banks and card scheme providers, but some data was also obtained from third parties (e.g. supermarket chains, gas stations and bank comparison websites). For this exercise, a variety of web-scraping³ techniques have been used. The web scraping was accomplished using primarily automated scraping using Python and Stata programming languages. In exceptional cases, the scraping was performed manually. All the obtained information has been parsed and treated using STATA statistical programming. All in all, well over 200,000 individual searches were performed between June and September 2018.

The various websites provided information on the location of ATMs and bank branches of various providers. For each ATM location, information on the provider (name of branding and operator), geographical location (street, postal code, city, region, country, etc.) and type of location (branch, postal office, on the street, airport, etc.) was obtained. For some banks, additional attributes on the ATM locations could be obtained, including the number of ATM machines at a given location, their functionalities (withdrawal, deposits, transfers, etc.) and accessibility (opening hours, accessibility, etc.). Each of the providers was determined to be a bank or independent provider according to the definition of this study, using information on the provider's website.

The information on ATM locations obtained via the web-scraping was combined with data on population and tourism intensity at regional level. Based on the postal codes, the ATM location was matched to a NUTS 3 geographical code. This enabled assessment of ATM availability at regional level. Eurostat provides information such as whether each NUTS 3 location is urban, rural or intermediate. At the NUTS 2 level (which can be derived from the NUTS 3 code), data on tourism were also gathered to ascertain the importance of tourism for the area in which each ATM is located. The nights spent by foreign residents in the regions was adjusted for the euro area countries, of which the residents have the same domestic currency (Belgium, France, Germany, Greece, Portugal and Spain). Tourism information is primarily relevant in the context of DCC charges, since it only applies to withdrawals in non-local currencies. Bilateral tourism information at national level was used to determine the relative importance of tourists from outside the currency area, which is either domestic tourists for Poland and Sweden or the euro area for the other six countries.

The figures retrieved were verified against records from supervisory authorities, with market experts and through comparison with the results from various web-scrapes. Overall, more than 95% of all ATM locations in the selected member states are included in the final database. Information on the ATM locations of all banks and independent providers of ATMs could be obtained. Although some independent providers no longer provide information on the locations of their ATMs on their own website or those of the card schemes, information on their locations could be obtained from banks and third parties. However, this might mean that

³ Web-scraping is a means of acquiring data from websites, generally using automated programmes.

some of the information on the location of independent providers is not complete or up to date (e.g. Cardtronics in Germany, Euronet in Greece and ATM Express in Portugal). According to market experts interviewed for this study, some independent providers no longer provide locations of their ATMs online for competition reasons.

2.3 Costs and revenues

Given the proprietary nature of most of the information on costs and revenues of operating ATMs, a model had to be used to estimate the costs and revenues for the three business models in the eight selected EU member states.

The model used for the estimations follows a bottom up approach. First, the main factors driving the revenues and costs were identified based on a large number of publications about the ATM industry, including the reports of Accenture (2016), ATM Marketplace (2017), ATMIA (2012), Deloitte (2012), KPMG (2016) and Value Partners (2014). Then total revenues and costs were estimated for each of the factors. Given the importance of the number of transactions for many of the revenue and cost factors, these were estimated separately. The number of transactions is adjusted for the degree of urbanisation, transactions, usage fees and visibility of the ATM.

Understanding what drives the various costs and revenues is important for assessing the sensitivity of the business models. All revenue factors are variable in nature (depending on the number of transactions), except for merchant payments that usually consist of a fixed monthly payment. The costs factors can be subdivided in two sub-categories, including installation costs and operational costs. The installation costs are fixed in nature and depreciated over the lifetime of the ATM machine. The operational costs are either fixed or variable in nature. The fixed operating costs include mostly monthly or annual payments for real estate, communication and monitoring. The variable operating costs include costs that depend on the number of transactions that the ATM processes.

The revenue and cost factors are listed below:

Revenues

- **Fixed revenues**
 - Merchant payments
- **Variable revenues**
 - Interchange fees
 - Surcharges
 - Dynamic currency conversion
 - Deposit services
 - Advertising
 - Other non-cash services

Costs

- **Installation costs**
 - Site finding/contracting costs

- ATM installation
- ATM machine
- ATM dismantling
- **Operating costs**
 - **Fixed costs**
 - Real estate
 - Security
 - Insurance
 - Communication
 - Monitoring cost
 - Taxation
 - **Variable costs**
 - Processing costs
 - Financing costs
 - Cash filling
 - Consumables
 - Cash processing
 - Maintenance

Most of the cost and revenue factors were estimated based on a combination of data from official statistics and extrapolations of information from a wide range of public and private sources for one or more providers or countries. The data was verified using the insights of various industry experts and, where possible, triangulation. As far as possible, estimations were based on actual verifiable data. However, in some cases assumptions had to be used, which leads to some degree of uncertainty about the results.

Obviously, costs and revenues vary significantly across entities. To this end, the approach requires the assessment be made on an averagely efficient entity, i.e. an entity able to handle the activity no better or worse than may be reasonably expected. Another complicating factor is that not all revenues and costs can be easily attributed, in particular to bank operated ATMs. For example, banks process many transactions for their own customers, for which the bank does not receive a dedicated payment but, for instance, an annual payment instead. In these cases, costs and revenues have been determined based on opportunity costs. For example, the amount of interchange fee that the bank would have to pay when a client used an ATM from another provider. Finally, since a single cost or revenue factor may involve several activities, total costs and revenues are expressed as the sum of the individual activities within each of the revenue streams and cost factors.

The sources and assumptions used to determine revenue streams and cost factors are presented in a comprehensive table in Annex I.

2.4 Country selection

The study covers a selection of eight EU member states that are representative of the ATM markets in all 28 EU member states. In order to ensure that the findings for these eight countries are indeed representative, the selection has been based on several criteria that affect

the costs and revenues of ATMs, including ATM penetration, density of bank branches, surcharges, disloyalty fees, additional technical requirements, taxation on ATMs, tourism activity and natural barriers.

In order to be representative, the selected member states need to cover the range of each of the criteria. A selection consisting of Belgium, France, Germany, Greece, Poland, Portugal, Spain and Sweden fulfils this requirement.

The locations and characteristics of the ATMs, estimated costs and revenues as well as an assessment of the sensitivity to a fall in transactions is discussed separately for each of the eight member states.

3. BELGIUM

Belgium consists of a small and densely populated territory, and is one of the more cashless EU countries. ATMs in Belgium are almost entirely operated by banks and located in bank branches, with relatively few remote ATMs and virtually no independent ATMs. This is in part because it is not lucrative to operate ATMs, owing to high fixed costs, fairly low revenues per transaction and restrictions on cash filling. This implies that Belgium is relatively susceptible to digitalisation.

3.1 Business models

Almost all ATMs in Belgium are provided by banks, many of which are subsidiaries of banks from neighbouring France and Netherlands. In terms of ATM locations, the largest providers in Belgium are BNP Paribas Fortis (19% of the total), ING (18%), KBC (15%), and Belfius (14%), which is owned by the Belgian government. In total these banks operate two thirds of ATM locations in Belgium, while smaller banks account for most of the rest.

The only independent ATM provider in Belgium is Travelex, which operates 13 out of over 5,000 total ATM locations in Belgium. Euronet was also active in Belgium with its subsidiary YourCash, which installs lobby ATMs in retail locations that are refilled by the retailer.

The interbank network of Belgium is Worldline, which connects virtually all ATMs. Worldline is responsible for processing transactions from Bancontact, which is the leading means of electronic payments in Belgium and associated with debit cards. Worldline offers many ATM management services including site search, installation, maintenance and security.

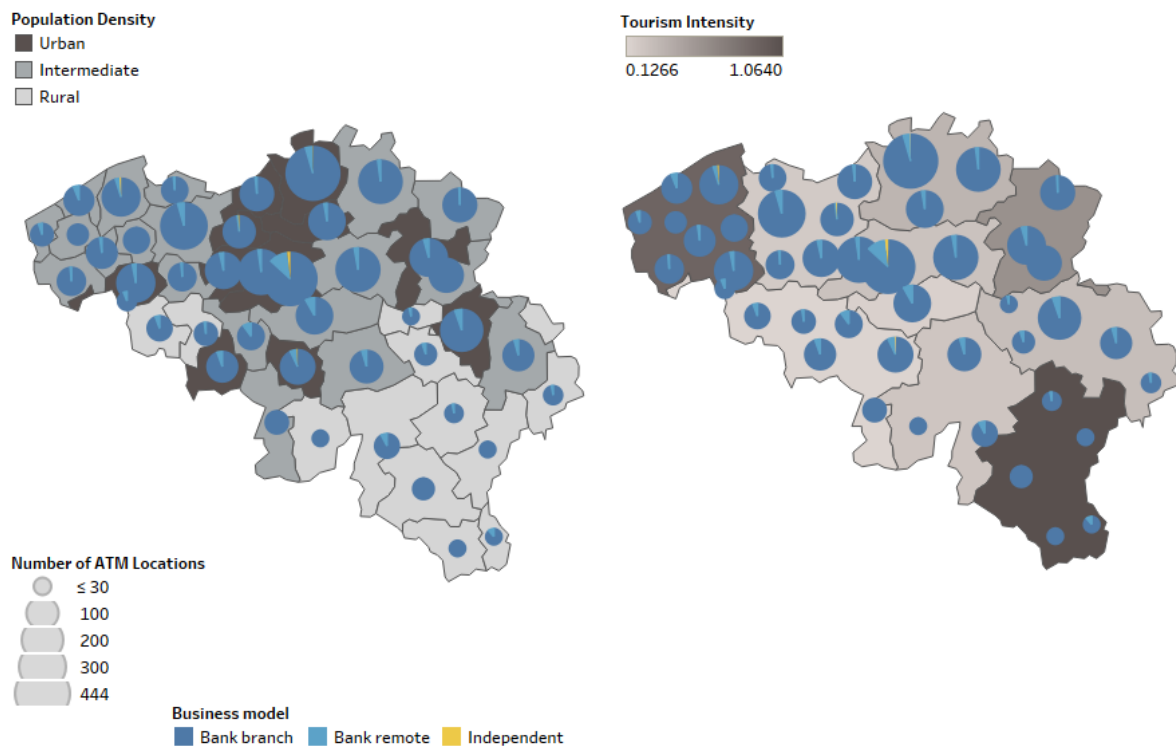
3.2 Locations and characteristics

Based on their location, the great majority of ATMs target the domestic population, with the exception of ATMs operated by the only independent provider, Travelex.

Most ATMs (over 95%) are located in bank branches, including about 8% in post offices of Bpost. ATMs in bank branches are mostly in bank lobbies, accessible 24 hours per day with a card swipe; only in a few exceptional cases are they only accessible during bank hours. Relatively few bank branch ATMs are through-the-wall machines accessible from the street.

According to the location information retrieved for Belgium, around 4% of ATM locations are bank remote. Belgium is the most densely populated of the selected countries, which may contribute to the small number of remote ATMs. Many of the remote ATMs were formerly in bank branches, which subsequently closed while continuing to operate their ATMs.

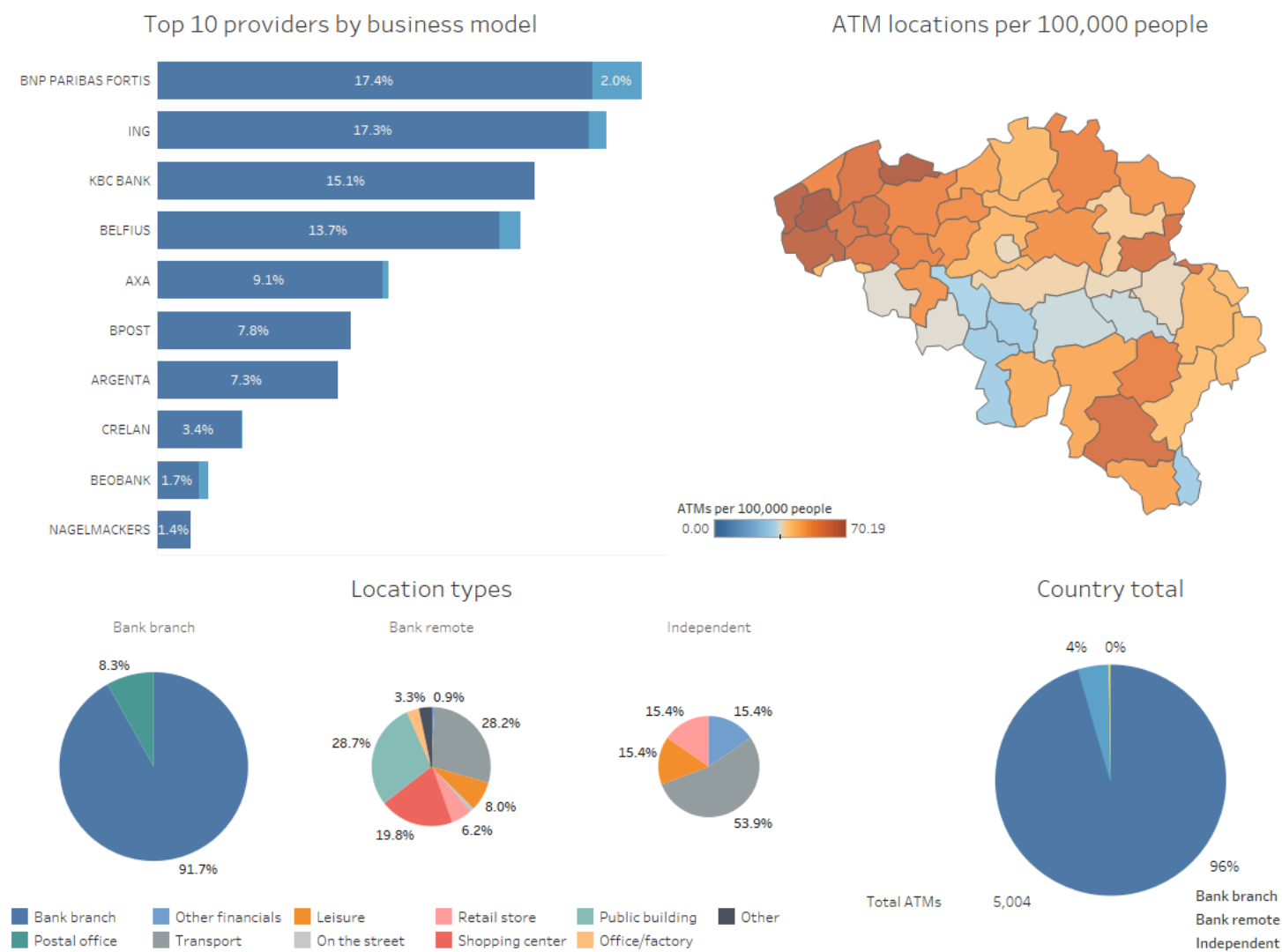
Figure 3.1 Distribution of ATMs across business models in Belgium



Before leaving the market, YourCash operated ATMs in retail stores, primarily supermarkets. The recent enforcement of a 1990 law, requiring ATM filling to be performed by certified security companies made it no longer possible for the retailer to fill the ATM; this implied substantially higher costs (Buurtsuper, 2018). The ATMs of the only remaining independent Travelex primarily target international card holders in need of currency exchange and are mainly located at airports.

Looking at the services that are provided on ATMs, the machines in Belgium do not offer advanced functionality for the most part. Very few have features like cell phone top up, contactless transactions, etc. In part, this may be because non-ATM machines are used for certain financial services (besides cash withdrawal) in bank lobbies. Cash depositing is a feature of some bank branch ATMs as well.

Figure 3.2 Overview of ATM locations in Belgium



Location types

Bank branch

Location type	Percentage
Bank branch	91.7%
Postal office	8.3%

Bank remote

Location type	Percentage
Other financials	28.2%
Public building	28.7%
Retail store	19.8%
Shopping center	8.0%
Office/factory	6.2%
Transport	3.3%
On the street	0.9%

Independent

Location type	Percentage
Other financials	53.9%
Retail store	15.4%
Shopping center	15.4%

Country total

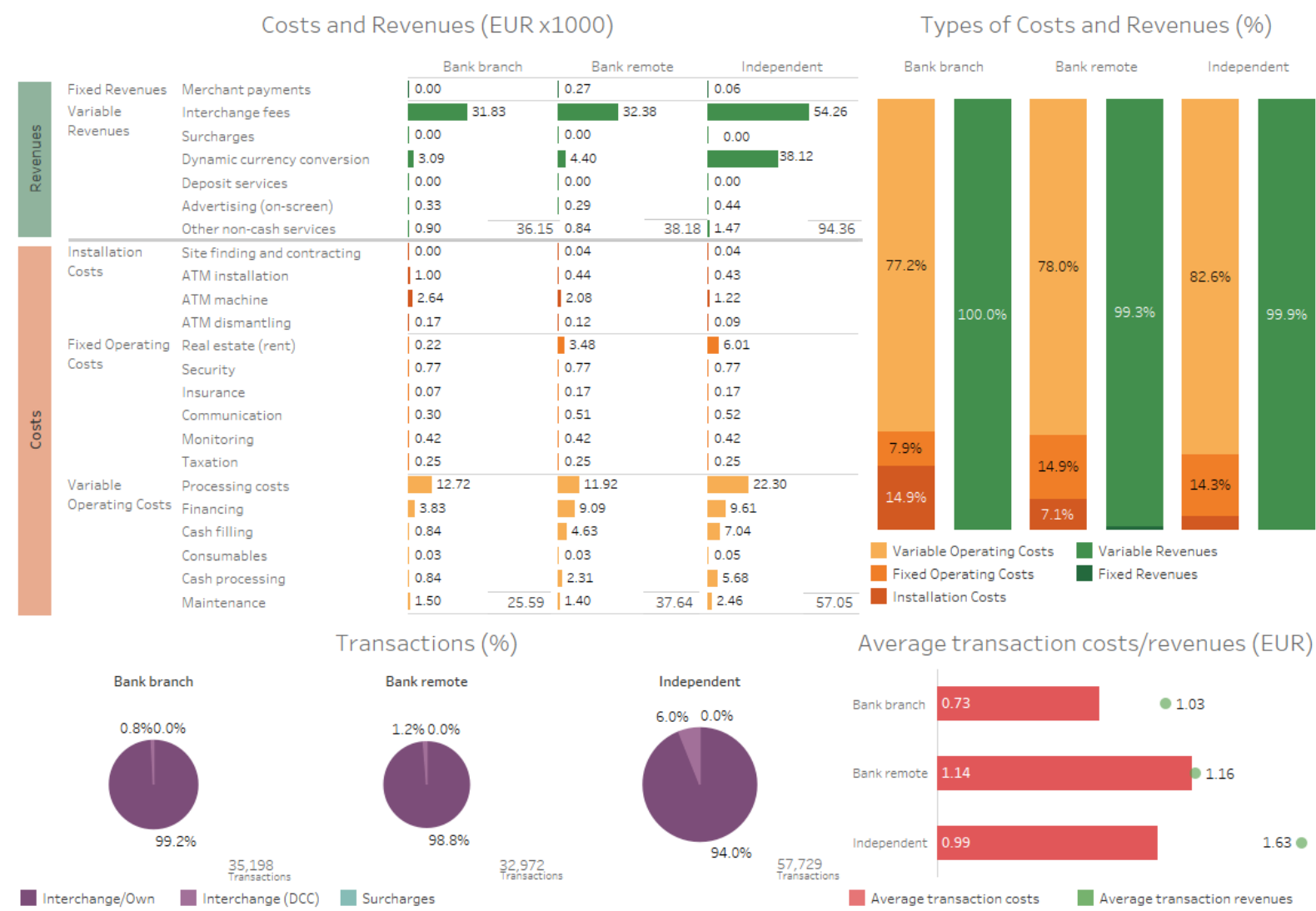
Location type	Percentage
Bank branch	96%
Bank remote	4%
Independent	0%

Total ATMs 5,004

Legend

Bank branch	Other financials	Leisure	Retail store	Public building	Other
Postal office	Transport	On the street	Shopping center	Office/factory	

Figure 3.3 Annual costs and revenues by business model in Belgium



3.3 Costs and revenues

Generally, interchange fees are the most important source of revenues for ATMs in Belgium. For the most part, Belgian card holders do not pay any fees when withdrawing from ATMs, whether it is their own bank or another bank. However, banks are allowed to impose variable levies on different types of transactions and negotiate bilateral agreements on fees. Some banks have also introduced disloyalty fees, which were forbidden in the past. These fees are not widespread at present.

3.3.1 Transactions

ATMs in Belgium process a high share of interchange and own transactions per year compared to those in the other countries for which the revenues and costs have been estimated. Bank branch ATMs process 35,198 withdrawals per ATM per year on average, of which 99.2% are interchange or own customer and 0.8% DCC. Bank remote ATMs process on average around 32,972 transactions per year, with 98.8% being interchange and 1.2% DCC. Independent ATMs handle the most transactions per year – around 57,729 – and significantly more DCC transactions, at 6% of the total. This is primarily due to ATMs located at airports.

3.3.2 Revenues

The only significant variable revenue for bank branch ATMs is from interchange fees. For bank remote and in particular independent ATMs, DCC revenues also constitute an important source of income. DCC accounts for a higher percentage of transactions for bank remote ATMs in Belgium than in neighbouring France and Germany, but a lower percentage than for countries with more tourist activities such as Spain. The few independent ATMs do generate a large amount of revenue compared to bank branch and bank remote ATMs, owing to a higher than average number of transactions per machine, as well as a high proportion of DCC transactions.

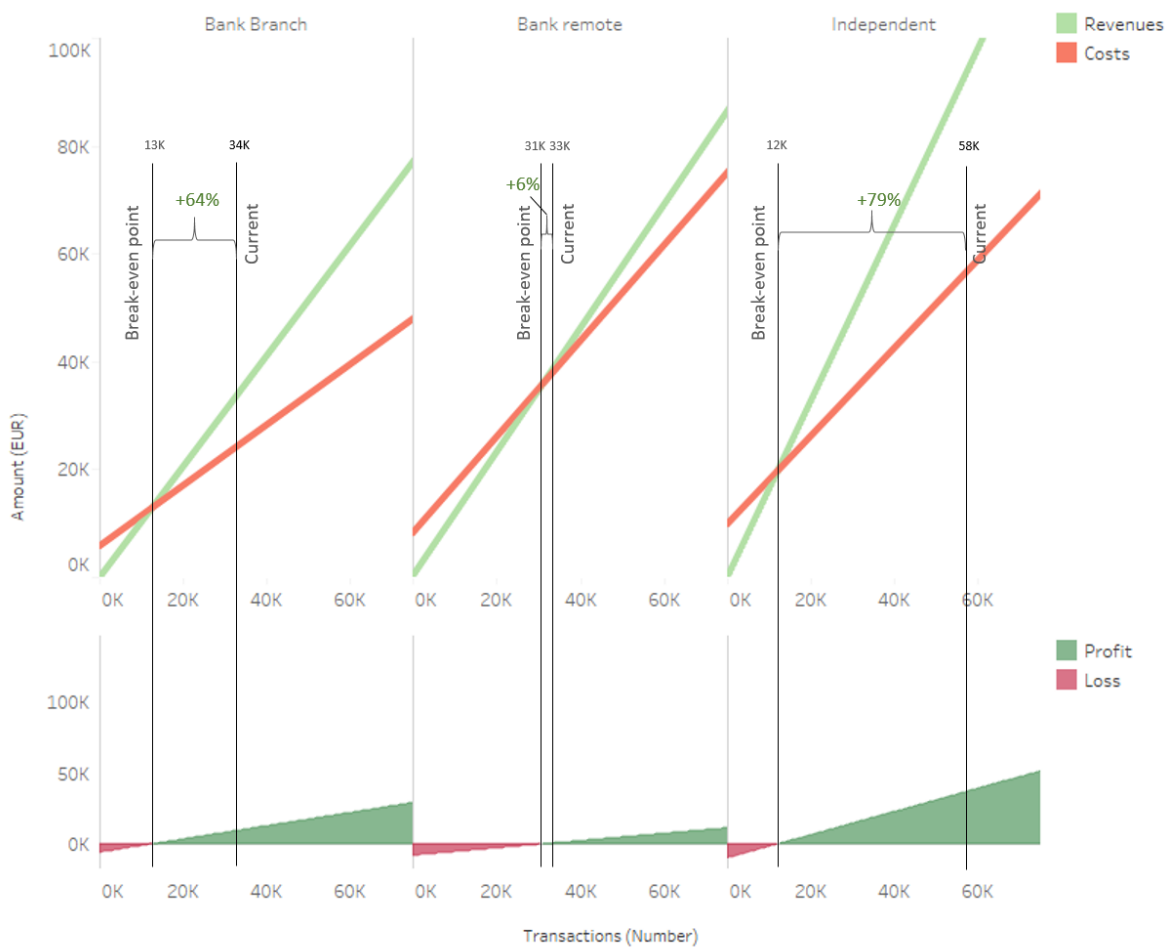
3.3.3 Costs

Belgium has relatively high costs owing to several factors. First, fixed costs are high because specific local taxes apply for bank branches and ATM machines. The exact amount of taxation, and other regulatory conditions for ATM providers, varies at the level of the local authority and type of location. For example, in the Brussels region each bank branch is responsible for paying a special tax of €1,000 per branch per year, while ATM providers must pay a tax of €100 per machine per year. Additional taxes may apply when installing a new machine. Second, variable costs are higher than average owing to average gross salary costs. Third, additional expenditures may be required to comply with regulations at the national, regional and local levels.

3.4 Sensitivity and trends

Generally, usage and ATM withdrawals are relatively low and declining in Belgium. This is also reflected in the shrinking value and number of cash withdrawals. Belgium had an average cash withdrawal amount of €138 in 2017 (ECB, 2018). By comparison, the average cash withdrawal in the EU is €131. The number of cash withdrawals in Belgium is around the EU average at 0.5 times per week. Taken together, this indicates that cash is mostly relevant for very small transactions. The trend away from cash is also visible in retail banking, as many bank branches only handle cash electronically, relying on ATMs and other banking terminals to handle cash.

Figure 3.4 Costs, revenues and profitability by number of transactions in Belgium



The great majority of Belgium ATMs are located in bank branches, which are gradually decreasing in number. The closure of a bank branch is often motivated by its non-ATM related costs and revenues, but it often leads to the dismantling of the ATMs. The total number of bank branches in Belgium has fallen significantly in the last two decades with about 3% per year (ECB, 2018). Some of these branches were converted into unstaffed outlets with ATMs and other machines for particular banking services.

Currently, bank branch ATMs in Belgium do not appear particularly sensitive to changes in transaction numbers. Transactions at bank branch ATMs would need to fall by 64% to become

loss-making on average. This does not mean that all those ATMs are individually profitable: with the gradual reduction in transactions, ATMs in certain predominantly rural areas that already process few withdrawals might now no longer be profitable and potentially face closure. Moreover, when a bank branch is replaced by a remote ATM, the required number of transactions to avoid a loss more than doubles from 12,500 to 30,900 transactions per ATM per year. This means that the Belgium network would become much more vulnerable to a decrease in cash withdrawals when more ATMs are situated at bank remote locations. Based on the current level of transactions, the average bank remote ATM would become loss making if transactions were to drop 3%.

The few remaining independent ATMs in Belgium would continue to be profitable even if transactions were to drop 79% from current levels. However, with the departure of YourCash, there are only very few independent ATMs in Belgium targeting international card holders. The YourCash ATMs were mostly located in supermarkets and targeted the domestic population, relying on the revenues from interchange fees and keeping the costs low through retailers refilling the machines.

Furthermore, bank branch ATMs in Belgium are relatively insensitive to potential future changes in DCC fees, as all would still pass the break-even point with zero DCC transactions. In turn, the bank remote ATMs depend for a small but critical part of their revenues on DCC fees. The independent ATM obtain a substantial part of their revenues from DCC, but they would still be profitable without these revenues. This is due to the high number of interchange transactions processed by these ATMs. However, this means that ATM providers are highly reliant on the level of the interchange fees.

Looking at alternatives to over-the-counter and ATM withdrawals, cashback at points of sale is offered in some Belgian locations (ECB, 2017). This seems to be most prevalent in supermarkets and gas stations, but does not seem to be a particularly widespread practice at present.

4. FRANCE

Of the selected countries, France has the highest total number of ATMs, and a slightly higher than average number of ATMs per capita. France is the largest EU member state in size and has the largest population after Germany. However, the French ATM market presents particular difficulties to ATM providers, namely high costs related to security requirements and rental costs, and the general trend towards cashless options for all but very small transactions. In spite of many tourists, these factors and disloyalty fees make France a rather unattractive location for independent and small ATM providers.

4.1 Business models

Virtually all French ATMs are operated by six large banks. The French retail banking market is traditionally composed of four major types of banks, namely commercial banks, co-operative and mutual banks, savings banks, and consumer credit specialists. The largest French commercial banks are BNP Paribas and Société Générale. The main co-operative and mutual banks are Banque Populaire (part of BPCE), Crédit Agricole, and Crédit Mutuel. A large number of smaller banks are also present, but their market share in terms of ATMs is low. According to the dataset, the top providers of ATMs in ascending order are Crédit Agricole (29.3%), BPCE (19.9%), Crédit Mutuel (17.5%), La Banque Postale (13.3%) and Société Générale (10.7%).

Very few independents actively deploy ATMs, in spite of the high levels of tourism. Of the selected countries, France has, after Belgium, the second lowest proportion of independent ATMs – just under 0.5% of the total, or 68 machines. The largest independents are Euronet and Travelex. ChangeGroup has a small presence in France, with a few branches offering currency exchange, but fewer than 5 ATMs located in their currency exchange offices.

Since 1984, the French domestic interbank network has been Cartes Bancaires (CB), on which the majority of ATMs operate. CB is associated with Carte Bleue Visa – all Carte Bleue cards are part of CB, but CB cards can be either Carte Bleue or MasterCard.⁴

4.2 Locations and characteristics

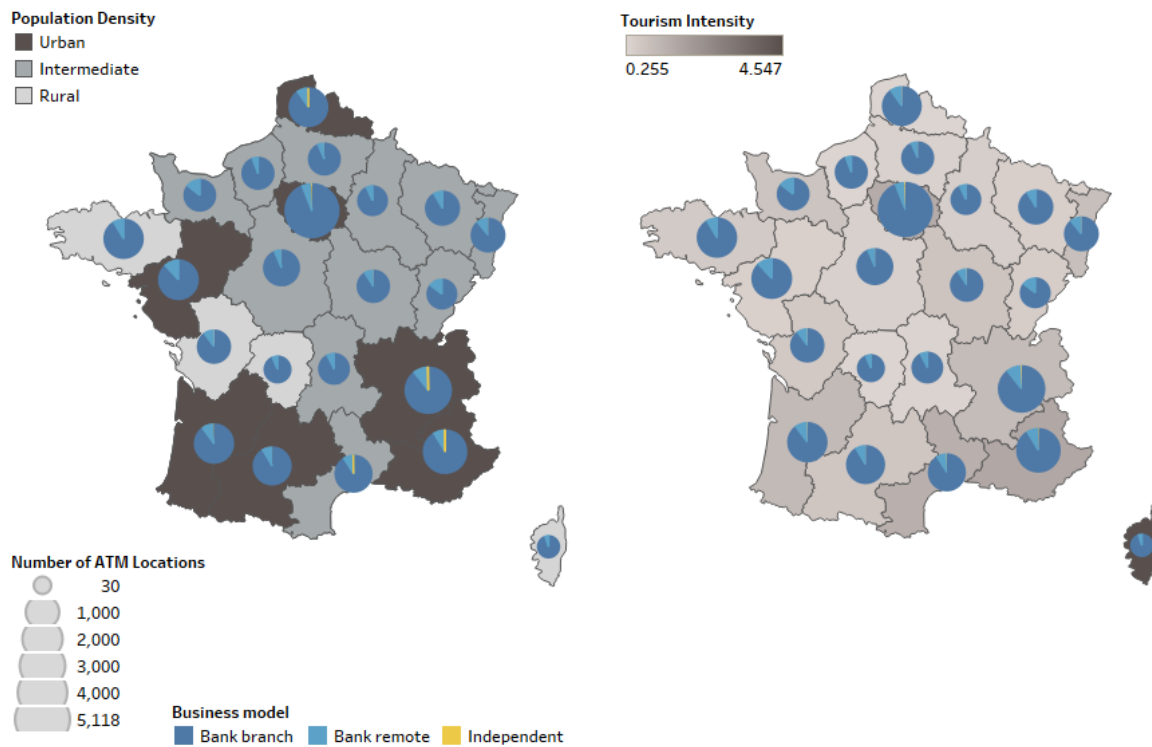
Based on their location, the great majority of ATMs target the domestic population, with the exception of the independent provider ATMs.

Most bank ATMs (91%) are located in bank branches, while only 9% of the total are remote. The bank branch locations are usually through-the-wall installations accessible from the street,

⁴ Almost all debit cards are co-badged between the national domestic payment card or ATM scheme for domestic payments and Mastercard or Visa for international payments.

though many banks offer ATMs in the hall accessible during business hours, or in lobbies, accessible at any time by swiping a payment card to enter. The French post office, La Poste, also provides banking services in post offices through its subsidiary La Banque Postale. The majority of remote ATMs are located in shopping centres (62.2%), followed by on the street (13.5%) and retail stores (11.6%).

Figure 4.1 Distribution of ATMs across business models in France



Independent ATMs in France are exclusively located in areas frequented by foreigners to target consumers needing currency exchange. The most common locations are hospitality and leisure locations (36.5%), transport locations (35.9%) like railway stations, bus stops and airports, and other financial businesses (14.8%) such as currency exchange offices. Travelex mostly operates ATMs in airports, but also a few in high-traffic street locations in tourist areas, where the ATMs often accompany a currency exchange office. Similarly, ChangeGroup operates ATMs at a few of its French branches.

Many that offer additional non-cash services seem to be widespread in France. For example, some of the BPCE ATMs allow cell phone top-ups for common cell phone providers, account transfers, deposits of either cash or checks, and printing transaction statements.

Figure 4.2 Overview of ATM locations in France

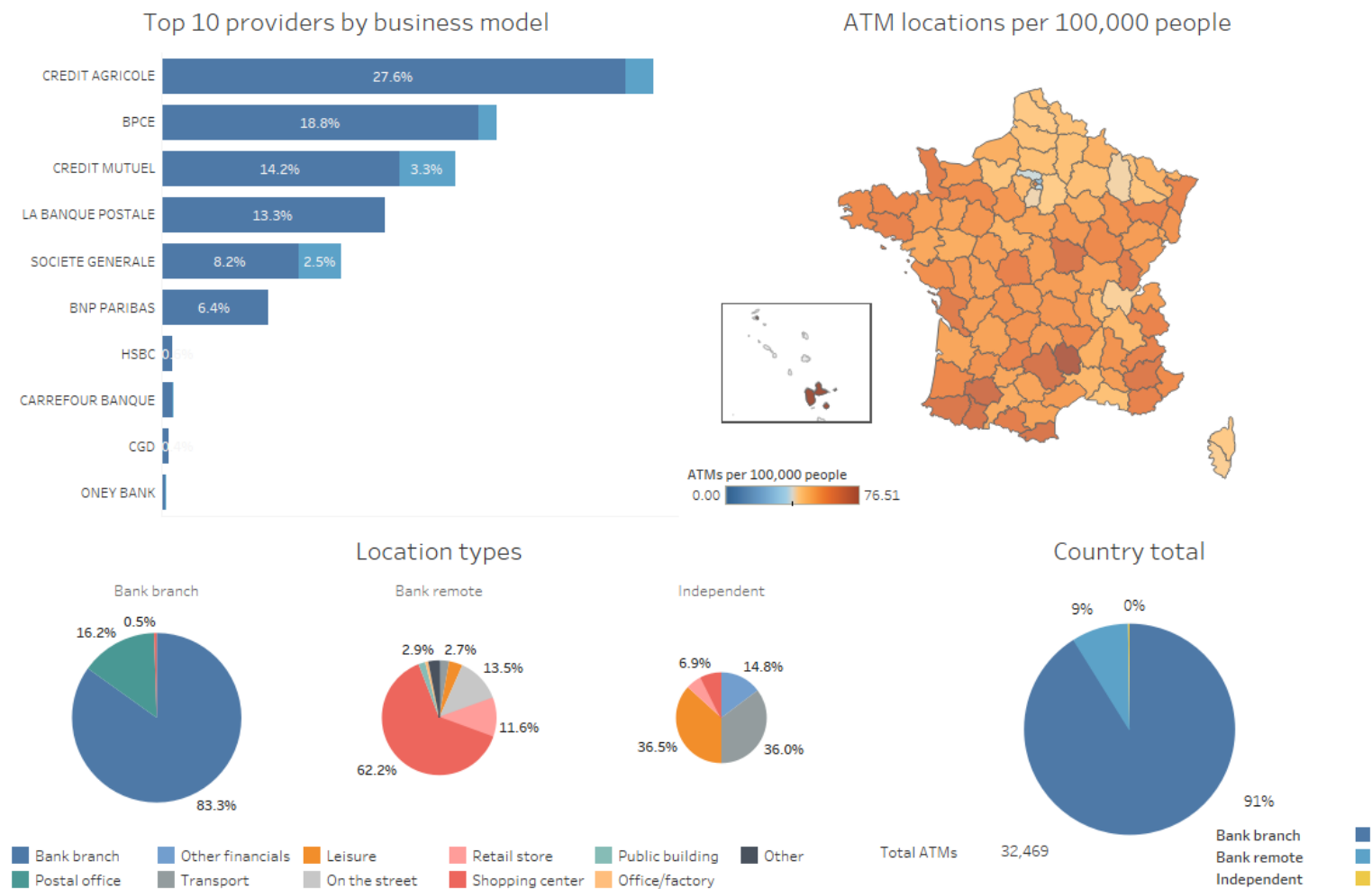
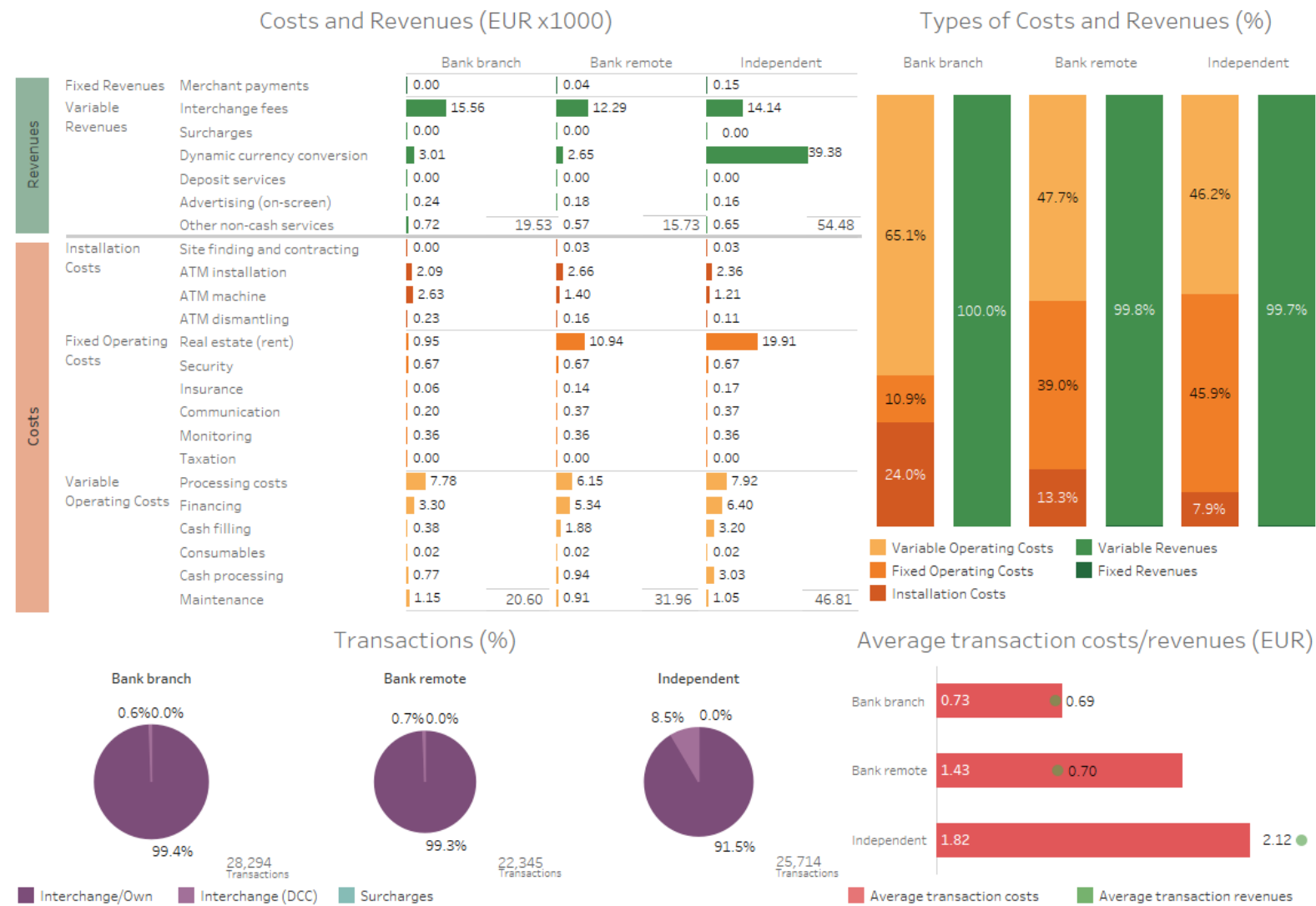


Figure 4.3 Annual costs and revenues by business model in France



4.3 Costs and revenues

No cards and ATMs on the CB network charge customers any surcharges for cash withdrawal. However, most of the banks, in particular large banks, charge customers disloyalty fees for using ATMs from other banks.

4.3.1 Transactions

Compared to the other selected countries, ATMs in France process on average lower numbers of transactions per year, but a higher share of interchange or own customer transactions. Bank branch ATMs process 28,294 transactions per ATM per year, of which 99.4% are interchange or own customer and under 0.6% DCC. Bank remote ATMs process on average 22,345 transactions per year, at nearly the same ratio of interchange and DCC as bank branch ATMs. The average independent ATM handles 25,714 transactions a year, of which around 91.5% are interchange transactions, and 8.5% DCC.

4.3.2 Revenues

Overall, the average total revenue for ATMs in France is the lowest among the selected countries, except for independent ATMs. For French ATMs, the majority of revenue comes from interchange fees and DCC. Owing to a higher number of transactions, bank branch ATMs generate more interchange and DCC revenues. Independent ATMs generate similar interchange fee revenue as bank branch ATMs, but about 11 times the DCC revenue. Surcharges and deposit services do not generate revenue for any type of ATM. Other non-cash services and advertising represent very small revenue streams for each type.

4.3.3 Costs

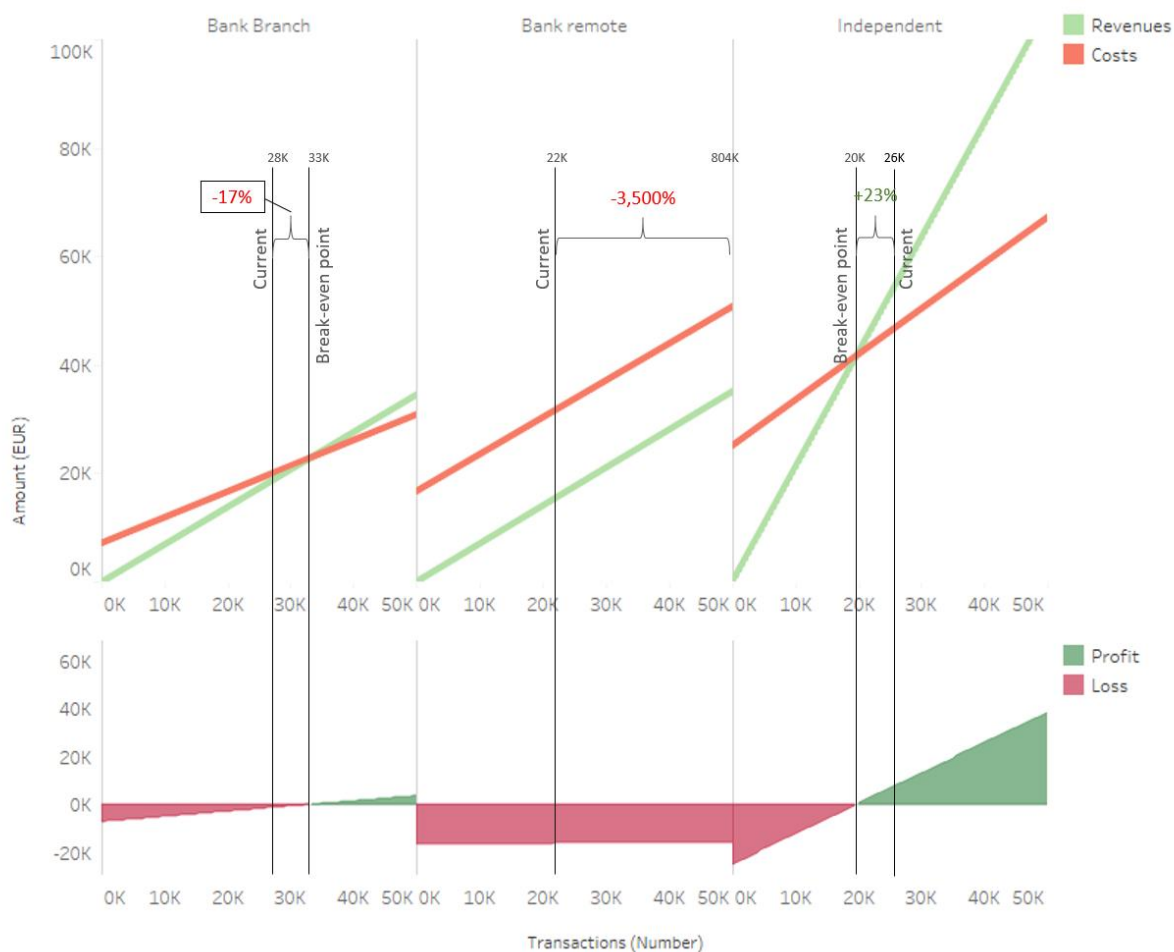
France has the highest fixed costs of selected countries, mainly due to higher real estate prices but in particular due to the larger space needed. ATMs in France are required to have a security bunker of at least six square meters, excluding the approximately 1 square meter required for the ATM. Thus, ATM providers must rent more space in France compared to other countries. As most branches have two or more ATM machines, the bunker can be shared between the machines, but this is often not the case for remote and independent ATMs.

For variable operating costs, the largest differences between ATM types are in financing costs, cash filling, and cash processing. Most significantly, financing costs for bank remote and independent ATMs are around two times as expensive as for bank branch ATMs. Cash filling and cash processing also represent greater expenses for bank remote and independent ATMs. For bank branch ATMs, cash filling and cash processing can be performed mainly by on-site bank employees, reducing transport costs and working time required to conduct these activities.

4.4 Sensitivity and trends

Cash usage and ATM withdrawals in France are on a downward trend even if cash is still used relatively frequently, mostly for very small purchases. ATM withdrawals are not infrequent, but for small amounts compared to the rest of the EU, averaging below €95 (ECB, 2017). The number of domestic ATM withdrawals stagnated between 2012 and 2017, while over the same period the number of ATM machines fell, and number of card payments rose (ECB, 2018).

Figure 4.4 Costs and revenues by number of transactions in France



The great majority of ATMs in France are located at bank branches, which have steadily declined since 2006 (ECB, 2018). This has contributed to a limited decline in the total number of ATMs. Some of the ATMs in closed bank branches have been replaced by bank remote ATMs.

A drop in the number of withdrawals would primarily affect bank branch ATMs in France. Bank branch ATMs are currently operated at transaction levels below the break-even point. The ATMs would require 17% extra transactions in order to become economically viable. Moreover, almost regardless of the number of transactions, bank remote ATMs would still operate at a loss. If bank branches were to continue closing, more transactions could move to the remaining bank branch and bank remote ATMs.

French banks might have a strategic motive to continue running ATMs at a loss. ATMs could be necessary to continue delivering cash services to customers without having to give up the disloyalty charges for withdrawals at ATMs of other banks. ATMs form only part of the activities of bank branches (e.g. sales of bank and insurance products). Besides the costs and revenues of the ATM, the decision to operate a bank branch also involves consideration of the costs and revenues of these other activities. Operating an ATM in a bank branch might thus be cheaper than a bank remote ATM, but taking the other costs and revenues of the bank branch into consideration, it might be more attractive financially to operate a bank remote ATM. Moreover, the French government is pushing state-owned La Banque Postale to operate ATMs in rural areas and local authorities have the possibility to install an ATM at a merchant or public service house (cBanque, 2018).

The few independent ATMs in France are unlikely to become unviable soon owing to the reduction in cash usage. These ATMs would still remain above the break-even point even if transactions were to drop 23%. However, the viability of independent ATMs is highly reliant on the ability to charge DCC fees from international card holders. A potential limit to DCC charges could greatly impact the profitability of the few independent ATMs (see Box on DCC, page 71).

5. GERMANY

Germany has the largest population of selected countries, and the highest total number of ATMs. Germany's ATM market is remarkable for several reasons. First, compared to other north-western European countries, Germany is very reliant on cash. This is true even for larger transactions, whereas in most other selected countries, cash is mostly used for very small transactions. Second, the German ATM market is quite broad, with a large number of both banks and independents operating ATMs. Third, ATM transactions include surcharges, which contribute to ATMs generating a relatively large amount of revenue per transaction as well as in total.

5.1 Business models

Germany's retail banking sector is traditionally composed of three types: savings banks (Sparkassen), co-operative banks (Volksbanken and Raiffeisen banks) and commercial banks (such as Deutsche Bank and Commerzbank). These banks operate the majority of ATMs in the country, but there are also a couple of foreign banking groups active in Germany, including Crédit Mutuel from France (owner of Targobank), Santander from Spain, and ING (ING DiBa) from the Netherlands. By far, the largest providers of ATMs are the networks of savings banks (37.8% of the total) and cooperative banks (35.7%).

Five independent ATM providers are active in Germany: Cardtronics, Euronet, InterCard, Notemachine and Travelex. Altogether, independents account for approximately 5% of German ATMs. Both Euronet and Note Machine have an agreement with Bankhaus Lenz to provide sponsorship services. Unlike banks, independents are increasing their numbers of deployed ATMs (RBR, 2018b).

Most Germany ATMs and banks are connected by Girocard: a domestic card scheme. Girocards are usually co-branded with Maestro or Cirrus from MasterCard, or V Pay from Visa, allowing them to be used outside of Germany.

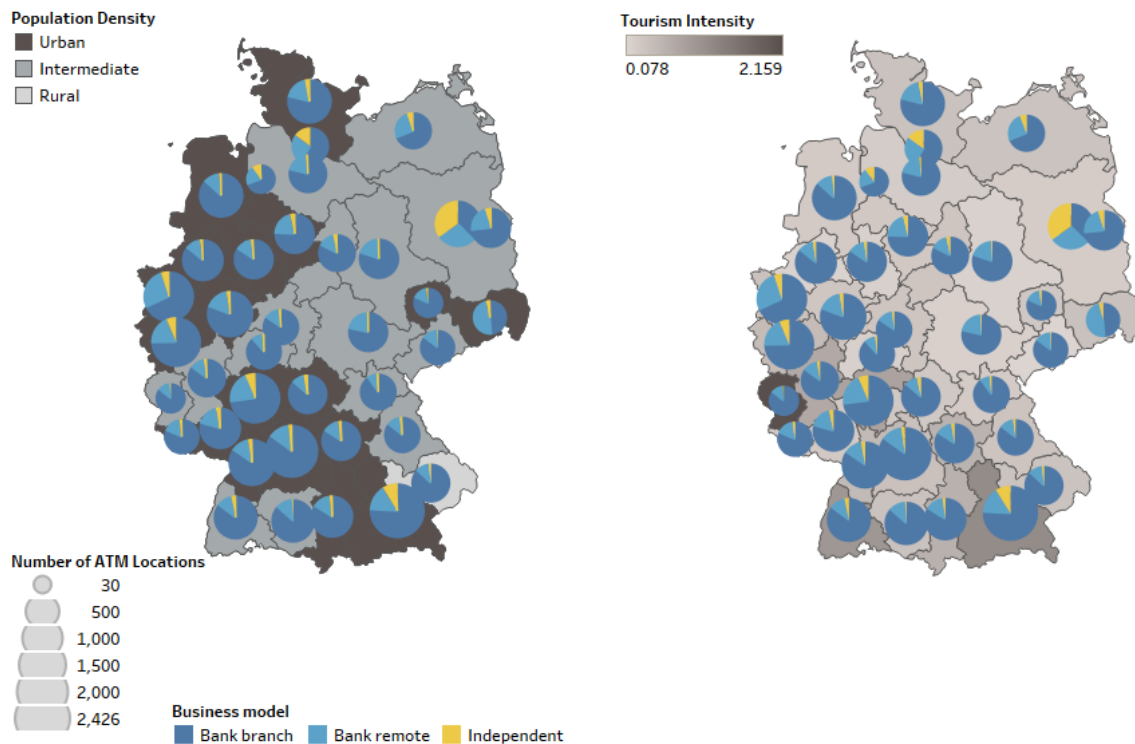
Moreover, there are various interbank cooperation networks: Finanz Informatik (for savings banks), Fiducia GAD (for co-operative banks), and Sparda DV. Two additional interbank cooperation networks are CashPool, which is the smallest network and mostly consists of smaller and branchless banks, and Cash Group, which includes several larger commercial banks such as Deutsche Bank (DB) and Commerzbank that mutually waive ATM usage fees for their customers.

5.2 Locations and characteristics

Based on their location, the great majority of ATMs target the domestic population, both those run by banks and independently operated ATMs.

The majority (76%) of ATMs are located at bank branches. For example, Sparkassen operate more than six times more bank branch ATMs than ATMs at remote locations. Most branch ATMs are located in bank lobbies accessible 24 hours per day with a card swipe, with a much smaller number of through-the-wall installations accessible from the street. Even fewer ATMs are located in bank halls and only accessible during bank hours. Additionally, 2.3% of bank branch ATMs are located at post offices, as Deutsche Postbank (a subsidiary of Deutsche Bank) is a fully-licensed bank.

Figure 5.1 Distribution of ATMs across business models in Germany



Bank remote ATMs account for 19% of the total. Certain banks, such as ING-DiBa, exclusively offer remote ATMs. The most common locations for remote ATMs are shopping centres (32% of remote ATMs), retail stores (25%), and on the street (24.7%). Some banks also have partnerships for remote ATMs, such as Shell gas stations hosting many ATMs for Deutsche Postbank.

Independent ATMs target both domestic and international card holders, especially in and around Berlin, Hamburg and Munich. The most common locations are in retail stores (50.2%), hospitality and leisure locations (13.4%) and on the street (8.2%). The independent Travelex seems to operate exclusively in airports and hotels.

The majority of German ATMs offer only basic functionality, but there are exceptions. All Cash Pool ATMs, which includes smaller banks as well as a few larger ones like Targobank and Santander, enable cell phone top-ups in addition to account transfers, statement printing, and cash and check deposits.

Figure 5.2 Overview of ATM locations in Germany

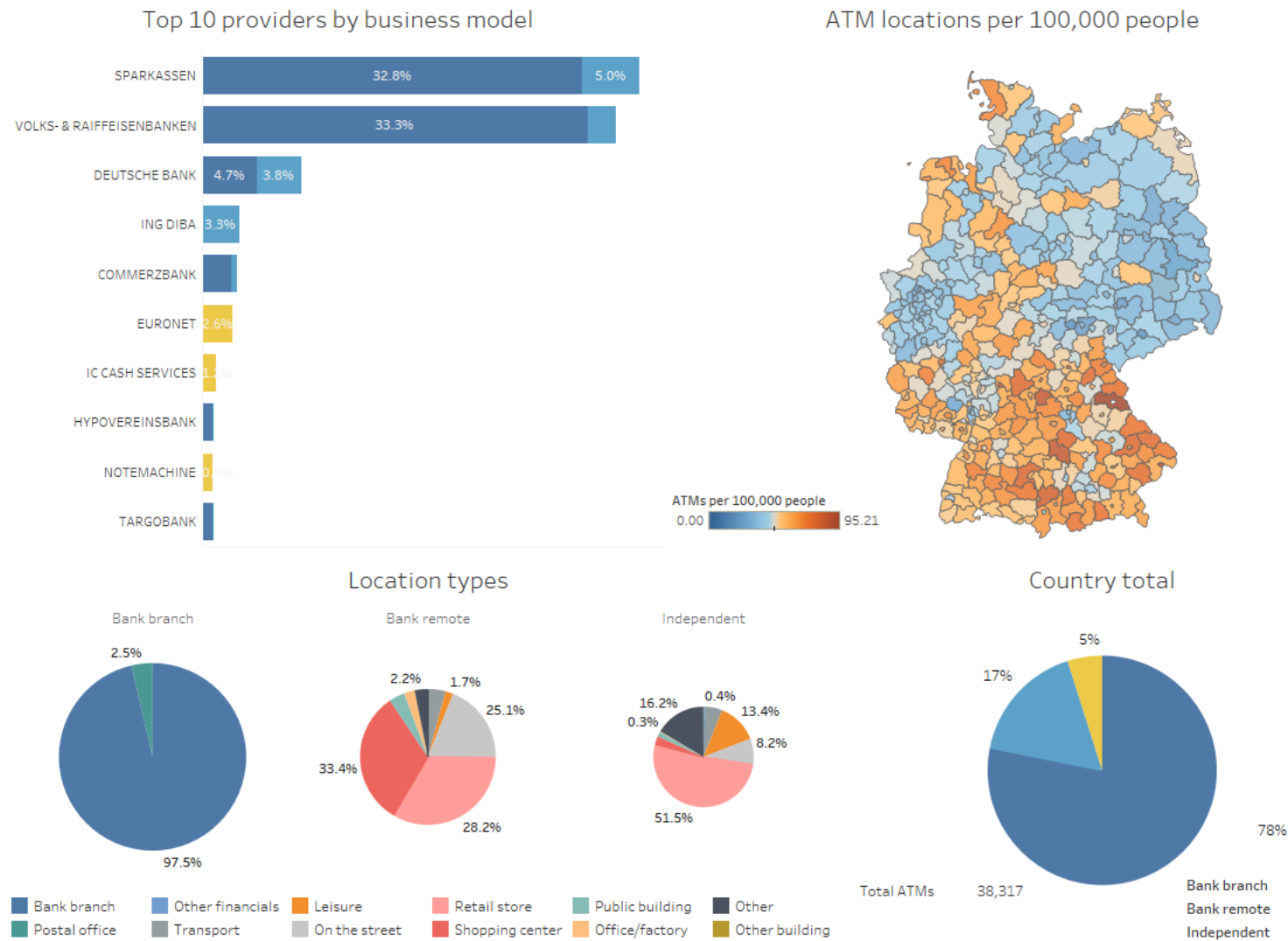
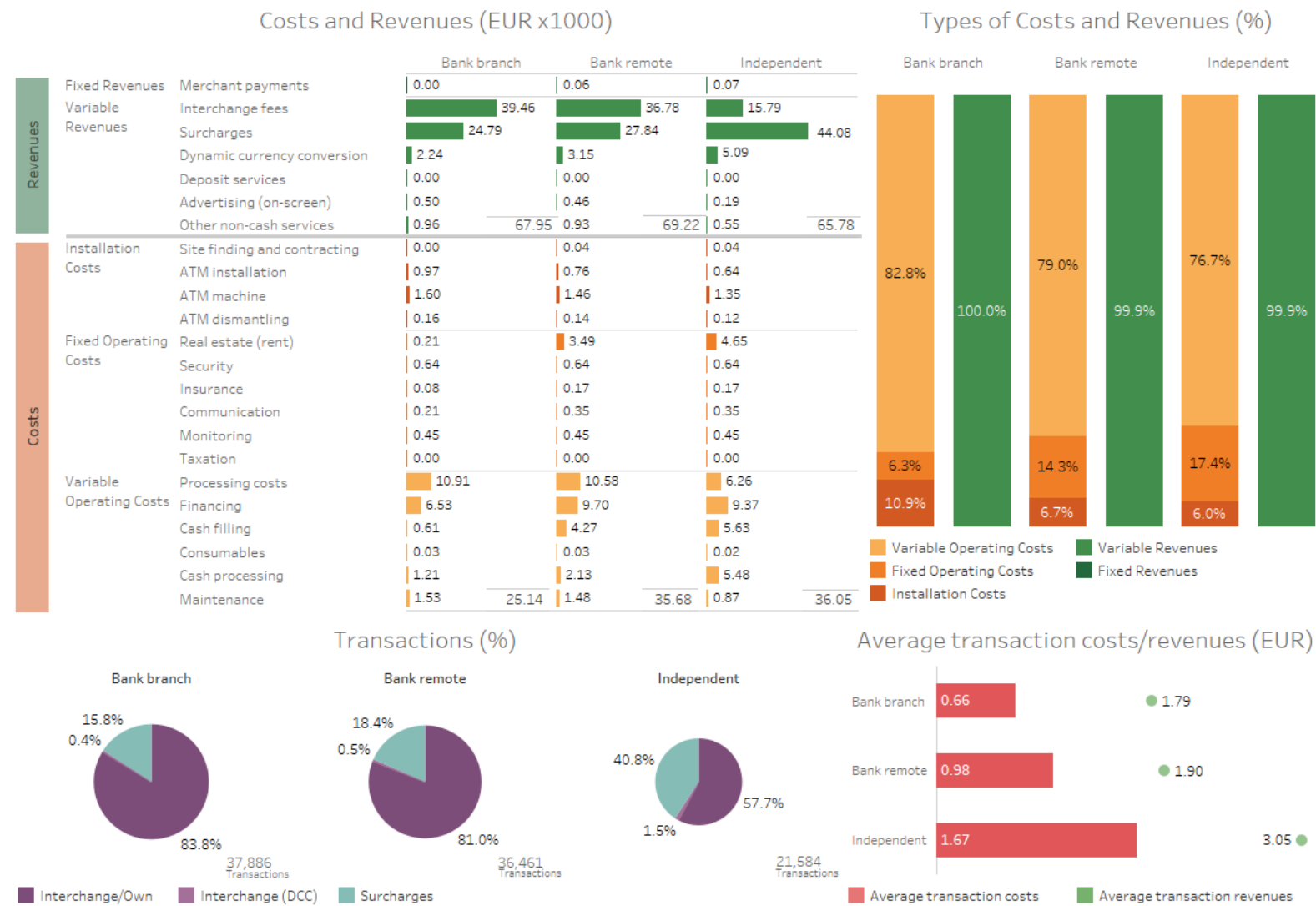


Figure 5.3 Annual costs and revenues by business model in Germany



5.3 Costs and Revenues

A defining feature of the German market is that bank ATMs charge relatively high surcharge fees for withdrawals. This means that withdrawing from an ATM operated by a different bank to the card issuer results in a fee averaging €5. However, most banks within one of the various networks waive fees for withdrawals within that network.

A recent trend is that German banks have begun issuing Visa cards, alongside Girocards, for cash withdrawals. This allows issuing banks, rather than consumers, to pay the interbank fee. Additionally, no cash advance fee is associated with cash withdrawal using a Visa card in this regard. However, banks must pay a fixed amount per withdrawal, and thus may require customers to withdraw a minimum amount. ING-DiBa, for example, requires a minimum €50 withdrawal using a Visa card, unless the customer's balance is below that amount.

Independent ATMs in Germany are mostly at locations that attract more international card holders. This is particularly interesting for them when it concerns DCC transactions, which in general generate higher revenues per transaction than interchange and surcharge transactions.

5.3.1 Transactions

Germany and Spain are the only selected countries where surcharge transactions are common. Bank branch ATMs process an average of 37,886 transactions per year, of which 84.2% are interchange or own customer (of which 0.4% also earn DCC fees) and 15.8% generate surcharges. Bank remote ATMs process an average of about 36,461 transactions per year, of which 81.5% are interchange or own customer (of which 0.5% also earn DCC fees) and 18.4% are surcharge transactions. The total number of transactions at independent ATMs is 21,584 per ATM per year, more than 40% lower than for both bank branch and bank remote ATMs. The average independent ATM handles about 59.2% interchange transactions (of which 1.5% also earn DCC fees) and the remainder is surcharge transactions (40.8%).⁵

5.3.2 Revenues

The average amount of revenue for bank branch and bank remote ATMs is quite high, mainly due to the surcharge fees. Bank branch ATMs in particular generate a large amount of revenue from surcharges – about two-thirds that from interchange fees. Bank remote ATMs generate slightly less interchange fees than bank branch ATMs, but more surcharges as well as more DCC fees. Overall, bank remote ATMs generate the most revenue annually with around €69,220 per machine annually. Bank remote ATMs generate slightly more with €67,960 per machine. Independent ATMs generate slightly less revenue overall with €65,780 per machine. They

⁵ The model used to estimate costs and revenues might overestimate the number of surcharge transactions for Germany. The share of surcharge transactions is based on the UK, where the ATMs charging a surcharge fee for withdrawing cash process on average 90% less transactions than those that do not charge a direct fee to the person withdrawing cash. The average surcharges in Germany are, however, about twice as high as in the UK. The available public information, however, does not allow to accurately determine whether and to what extent the higher surcharges lead to a lower number of transactions.

compensate the substantially lower number of transactions with higher average fees per transaction.

5.3.3 Costs

In Germany, installation costs are in general higher for bank branch ATMs than for bank remote and independent ATMs, as they are more often TTW than lobby ATMs. For fixed operating costs, the only major difference is real estate. Real estate costs are much higher for bank remote and independent ATMs, which is again similar across all selected countries.

For variable operating costs, a few differentiating figures are noteworthy. Bank remote ATMs have the highest variable operating costs, owing to processing, financing, and cash filling costs. Variable operating costs for bank branch ATMs are substantially lower due to the reduced cost of cash filling, as well as financing costs. Independent ATMs have low processing costs due to fewer transactions per year. In total, bank branch ATMs cost around €25,140 per year to operate, bank remote ATMs cost €35,680, while independent ATMs cost €36,050.

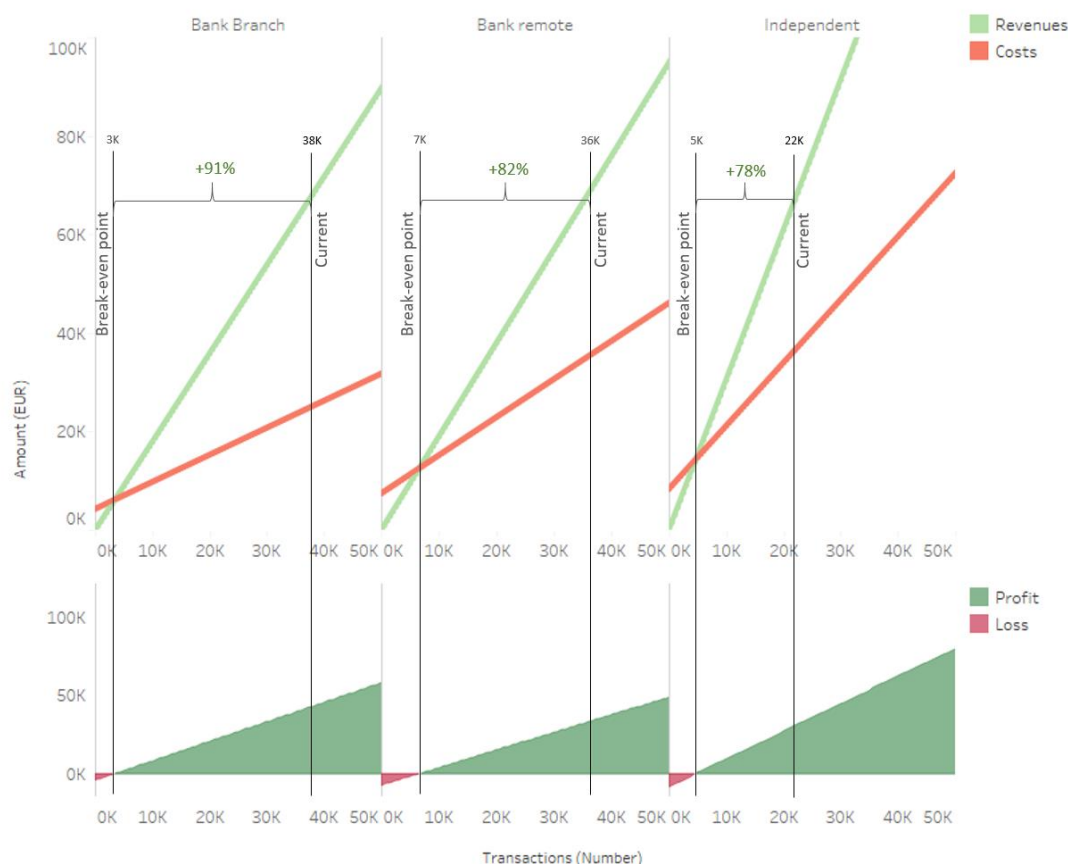
Overall, ATMs of all business models have higher revenues than costs. Independent ATMs are the most profitable, followed by bank branch and bank remote ATMs.

5.4 Sensitivity and trends

Cash usage and ATM transactions in Germany have so far remained relatively stable compared to the other selected countries. Use of cash remains prevalent in Germany, especially compared to other north-western countries in the euro area. The share of cash transactions at points of sale is 80% by number of transactions, and 55% by value of transactions (ECB, 2017). In Germany, many higher value transactions also take place with cash, which distinguishes Germany from other selected countries. Accordingly, the average cash withdrawal is relatively high for the EU at an average of €179, like the number the number of withdrawals per person per week. Additionally, Germany has some of the lowest perceived card acceptance rates in the euro area with around 64%, versus a euro area average of 72%.

Both bank branch and bank remote ATMs are decreasing in number. The total number of bank branches has declined continuously since 2002 from around 54,000 to 32,000 in 2017 (ECB, 2018). Additionally, several German banks are continuing to reduce the size of their ATM fleets (RBR, 2018b). This is likely to result in remaining machines handling more transactions. However, it could also result in fewer available ATMs. This may mean that consumers withdraw even larger amounts less frequently, which would reduce revenues from surcharges.

Figure 5.4 Costs and revenues by number of transactions in Germany



At present, ATMs in Germany do not appear particularly sensitive to changes in the total number of cash withdrawals. Bank branch, bank remote and independent ATMs are expected to be profitable even at a much lower number of transactions. Bank branch, bank remote and independent ATMs could still break even with a reduction in overall transactions of 91%, 82% or 78% respectively. Germany is exceptional as its ATMs pass the break-even point at only a few thousand transactions annually.

Currently, all bank business models appear most sensitive to a fall in surcharge revenues. Although surcharges apply to less than a fifth of the transactions of banks, they account for two-fifths of their revenues. The surcharge revenues are coming under pressure due to the increased issuance of co-branded cards. Online banks such as ING DiBa are issuing co-branded cards that do not permit a surcharge when withdrawing cash. Indeed, with more of these cards being used, transactions subject to surcharges are likely to be replaced by interchange fees.

ATMs in Germany do not appear particularly sensitive to changes in DCC fees. Total DCC revenues are generating no more than 8% on average for any of the business models.

A growing trend in Germany is cashback at points of sale. For example, ING-DiBa allows customers to use a Girocard for cashback at selected supermarkets and gas stations in Germany. This service is generally free of charge, but must accompany a purchase of at least €20.

6. GREECE

The Greek ATM market is defined by very high cash usage, high levels of tourism, and geographic difficulties, as Greek territory includes hundreds of inhabited islands. The Greek retail banking industry underwent significant restructuring since the sovereign debt crisis, which has resulted in more than average numbers of bank branch closures and therefore reduced numbers of bank ATMs. At the same time, there is a large number of independent ATMs targeting international card holders.

6.1 Business models

Most Greek ATMs are operated by banks, and the retail banking sector is composed of commercial banks, cooperatives, and foreign banks. The Greek banking environment has faced significant difficulties since the sovereign debt crisis of 2010 and subsequent austerity measures. Many banks have undergone restructuring and cost-cutting measures, while others have shut down altogether. Greek banks are still pursuing cost cutting measures in the wake of the financial crisis, which has resulted in many ATMs shutting down since the crisis. Paradoxically, the crisis and subsequent capital controls also resulted in Greece's payments market growing faster than any other in western Europe; limits on the cash that cardholders can withdraw at ATMs have boosted the debit card sector as well as the number of cash withdrawals (RBR, 2018a).

The ATM market in Greece is very concentrated, with only a few providers operating the great majority of ATMs. The largest providers of ATMs in Greece are Piraeus Bank (35% of the total), National Bank of Greece (NBG) (22%), Eurobank (18%) and Alpha (16%), together accounting for some 90% of all machines.

The only independent active in Greece is Euronet, with around 300 ATMs in the dataset.⁶ Euronet ATMs are distributed quite widely across Greece, but generally targeting international card holders.

The domestic sharing agreement in Greece is the DIAS network, in which the majority of banks and ATMs operate (DIAS, 2018). The largest banks, Piraeus, NBG, Eurobank, and Alpha Bank, as well both co-operatives are members of DIAS.

⁶ Euronet is likely to have more ATMs in Greece, but they are not reflected in the report since they do not publish the locations on their website and have stopped sharing the information with the online ATM locators that have been used to determine the ATM locations.

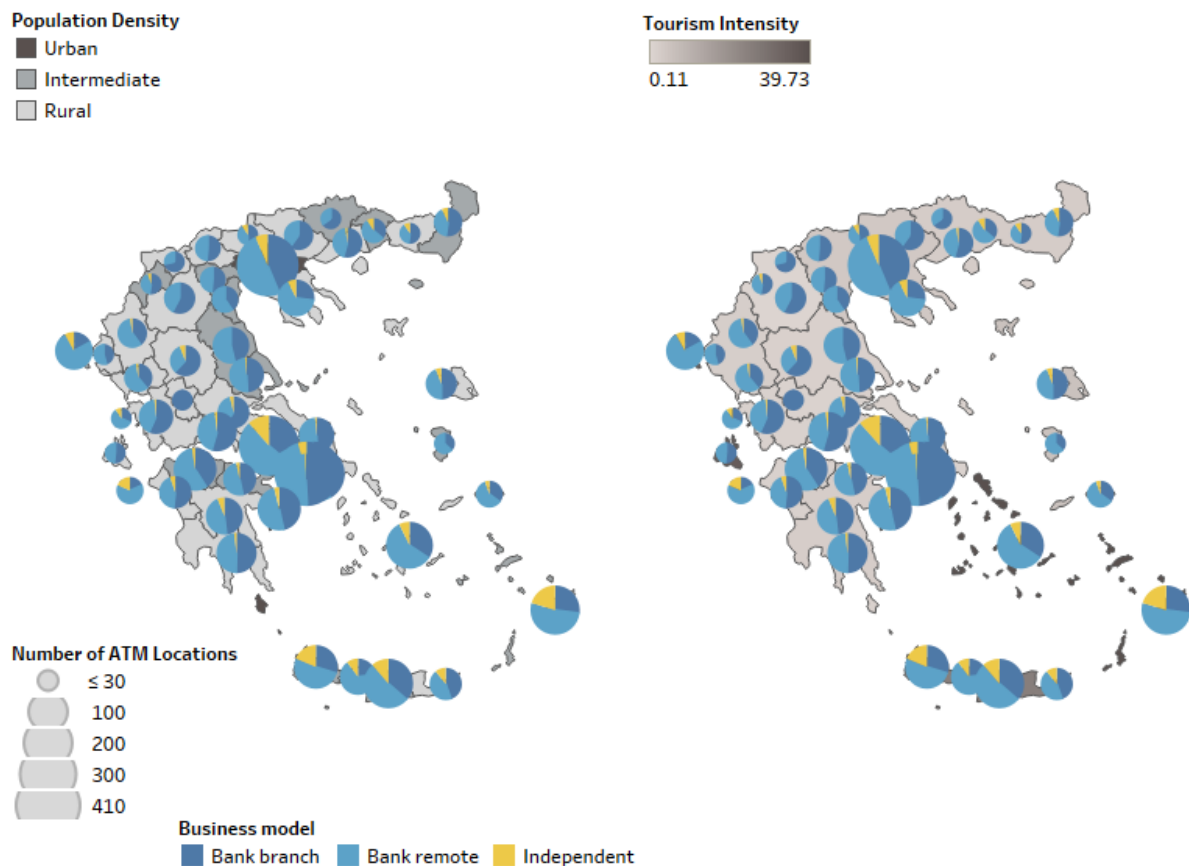
6.2 Locations and characteristics

Based on their location, the great majority of ATMs target a combination of domestic and international card holders, though independent ATMs are primarily targeted at international traffic.

About half of the ATM locations in Greece are bank branch or remote (50%). Most of these locations consist of bank branches, but some of the Eurobank branches are post offices. The great majority of bank branch, bank remote and independent locations have just one ATM machine installed. They are most often TTW and accessible from the street 24 hours per day. Moreover, another very substantial proportion of the locations consists of bank branches (43%).

Remote ATMs are quite common in Greece, with a full 44% of machines operated remotely. The largest providers all operate more or less half of their ATMs remotely. Most of the remote ATMs are located in retail stores (31.2%), hospitality and leisure locations (13.5%), public buildings (10.4%) and offices or factories (9.7%). In particular, there are relatively more remote ATMs in tourist areas than in rural and urban areas.

Figure 6.1 Distribution of ATMs across business models in Greece



Greece consists of over 200 inhabited islands, many of which can only be accessed by boat. These islands are not only where many Greeks live, but also popular tourist destinations. Greece is among the most visited tourist destinations in Europe, and some 95% of tourist nights spent are in coastal areas (Eurostat, 2017). However, the many islands also create logistical difficulties in operating a fleet of ATMs, especially as the need for cash is high throughout Greece.

ATMs in Greece are fairly feature rich. For example, Piraeus Bank ATMs allow card-free cash withdrawals, paying electricity or phone bills, online cash deposits, mobile phone top-ups, etc. The National Bank of Greece offers similar functions, depending on the type of card used. ATMs of some other banks are comparatively basic. Alpha Bank ATMs have only basic features alongside cash withdrawal, such as displaying account and loan information.

Figure 6.2 Overview of ATM locations in Greece

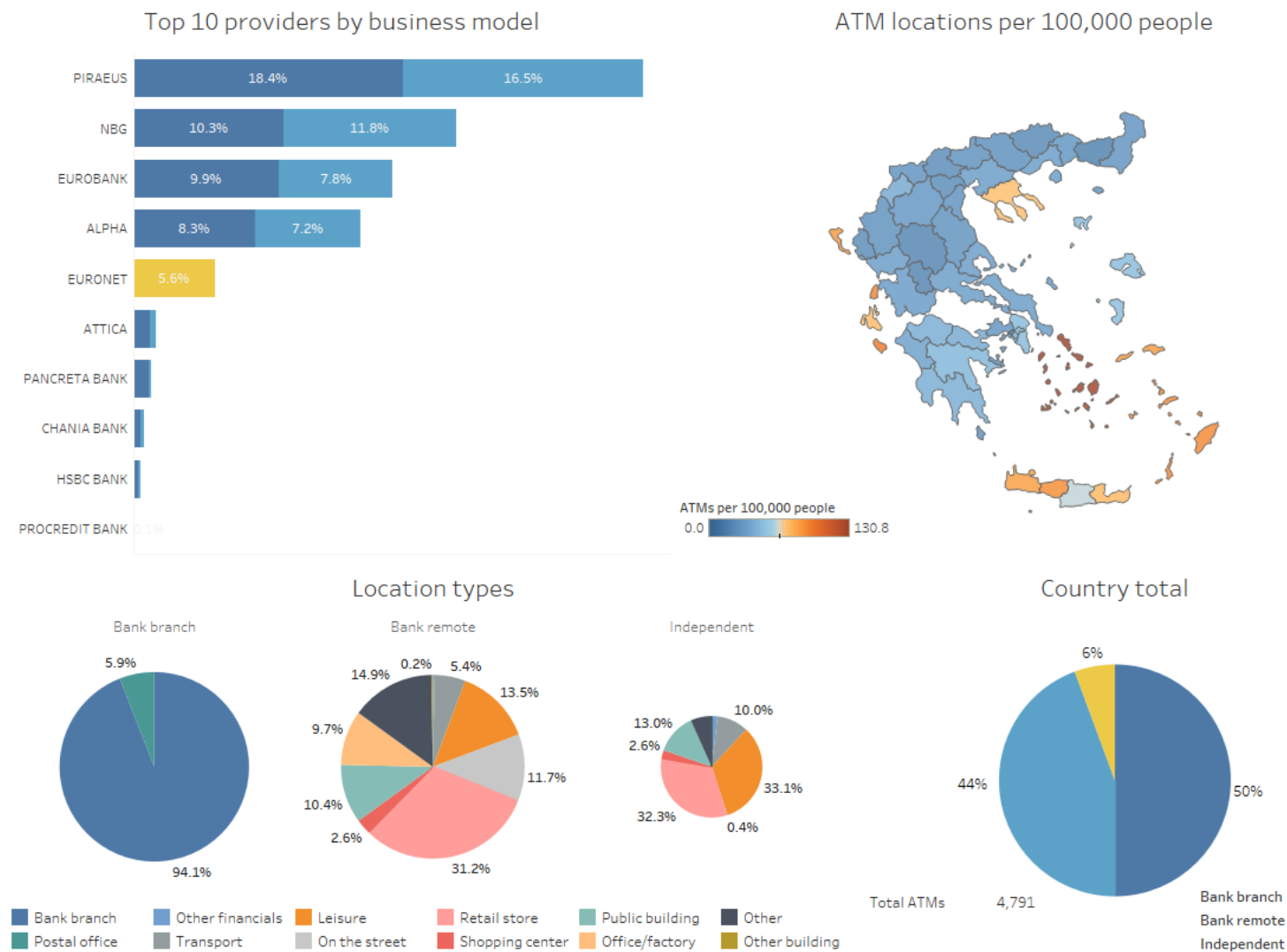
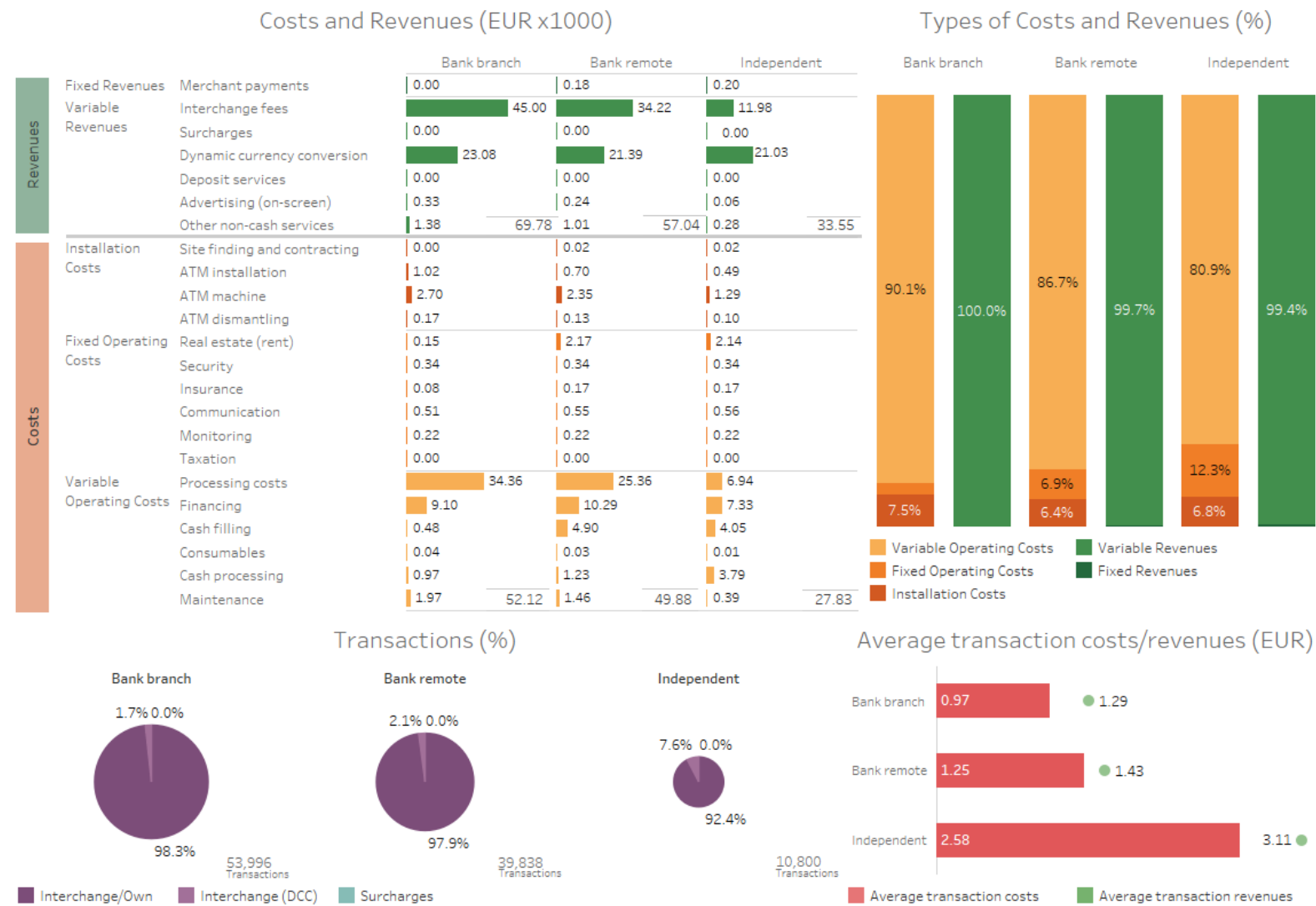


Figure 6.3 Annual costs and revenues by business model in Greece



6.3 Costs and Revenues

Typically, banks levy no surcharge for using an ATM for cash withdrawal. However, ATM transactions on the DIAS network are usually subject to a disloyalty fee when the card issuer and ATM provider are different banks. For example, NBG charges €2 for a withdrawal from another bank's ATM within Greece.⁷

6.3.1 Transactions

The average bank branch ATM in Greece processes 53,996 transactions per year. Of these, 98.3% are interchange or transactions for own customers, while 1.7% are interchange transactions also earning DCC fees. The average bank remote ATM processes slightly fewer transactions per year, but more of these are DCC. The total for the average bank remote ATM is 39,838 transactions, of which 97.9% are interchange or own customer transactions, and 2.1% are DCC. The average independent ATM handles fewer total transactions at 10,800 transactions per year. Of these, 92.4% are interchange transactions, while 7.6% are DCC. The difference in transactions between bank branch and bank remote ATMs is largely due to relatively fewer TTW and more lobby ATMs, which are more likely to be found by customers. The main difference in transactions between bank remote and independent ATMs is due to disloyalty fees, which substantially reduce the number of domestic transactions.

6.3.2 Revenues

Revenue for all Greek ATMs is driven by interchange fees and DCC. To a very small extent, other non-cash services offered at ATMs contribute to revenue.

Bank branch ATMs generate the most revenue, largely owing to more interchange transactions. Compared to bank branch ATMs, bank remote ATMs accrue less revenue from both interchange fees and DCC. While independent ATMs derive a similar amount of DCC revenue as bank remote ATMs, they obtain much less revenue from interchange fees. In total, bank branch ATMs generate on average per year €69,780, bank remote ATMs €57,040, and independent ATMs €33,550.

Each ATM business model is profitable in Greece. This can be attributed in large part to the particular prevalence of international card holders, which leads to high DCC revenues. DCC transactions account for between 1.7% and 7.6% of transactions on average, but are responsible for between 33% and 63% of revenues, more than in any of the other selected countries.

⁷ Recently some of the banks and independents have started levying surcharges for international card holders. This has not been anticipated in the estimations.

6.3.3 Costs

Installation costs mostly depend on the type of machine. Since bank branch ATMs are relatively frequently TTW, rather than cheaper lobby machines, this is reflected in higher installation costs for bank branch than bank remote and independent ATMs. The real estate costs for Greek ATMs are among the lowest of the selected countries. In fact, rental prices are only lower in Poland.

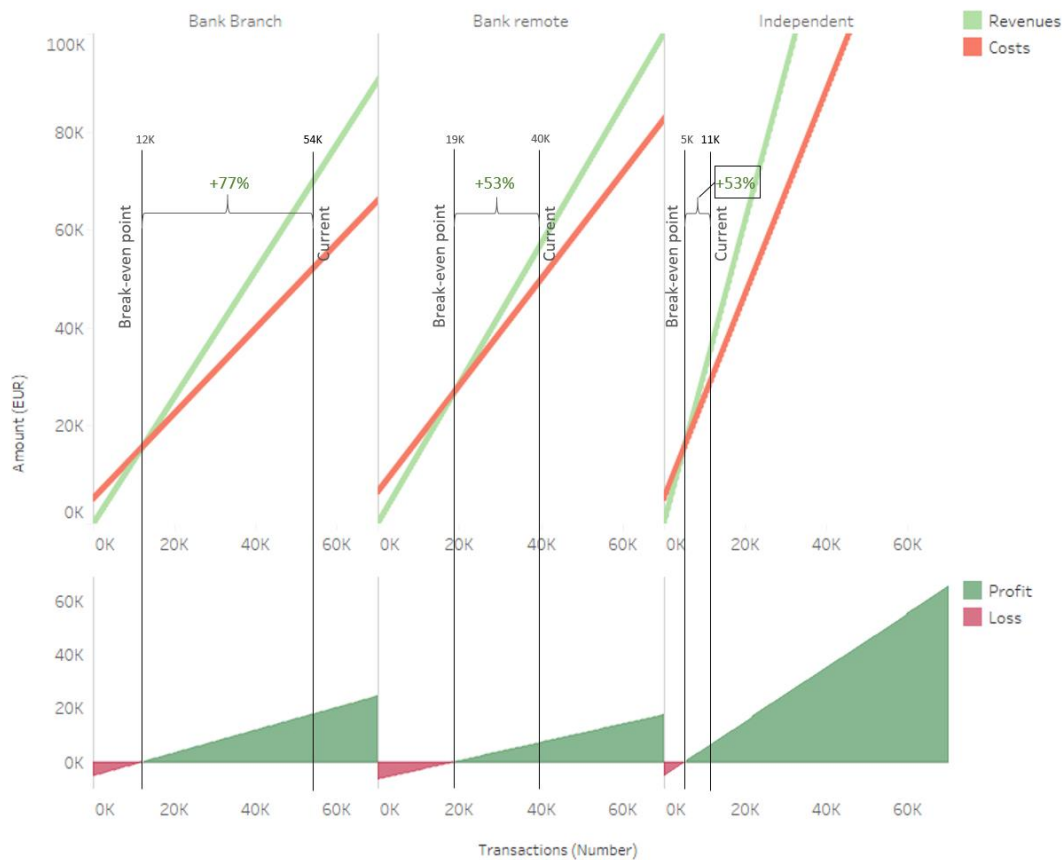
A few differences are visible in the variable operating costs. Compared with bank remote ATMs, bank branch ATMs have slightly higher processing costs, owing to higher total transactions, and significantly lower cash filling costs. Per transaction, bank branch ATMs are less expensive than bank remote and independent ATMs in terms of financing costs. Additionally, cash processing for independent ATMs is a much larger cost for independents relying on external sources, than for bank branch and remote ATMs. Overall annual costs are €52,120 for bank branch ATMs, €49,880 for bank remote ATMs, and €27,830 for independent ATMs.

6.4 Sensitivity and trends

Of the selected countries, Greece is the most reliant on cash and ATM withdrawals. The share of cash transactions at points of sale is 88% by number of transactions – the highest in the euro area – and 75% by value of transactions. Cash is a significant payment instrument even for recurrent payments such as rent and utility bills. Unlike every other euro area country, it is not uncommon in Greece to receive income in cash. Moreover, Greece has the lowest perceived card acceptance in the euro area (ECB, 2017).

In spite of its significant reliance on cash, Greece has a very low number of ATMs per capita compared to the euro area and EU average, and higher only than Sweden and Belgium among selected countries. In part, this is due to the trend of bank consolidation and restructuring associated with the financial crisis, and the closure of approximately half of bank branches between 2008 and 2017 (ECB, 2018). However, given that many ATMs at closed bank branches have been replaced by bank remote ATMs, an additional 6,500 transactions annually are required to pass the break-even point.

Figure 6.4 Costs and revenues by number of transactions in Greece



Overall, Greek ATMs do not presently appear particularly sensitive to changes in total transactions. Bank branch ATMs would only drop below the break-even point with a 77% reduction in total transactions. Bank remote and independent ATMs would continue to break even with a 53% reduction in total transactions.

However, Greek ATMs are highly sensitive to any changes in DCC. If DCC were to be capped at a certain fixed amount or percentage, Greek ATMs would become loss-making (see Box on DCC, page 71).

7. POLAND

Poland's ATM market is different from that in the other selected countries. Around 52% of ATMs in Poland are independent – by far the largest proportion of the ATM market in any of the selected countries. These independent ATMs and bank ATMs participate in a broad market with many participants and no single interbank network (e.g. CB in France and SIBS in Portugal). Independent ATM providers also have a tradition of partnering with banks, e.g. waiving disloyalty fees and operating ATMs in bank branches. The cooperation and competition between banks and independents has created an ATM market unique among the selected countries.

7.1 Business models

Poland's retail banking sector is composed of commercial banks, co-operative banks and credit unions, with a significant level of activity involving foreign banks. Bank BPS, SGB Bank and SKOK are the main associations of co-operative banks and credit unions. The banks providing most ATMs are Bank Polski (11.7% of the total), Bank BPS (10.8%), and Bank Pekao (6.5%).

The Polish ATM market is differentiated by a tradition of independents visibly operating bank ATMs. The largest providers are both independent: Euronet, with 38.9% of all ATMs,⁸ and Planet Cash, with 11.9%. Both are also pooling schemes in Poland; a number of smaller banks have sold their ATM fleets to the independents (RBR, 2018b), which now operate ATMs for the banks under their own brand. In other words, Polish Euronet and Planet Cash ATMs in bank branches are branded as such, whereas in other countries some of the ATMs in bank branches are operated by independents under the brand of the bank running the bank branch.

In Poland there is no branded interbank network (such as Girocard in Germany or CB in France) that connects the majority of banks and ATMs in Poland. Most financial institutions participate in unnamed sharing agreements with other ATM providers, indicated on the websites of the providers.

7.2 Locations and characteristics

Based on their location, the great majority of ATMs target the domestic population, including independent ATMs, which in most other markets are more oriented to international travellers.

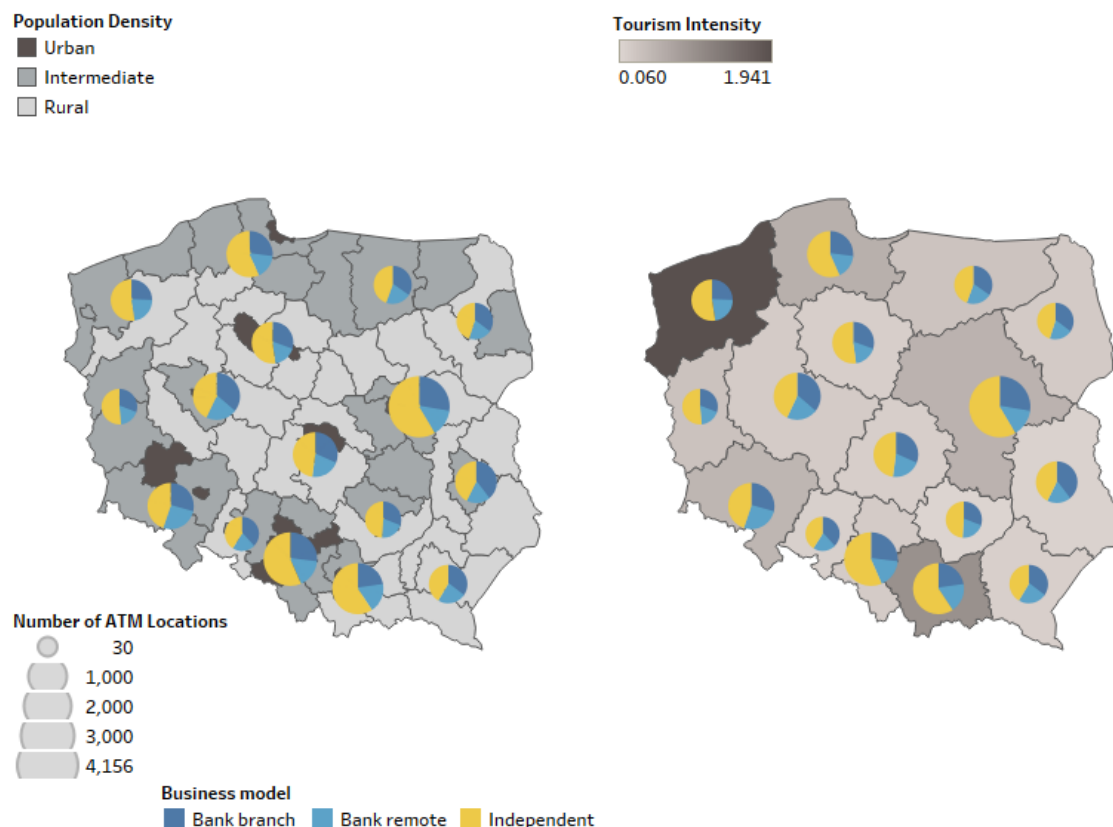
Independents provide most ATMs in Poland (52%). The great majority of these ATMs are located in retail stores (57% of independent ATMs) such as supermarkets. Moreover, a

⁸ The market share of Euronet is likely to increase at the moment that the recently announced acquisition and outsourcing deal with SKOK24 (3.1%) is completed.

substantial share of independent ATMs are located in bank branches (21%). These independent ATMs are only targeting tourists to a very limited extent. This can be seen in popular tourist destinations such as around Warsaw, Krakow and Malbork. Unlike in other selected countries, this is not exclusively the case, as independent ATMs operate essentially everywhere in Poland.

Turning to the banks, they provide less than half of the ATMs in Poland (48%). The majority of bank ATMs are located at bank branches (30%). At both types of locations, the banks usually provide one ATM machine. The majority of ATMs at bank branches are TTW installations accessible from the street 24 hours per day. Lobby installations accessible at any time by swiping a card are the second most common branch locations, with a minority installed in the hall and only accessible during business hours. Bank remote locations are most likely to be in retail stores (38.1%), shopping centres (11.3%), or on the street (8%). Some banks, such as Bank Pekao, Bank Zachodni WBK (subsidiary of Banco Santander) and SKOK24 operate roughly the same number of bank branch and remote ATMs. Others, like Bank BPS and SGB, operate the majority of their ATMs at bank branches.

Figure 7.1 Distribution of ATMs across business models in Poland



Most ATMs in Poland offer at least a few additional features in addition to cash withdrawal. All offer PIN change, and the majority allow cell phone top-ups. Many Planet Cash and Euronet ATMs offer advanced functionality in addition to basic cash withdrawal and balance enquiry. A few examples include bill payment, cell phone top-ups, cash deposit automation, cash recycling, as well as biometric finger readings for operations without presenting a card.

Figure 7.2 Overview of ATM locations in Poland

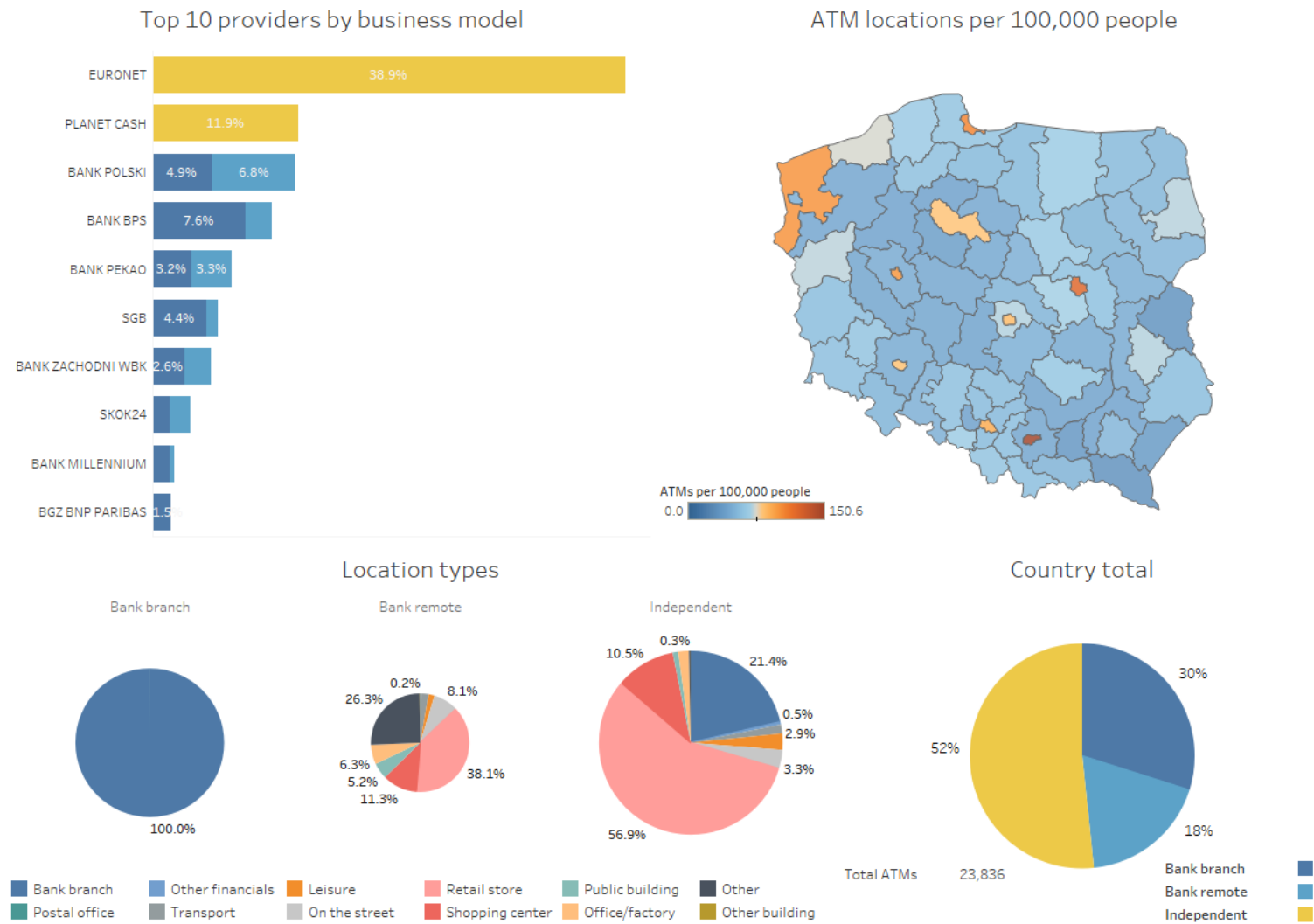
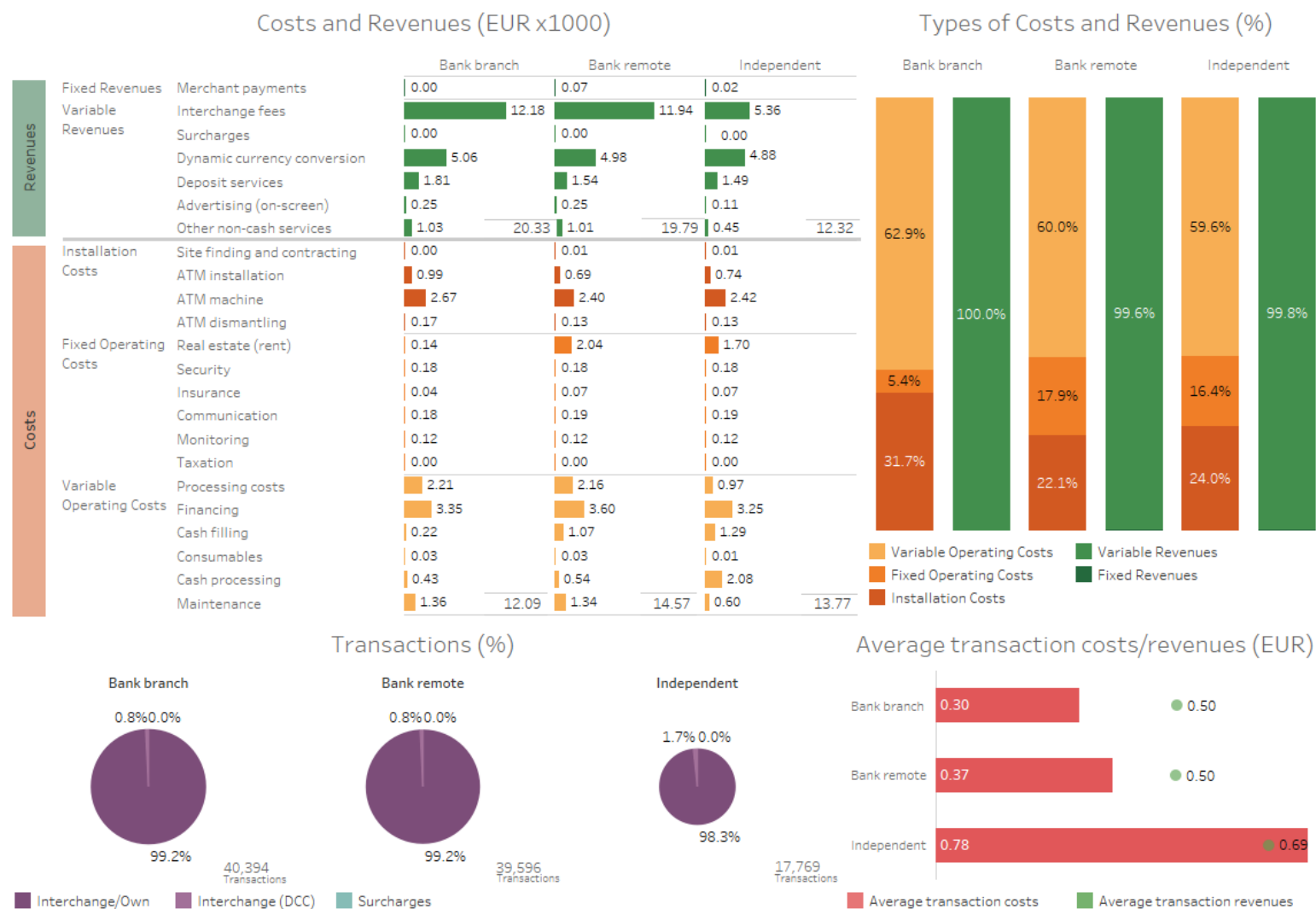


Figure 7.3 Annual costs and revenues by business model in Poland



7.3 Costs and Revenues

Most banks in Poland charge a disloyalty fee to their customers when they withdraw cash at a bank with whom they do not have an arrangement. Bank Millennium, for example, charges nothing for withdrawal from its own ATMs, 1 PLN for BZ WBK and Planet Cash ATMs in Poland, and 5 PLN for other ATMs in Poland (Bank Millennium, 2018). With the low number of international travellers, DCC transactions are fairly insignificant except within a few urban areas and transport locations. ATM providers primarily rely on interchange revenues.

7.3.1 Transactions

The average bank branch ATM processes 40,394 transactions per year, of which all transactions are either interchange or own customer, including 0.8% of DCC transactions. The average bank remote ATM handles slightly fewer transactions, 39,596 per year. A more or less similar share of transactions is subject to DCC fees. For independent ATMs, the total number of transactions is much lower at 17,769, of which around 1.7% are DCC transactions. The lower number of transactions is primarily due to the disloyalty fees, which affect the independents more than other providers.

7.3.2 Revenues

Revenues for all types of ATMs primarily come from interchange fees and to a lesser extent from DCC. Compared to other selected countries, deposit services and other non-cash services represent a larger proportion of revenue for all ATM types in Poland. Bank branch and remote ATMs generate fairly similar revenues, as they garner nearly the same amount of interchange and DCC revenues, alongside the highest revenue from interchange fees. Overall revenue is €20,330 for bank branch ATMs, €19,790 for bank remote ATMs, and €12,320 for independent ATMs.

7.3.3 Costs

The overall costs for operating each type of ATM are the lowest among selected countries, with the exception of independent ATMs, which are the second lowest.

The installation and fixed operating costs are not drastically different across all models, except for higher machine and installation costs for bank branch ATMs due to a higher TTW share, and higher real estate costs for bank remote and independent ATMs.

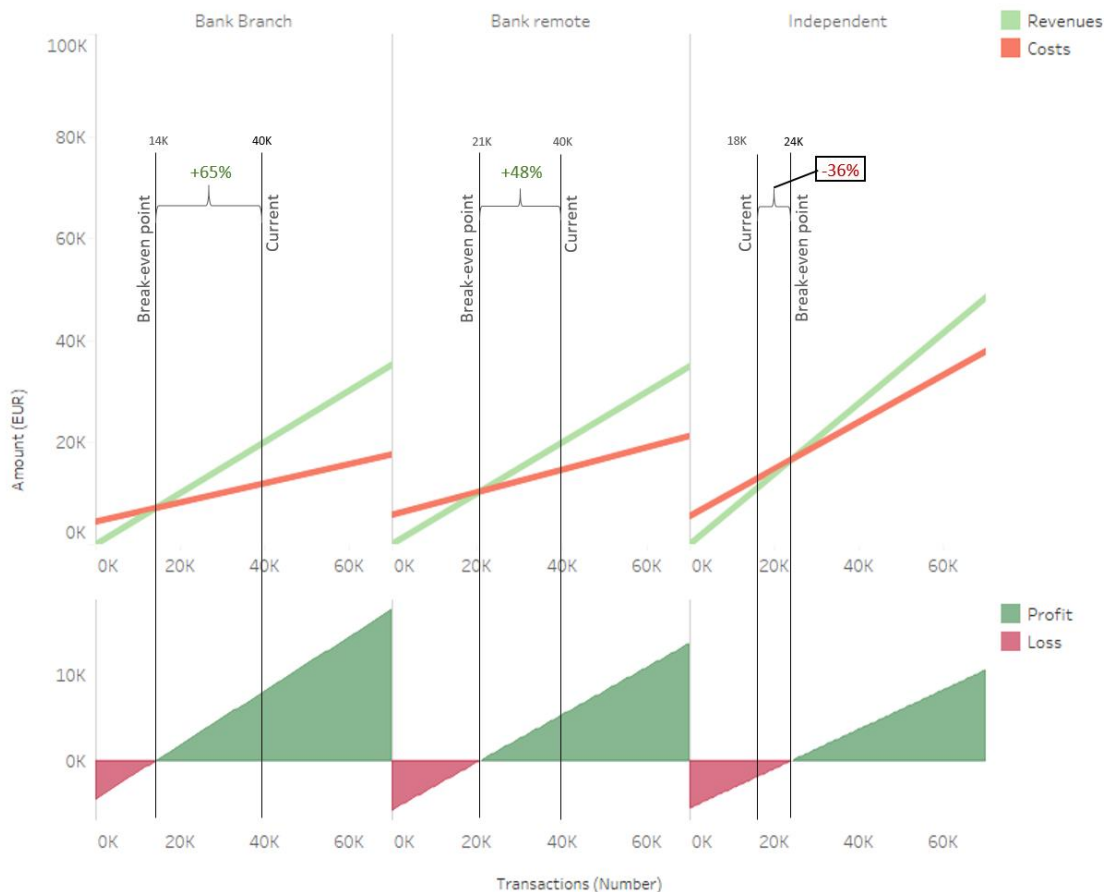
Slightly more differences are apparent in variable operating costs. Compared to bank branch and bank remote ATMs, independent ATMs have much higher cash processing costs. Overall, costs are €12,090 for bank branch ATMs, €14,570 for bank remote ATMs, and €13,770 for independent ATMs.

Because of the low operating costs, ATMs in Poland can be profitable even with fairly low revenue. However, the profit margin is narrow – particularly for independents, which lose an average of €0.09 per transaction.

7.4 Sensitivity and trends

In Poland there is still a relatively high cash usage, but this is declining. Cash is used for about 54% of all transactions by number of transactions, and 41% by value (Financial Observer, 2018). However, the share of cash transactions has fallen sharply in the past decade. This change is partially due to increased use of payment cards. Additionally, the National Bank of Poland (NBP) has taken steps to promote cashless payment channels.

Figure 7.4 Costs and revenues by number of transactions in Poland



Proportionally fewer bank branches have closed in Poland than other selected countries, roughly a 10% decline from 15,500 in 2013 to 14,000 in 2017. Not all of these branches have ATMs installed.

Bank branch and remote ATMs are not particularly sensitive to changes in overall transaction numbers, but independent ATMs are. Bank branch ATMs would break even with a 65% drop in total transactions, while bank remote ATMs would break even with a 48% reduction. However, independent ATMs currently operate at a loss; they would need an increase of 36% in total transactions to break even. This is especially noteworthy as over half of ATMs in Poland are operated by independents. Because these machines operate at a loss, the independent ATMs are potentially at risk. Nevertheless, so long as the compensation for outsourced ATMs and network participation fees the independents receive outweigh the operational loss, they are likely to continue operating a substantial ATM network.

Polish independent ATMs are sensitive to changes in DCC. Although very few transactions involve DCC – 1.7% of independent ATM transactions, these generate 40% of revenues. As independent ATMs already operate at a loss, limits on DCC revenue would result in greater losses. On the other hand, both bank branch and bank remote ATMs are well past the break-even point even in the absence of DCC revenues.

A noteworthy trend in Poland is the growth of the Blik mobile payments solution. This cell phone service allows transactions at ATMs or points of sale, in some cases cash withdrawals without fees. Lastly, in rural areas where there may not be enough ATMs to meet demand, cash back at points of sale are sometimes an option. These do not seem to be particularly common at present, but if too few ATMs are available to meet demand, cash back could become a more significant alternative.

8. PORTUGAL

Portugal has the highest number of ATM locations per capita of the selected countries (89 per 100,000 people). ATM machines tend to have very advanced features compared to the rest of Europe. Portugal is also marked by high cash usage. In particular these non-cash transactions and DCC fees form important sources of revenues to offset the relative low revenues from interchange fees.

8.1 Business models

Portugal's retail banking market is composed of commercial banks, co-operative banks, and foreign banks. The largest commercial banks include the Millennium BCP, CGD, Grupo BPI, and Novo Banco. Of the foreign banks active in Portugal, Spanish owned Banco Santander Totta has an especially high market share.

The Portuguese retail banking sector was significantly affected by the financial crisis. This resulted in the Portuguese government bailing out major banks, as well as numerous mergers and restructurings of major banks. Currently, the largest providers of ATMs are Banco Santander Totta (with 16.1% of the total), CGD (15.2%), Millennium BCP (13.9%) and Credito Agricola (14.6%). Euronet and ATM Express (SIBS) are the only independent operators in Portugal, operating about 6.5% of total ATM locations.

Multibanco is the national interbank network that links the majority of banks and ATMs in Portugal. Multibanco is a subsidiary of SIBS, a utility provider offering services to ATM and point of sale networks (SIBS, 2018).

8.2 Locations and characteristics

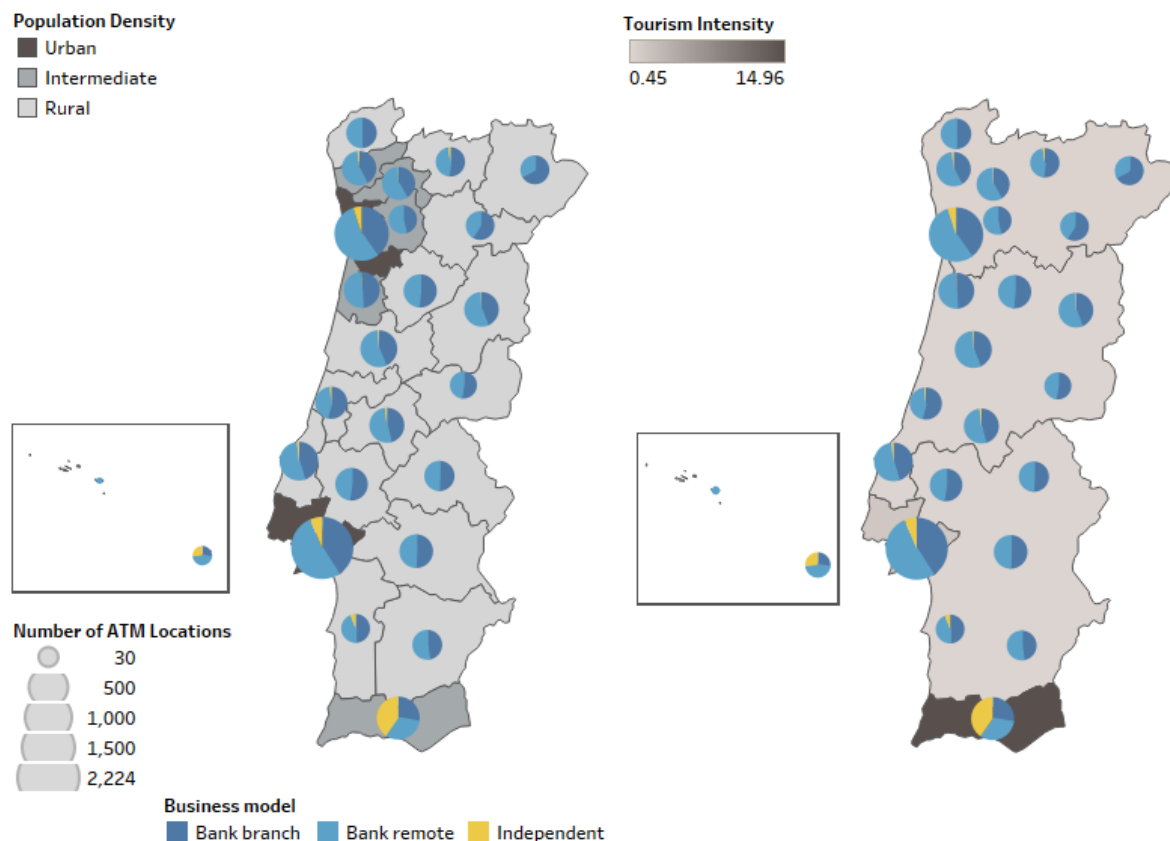
Based on their location, the great majority of ATMs target the domestic population, with the exception of independent ATMs that are more often geared towards international travellers.

The majority of ATMs in Portugal (50%) are bank remote. The largest banks by ATM deployment (Banco Santander, CGD, Credito Agricola, Millennium BCP and BPI), all deploy more ATMs remotely than in branches. Remote ATMs are found in a variety of locations, the most frequent being retail stores (38.5% of remote ATMs), followed by public buildings (16.1%) and offices/factories (16.1%), shopping centres (11.6%), and hospitality and leisure locations (8.6%).

Bank branches account for 43% of ATM locations in Portugal. Bank branch ATMs are mostly located in the lobby, accessible 24 hours per day with a card swipe. A sizable proportion are also TTW installations accessible from the street. A small minority among the bank branch ATMs

involves post offices (3.0%), as the national postal service Banco CTT was privatised as part of Portugal's bailout terms, and subsequently started offering banking services. However, only those of its offices that offer banking services have an ATM. Bank branches often have more than one ATM machine.

Figure 8.1 Distribution of ATMs across business models in Portugal



Independent ATMs are very concentrated in urban and tourist areas in Portugal. A significant number of independent ATMs are located in Porto and Lisbon, but the highest proportion is located in the Madeira Islands and Algarve southern coastal region, corresponding to the highest tourism intensity. The locations of independent ATMs are quite diverse, with many in retail stores (26.7%); hospitality and leisure locations (25.3%); transport locations such as airports, bus and train stations (15.9%); and offices and factories (10%).

ATMs in Portugal are among the most advanced in Europe, providing many functions besides cash withdrawal (Sabater and Delgado, 2017). For Multibanco ATMs on the SIBS network, relatively standard functionality like cell phone top-ups, cash or check deposits, and account transfers are common. Many Multibanco ATMs also offer novel functions such as purchase of transport or cinema tickets, tax payment, and services such as issue of hunting and fishing licenses.

Figure 8.2 Overview of ATM locations in Portugal

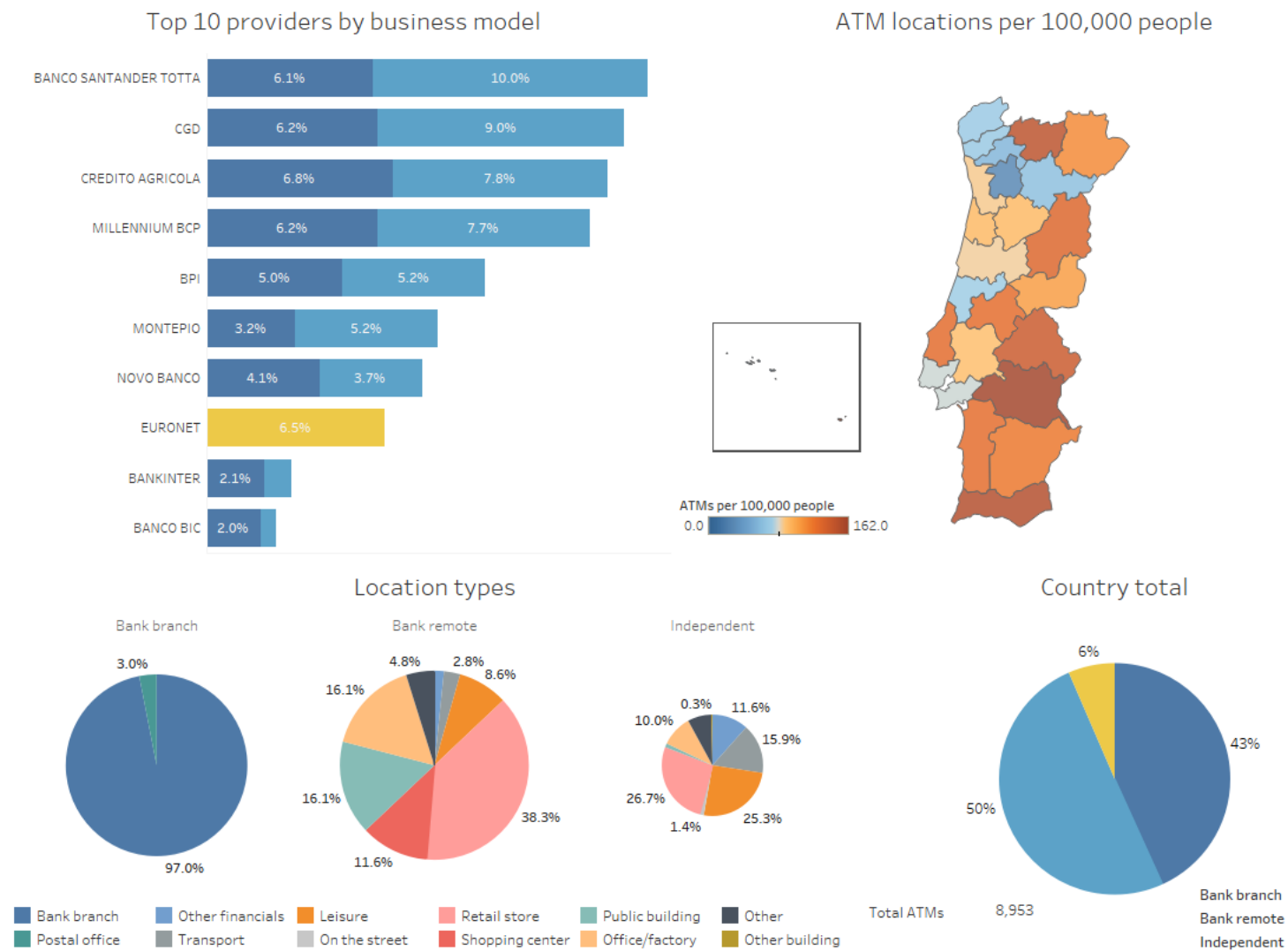
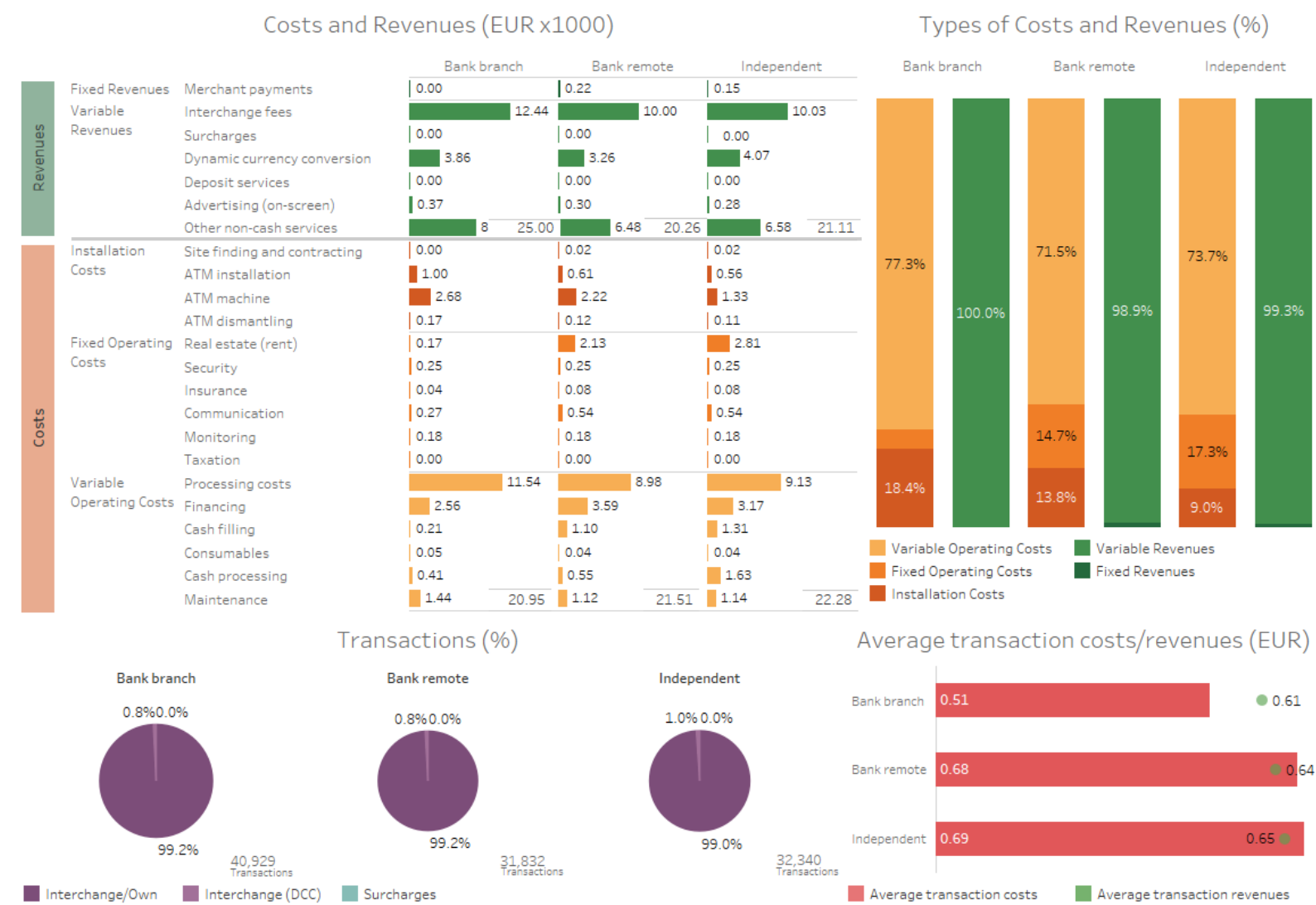


Figure 8.3 Annual costs and revenues by business model in Portugal



8.3 Costs and Revenues

The ATMs in Portugal receive relatively low interchange fees, which is somewhat compensated by the revenues from non-cash services and DCC transactions. All Multibanco withdrawals and payments in Portugal are free of charge to the consumer.

8.3.1 Transactions

The average bank branch ATM processes 40,929 transactions per year. Of these, all transactions are interchange or own customer and 0.8% are DCC. The average bank remote ATM handles an average of 31,832 transactions per year, and as for bank branch ATMs all these transactions are interchange or own customer with approximately 0.8% also DCC. Independent ATMs process an average of 32,340 transactions per year, all interchange and 1.0% also DCC.

8.3.2 Revenues

Interchange fees form the main revenues for all business models in Portugal. To a lesser extent, DCC and other non-cash services also form an important source of revenue for ATMs in Portugal. Bank branch ATMs generate the most revenue at €25,000 annually, while bank remote ATMs generate €20,260. The difference is due to a higher number of transactions for bank branch ATMs, which generate more interchange revenues. DCC revenues are similar for both bank branch and bank remote ATMs. Independent ATMs generate revenues similar to bank ATMs, approximately €21,110 annually.

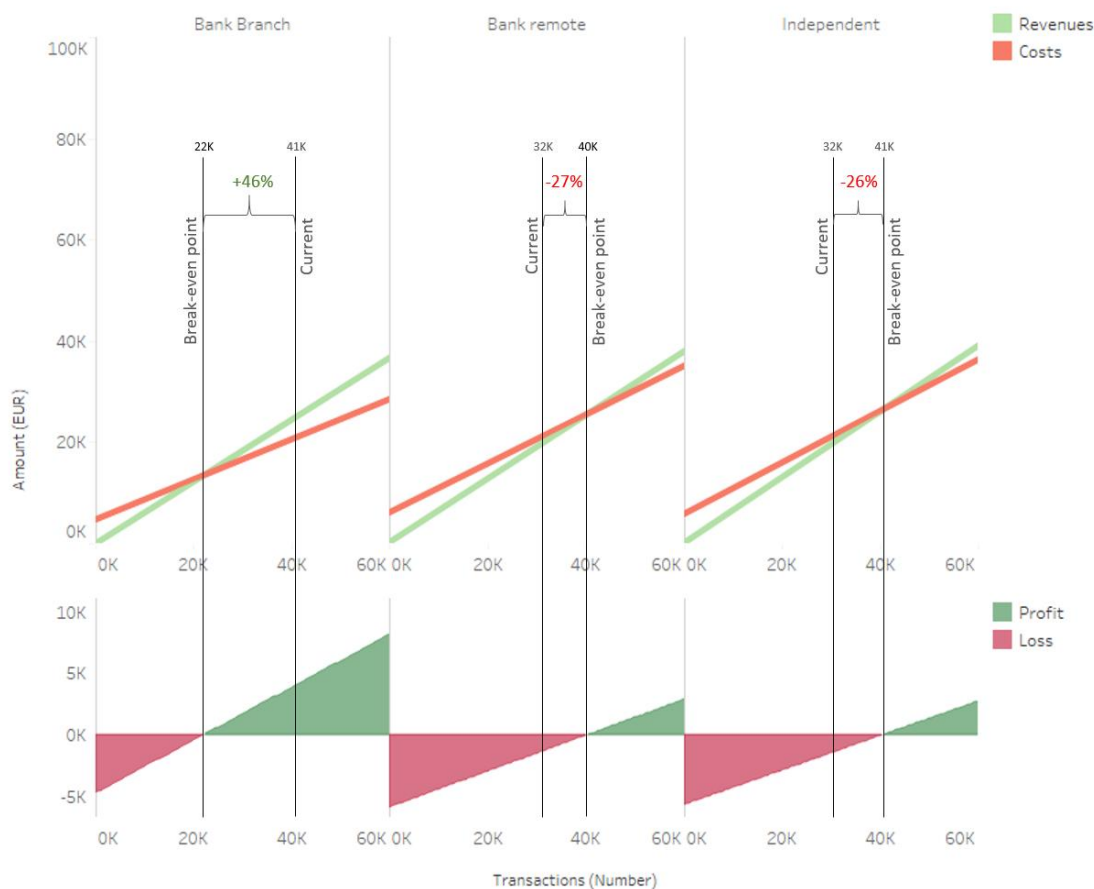
8.3.3 Costs

The installation costs and fixed operating costs in Portugal are similar to those in most other selected countries. ATM installation and machine costs are highest for bank branch ATMs, while real estate is highest for bank remote and independent ATMs. In variable operating costs, the three business models are quite similar to one another. This results in average transactions costs that are fairly similar for both bank remote and independent ATMs. In total, the annual costs of bank branch ATMs are €20,950, €21,510 for bank remote ATMs and €22,280 for independent ATMs.

8.4 Sensitivity and trends

Portugal relies significantly on cash and is not trending rapidly towards other payment methods. The share of cash transactions is 81% by number of transactions, and 52% by value of transactions. While cash is mostly for very small purchases under €9, it is also the most used means of payment generally. In Portugal, cash is withdrawn very frequently at 0.9 times per person per week, almost twice the EU average. The average withdrawal value of €70 is among the lowest in the EU. Portugal's perceived card acceptance is around 69% – just below the euro area average (ECB, 2017). Thus, Portugal is a society that relies heavily on cash and frequent visits to ATMs. Portuguese citizens may also be more risk averse towards online banking, and thus prefer traditional payment methods (Fonseca, 2014).

Figure 8.4 Costs and revenues by number of transactions in Portugal



Around 27% of bank branches closed between 2010 and 2017 (ECB, 2018), contributing to a decline in bank branch ATMs and increasing the number of remote ATMs. This is unlikely to cause any particular strain for Portuguese banks, as bank branch and remote ATMs have approximately the same break-even point.

ATMs in Portugal are highly sensitive to changes in overall numbers of transactions. Bank branch ATMs would fall below the break-even point with a 46% drop in total transactions. Thus, a significant reduction in total transactions could cause bank branch ATMs to have higher costs than revenues, and may lead banks to remove some from the market. Based on the estimations, bank remote and independent ATMs are already operating at a loss. They would require a quarter more transactions to break even. This might lead to the dismantling of some of the remote ATMs or a shift to ATMs that are cheaper to operate (e.g. merchant refill ATMs).

Bank remote and independent ATMs are more sensitive to changes in DCC. Indeed, DCC accounts for 0.8% of bank remote transactions and 16% of revenues, and similarly 1.0% of transactions and 19% of revenues for independents. At current levels of transactions, a moderate DCC cap at a percentage of transaction would increase the losses of bank remote and independent ATMs. With a high fixed maximum DCC charge, bank remote and independent ATMs would still break even (see Box on DCC, page 71).

9. SPAIN

The Spanish ATM market is distinguished by several factors. First, cash transactions are still quite common, but mostly for small transactions. Second, tourism is a major economic force, particularly in coastal areas, islands, and the major cities. Third, together with Germany, Spain is the only selected country where surcharges on domestic transactions are common.

9.1 Business models

The Spanish retail banking sector is comprised of commercial banks, savings banks (cajas de ahorros), and co-operatives (cajas rurales, populares y profesionales). Spain's banking sector struggled during the 2008 financial crisis. For the most part however, Spanish banks have successfully rebounded. In the restructuring resulting from the crisis, most savings banks and many co-operatives converted to commercial banks. In the dataset, the banks operating the most ATMs are Santander (16.7% of total ATM locations), La Caixa (15.8%), BBVA (10.1%), Banco Cooperativo (8.1%) and Banco Sabadell (7.0%).

Several independent ATM providers are active in Spain. The largest is Euronet with around 5% of the total ATM locations. Carrefour, Cashzone, and Money Exchange are also active, but with much fewer ATMs.

Previously the Spanish ATM market contained three card schemes: ServiRed, Euro 6000 and Telebanco 4B. All ATM providers were members of at least one of these. However, these card schemes merged in June 2018 after approval from the Spanish National Competition Authority (CNMC) (El Economista, 2018; CNMC, 2018). The CNMC stated that the effect of the merger will be more alternatives in card products for payment service providers and end users.

9.2 Locations and characteristics

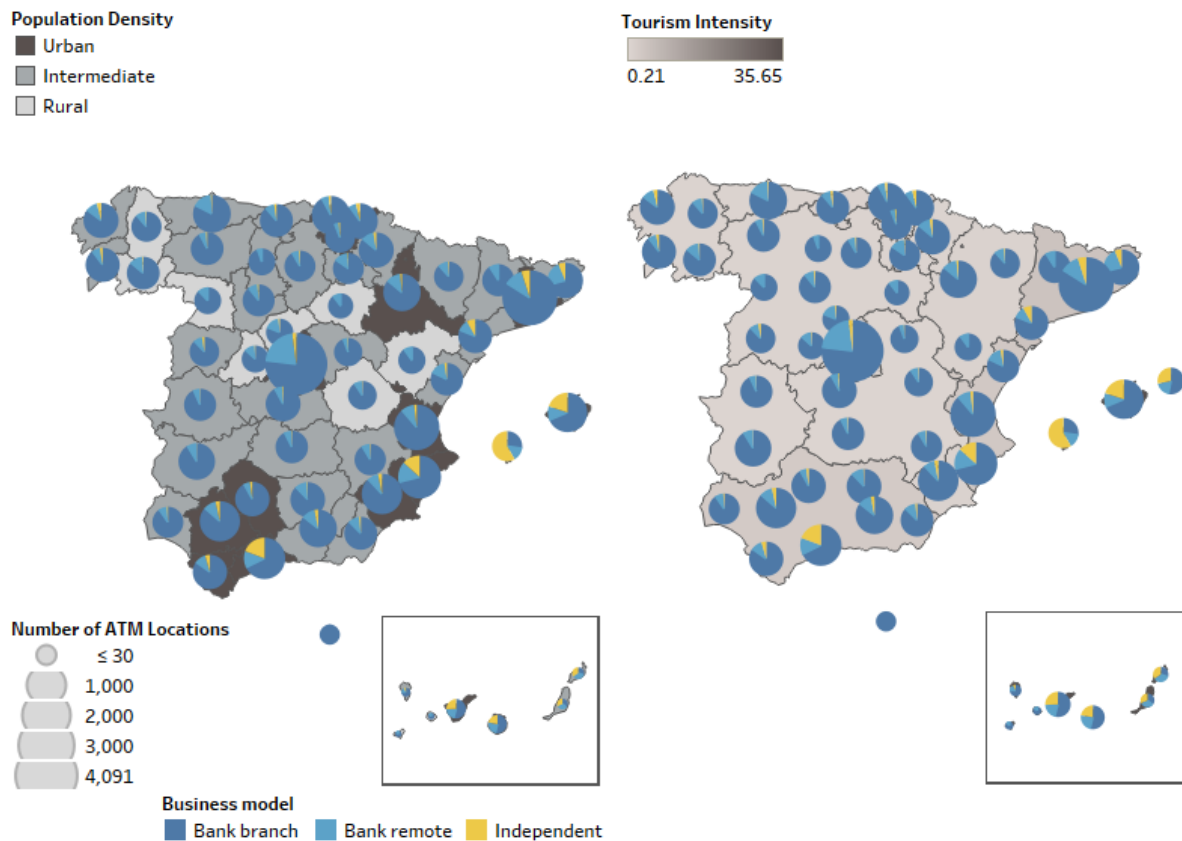
Based on their location, the great majority of ATMs target the domestic population, with the exception of independent ATMs that primarily target international travellers.

The majority of Spanish ATMs (around 83%) are located at bank branches. These are most often in the lobby, accessible 24 hours per day with a card swipe. TTW installations accessible from the street are also common, while there are very few ATMs installed in the hall and only accessible during business hours. Most of the bank branches have more than one ATM machine per location. Remote ATMs operated by banks form the second largest group with around 11% of ATM locations. These are mostly on the street (61.8%) and shopping centres (16.0%).

Independent ATMs are quite active in the southern coastal areas of the mainland with more tourist traffic, particularly Andalusia, Murcia and near Barcelona in Catalonia. The highest

concentrations, however, are found in the Canary and Balearic Islands. Independent ATMs are mostly found in hospitality and leisure locations (31.7%), retail stores (31.3%), shopping centres (20.1%), and on the street (1.9%). Rural and intermediate regions have very few independent ATMs.

Figure 9.1 Distribution of ATMs across business models in Spain



Spanish ATMs have very advanced features in some cases. In particular, the new “Punt Groc” fleet of La Caixa has sophisticated functionality such as contactless readers for cards, cell phones and wearable devices. Additional features include cash deposit functionality relying on banknote recognition and immediate clearing. The interface displayed at La Caixa is customisable for individual cardholders to provide quicker access to frequently performed operations, and provides advanced accessibility options for the elderly and disabled.

Figure 9.2 Overview of ATM locations in Spain

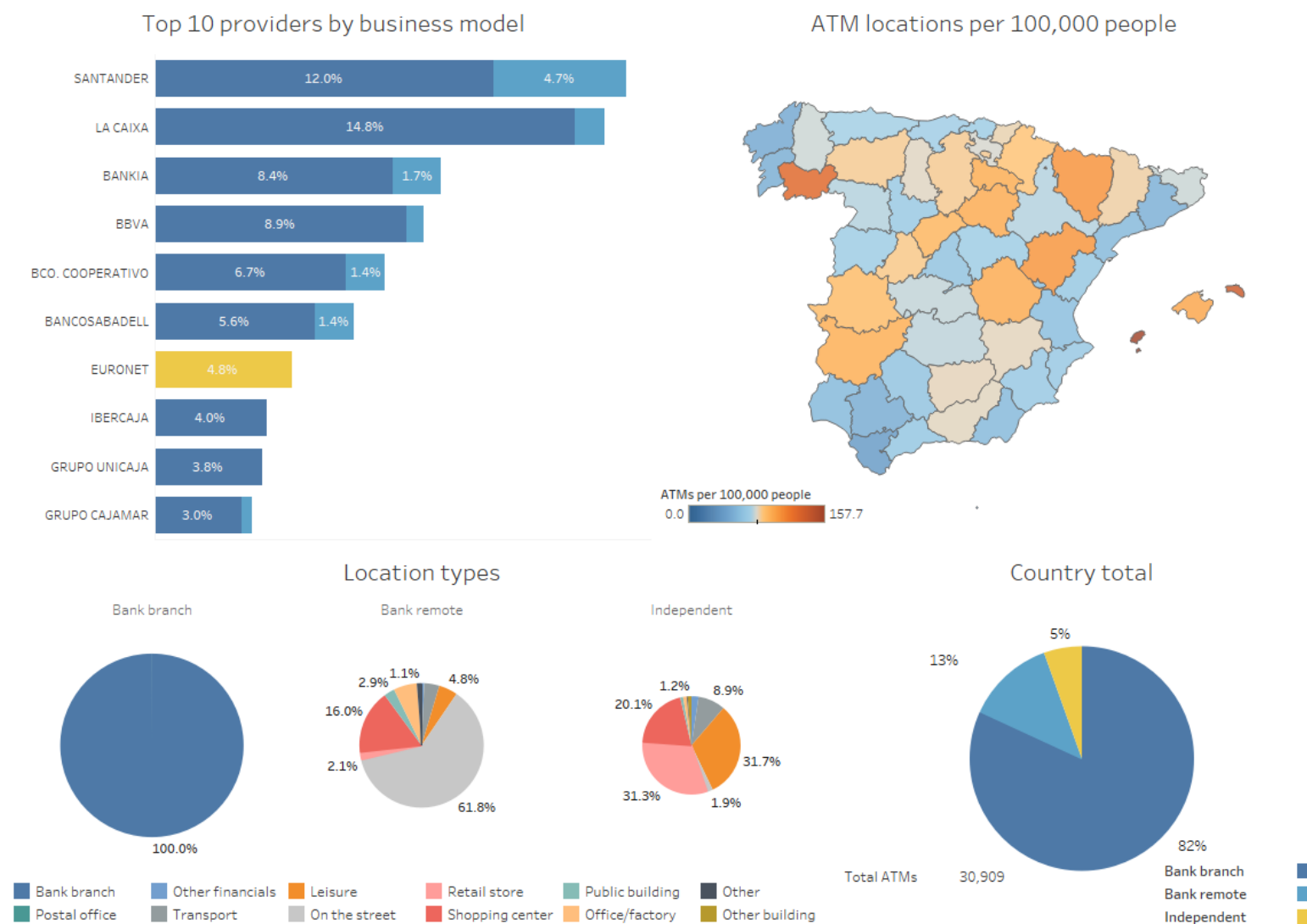
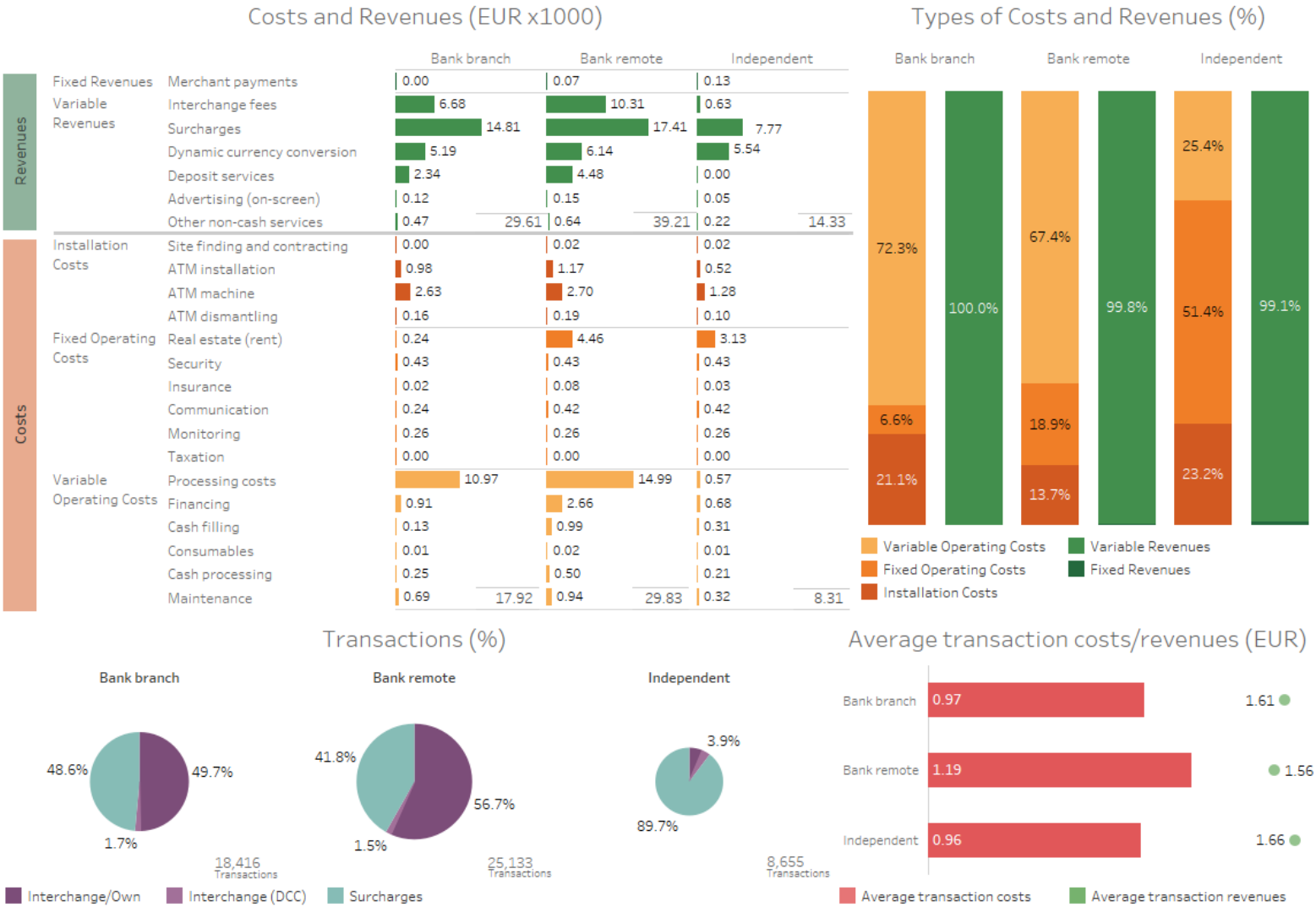


Figure 9.3 Annual costs and revenues by business model in Spain



9.3 Costs and Revenues

Generally, surcharge fees are the largest source of revenues for ATMs in Spain. For the most part, Spanish card holders have to pay a surcharge fee when withdrawing from an ATM other than one provided by their own bank or banks with whom the bank has an agreement. Moreover, Spanish banks were among the first to adopt DCC, which is generating a significant share of the revenues for all business models.

9.3.1 Transactions

The average bank branch ATM processes a very low number of transactions per year at 18,416 per ATM per year. Of these, about half are subject to surcharges (48.6%), while the other half are interchange or own customer transactions, including 1.7% of DCC transactions. The low number of transactions is a result of consumers avoiding ATMs with direct fees (i.e. surcharges). The average bank remote ATM handles more transactions at 25,133 per year, of which the majority are interchange or own customer transactions. Within the 58.2% represented by interchange transactions, 1.5% are DCC. Independent ATMs handle the fewest transactions per year, averaging 8,655. Only international transactions are subject to interchange fees, while 89.7% involve surcharges, and the remaining 3.9% are DCC.

9.3.2 Revenues

Surcharging is a defining feature of Spanish ATM pricing. In the past, the ATM provider charged the card-issuing bank a fee within a network (such as Servired or Euro 6000). The network then charged its customers a commission for this service, or assumed the cost itself. This model was changed in 2016 by Circular 3/2016 of the Bank of Spain (Bank of Spain, 2016).⁹ Under the new regulation, membership of the same network for card issuers and ATM providers no longer guarantees equal terms of ATM usage. The card-issuing bank or ATM provider can reach agreement on the fee amount that must be paid, and in the absence of an agreement, the commission determined by the ATM provider is the same throughout Spain. Thus, there is typically no advantage to using an ATM belonging to the same network as a card issuer (Sabater and Delgado, 2017). Charges for consumers vary according to which bank operates the ATM; for example, Caixabank charges €2 per cash withdrawal, €1.85 for Banco Santander, and €0.50 for ING Direct. A recent trend is that a few Spanish banks are offering customers the same transaction rates at the ATMs of other banks as at their own (RBR, 2018b).¹⁰

Between 2014 and 2015, disloyalty fees applying to withdrawals from ATMs serviced by banks other than the card issuer, were a feature of Spanish ATMs as well. In 2015, Banco Santander announced its intention to join La Caixa and BBVA in adding a surcharge to the disloyalty fee charged by the card-issuing bank. FACUA-Consumers in Action (a consumer advocacy group) then filed a complaint with the Bank of Spain urging penalties for this “double charging”

⁹ See Bank of Spain Circular 3/2016, addressed to institutions owning ATMs and issuers of cards and payment instruments, on information on the commissions for cash withdrawals from ATMs.

¹⁰ This is not yet reflected in the estimations, since it is likely to have a limited effect on the estimation results.

practice (FACUA, 2015). Subsequently, the Royal Decree 11/2015 of October 2 banned the practice of charging both surcharges and disloyalty fees for ATM withdrawals (Bank of Spain, 2015).

Revenues in Spain primarily consist of surcharges, interchange fees and DCC. Surcharges generate nearly twice the revenue for bank branch and bank remote ATMs than independent ATMs, in spite of the higher number of transactions. Deposit services are a small revenue source for bank branch and bank remote ATMs, while other non-cash services and advertising are minor sources of revenue for all business models.

Overall, bank remote ATMs generate the most revenue at €39,210. Next, bank branch ATMs have an average revenue of €29,610, primarily due to many surcharge transactions. The lowest revenue is generated by independent ATMs at €14,330.

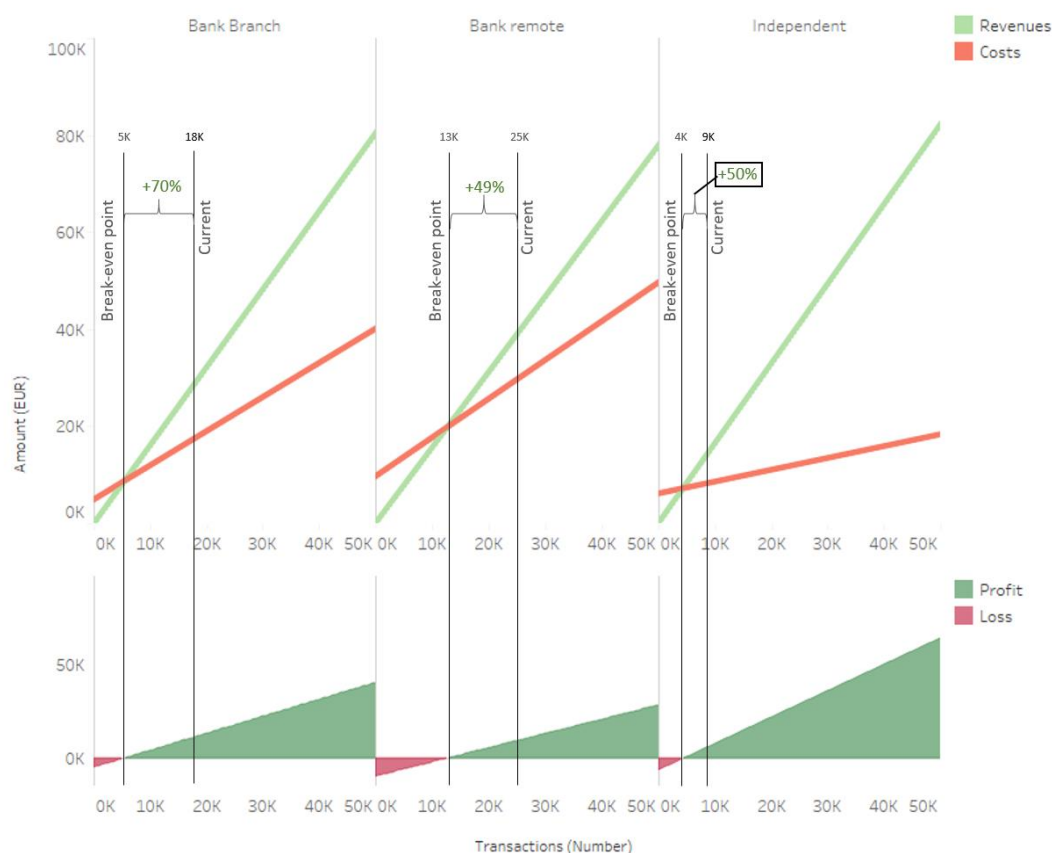
9.3.3 Costs

Installation costs in Spain are highest for remote ATMs, rather than being equivalent with those for independent ATMs as in most selected countries. This is due to the high proportion of on the street locations with TTW ATMs, which requires a more expensive machine and installation process. Fixed operating costs follow the pattern seen in all selected countries: bank branch ATMs have the lowest real estate costs, while bank remote and independent ATMs have the highest. In variable operating costs, the processing costs are highest for bank remote ATMs, followed by bank branch and independent ATMs.

9.4 Sensitivity and trends

Cash is used in Spain much more often than the euro area average. The share of cash transactions at points of sale is 87% by number of transactions, and 68% by value of transactions. The average number of cash withdrawals per person per week is around 1.3, just over the euro area average, with an average value of €44. Spain's perceived card acceptance is around 68% – just below the euro area average (ECB, 2017). Additionally, consumers in Spain are hesitant to change their spending habits and rely on electronic means of payment (Sabater and Delgado, 2017).

Figure 9.4 Costs and revenues by number of transactions in Spain



Fewer ATMs are available in Spain now, as around 40% of bank branches closed between 2008 and 2017 (ECB, 2018). This resulted in a disproportionately large reduction in the number of bank branch ATMs versus bank remote ATMs. However, this is unlikely to be a pressure on banks, as the break-even points for bank branch and bank remote ATMs are approximately the same.

Bank branch and independent ATMs are not particularly sensitive to changes in the total number of transactions. Bank branch ATMs could handle 70% fewer transactions and still surpass the break-even point. Similarly to other countries, bank remote ATMs require a higher number of transactions to cover operating costs – 5,500 versus 13,000 for bank branch ATMs. Still, bank remote ATMs could process 70% fewer transactions and still break even. Independent ATMs would also be unaffected by changes in the total number of transactions, largely because they process only surcharge or DCC transactions, which produce much more revenue than interchange. Independent ATMs could fall from around 50%, from 8,655 to 4,500 transactions annually, and still break even.

Spanish ATMs are not particularly sensitive to changes in DCC, as they generate much of their revenues from surcharges and interchange. Although proportionally, bank remote and independent ATMs handle many more DCC transactions, they generate enough variable revenue from other services to exceed the break-even point.

10. SWEDEN

Sweden is among the most cashless societies in the world. Both banks and consumers are using less cash than ever before. Accordingly, Sweden has the lowest number of ATMs of all the selected countries, both by absolute number and per capita. The ATM market is very concentrated due to low cash usage and pooling of the ATM networks of the largest banks. Still, several independents are active, with independent Kontanten having the largest share of ATMs.

10.1 Business models

The Swedish retail banking market is composed of commercial banks, savings banks, foreign banks, and two co-operatives (Kooparativa Förbundet and ICA Banken). The largest banks in Sweden are Swedbank Group, Handelsbanken, Skandinaviska Enskilda Banken (SEB) and Nordea. Swedbank Group contains the commercial bank Swedbank, as well as numerous savings banks. The largest foreign bank is Danske bank. Swedish retail banking is distinguished by the shift away from cash, and fewer than half of Swedish bank branches still handle cash. Other changes in Sweden's retail banking market have included trends such as the introduction of niche banks and the growing presence of foreign banks.

The Swedish ATM market is notable for its pooling agreement, which is common in narrow markets where customer demand for cash has significantly declined (RBR, 2018b). Bankomat AB, which is owned by Danske Bank, Handelsbanken, Nordea, SEB, Swedbank and Sparbankerna, took possession of most ATMs in Sweden beginning in January 2013 (Swedbank, 2013). At present, more than half of Swedish ATMs (56%) are branded as Bankomat.

Several independents are active in Sweden. Kontanten (part of Nokas Group) operates 22.7% of all Swedish ATMs in the dataset, and Autocash 3.5%. Re:cash and Teller Sweden have a few ATMs each.

10.2 Locations and characteristics

Based on their location, the great majority of ATMs target the domestic population, including those of independent ATM providers.

The largest share of ATMs in Sweden are bank remote (35%). All the bank remote ATMs are operated by Bankomat. Almost all these ATMs are located on the street (82.8%) or in shopping centres (15.7%).

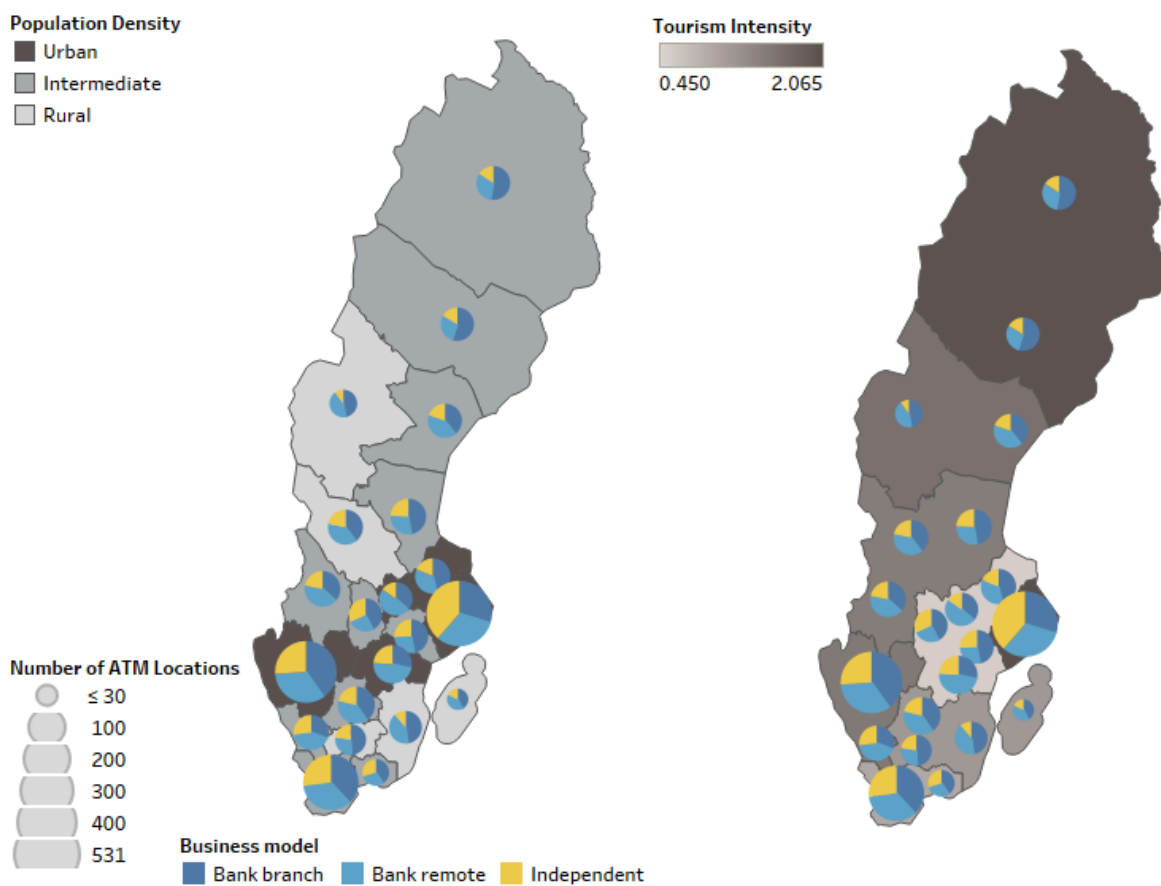
About 40% of bank branches in Sweden have an ATM. Almost half of these ATMs are located in the ICA supermarkets, while the other half of the bank branch ATMs are Bankomat in one of the branches of the largest banks in Sweden. Most bank branch ATMs are TTW installations

accessible 24 hours per day from the street. A smaller number in bank lobbies are accessible at any time with a card swipe.

Independents primarily operate ATMs in shopping centres (86.9%) or retail stores (13.1%), including gas stations. For example, Kontanten has contracts with a number of gas stations like Statoil. The highest concentrations of independent ATMs are in and around Stockholm and Gothenburg, which have the highest populations and host the most international travellers. A slightly higher proportion of independent ATMs can also be found in western areas with ski resorts.

The north of Sweden has some of its highest tourism intensity, but these areas are very remote and have low population density. Thus, few ATMs are operated in the northern half of Sweden.

Figure 10.1 Distribution of ATMs across business models in Sweden



ATMs in Sweden do not typically offer advanced functionality. Some Bankomat ATMs offer cash withdrawals and deposits, bank statements, transfers between accounts and PIN change. Many, however, seem to be limited to cash withdrawals.

Figure 10.2 Overview of ATM locations in Sweden

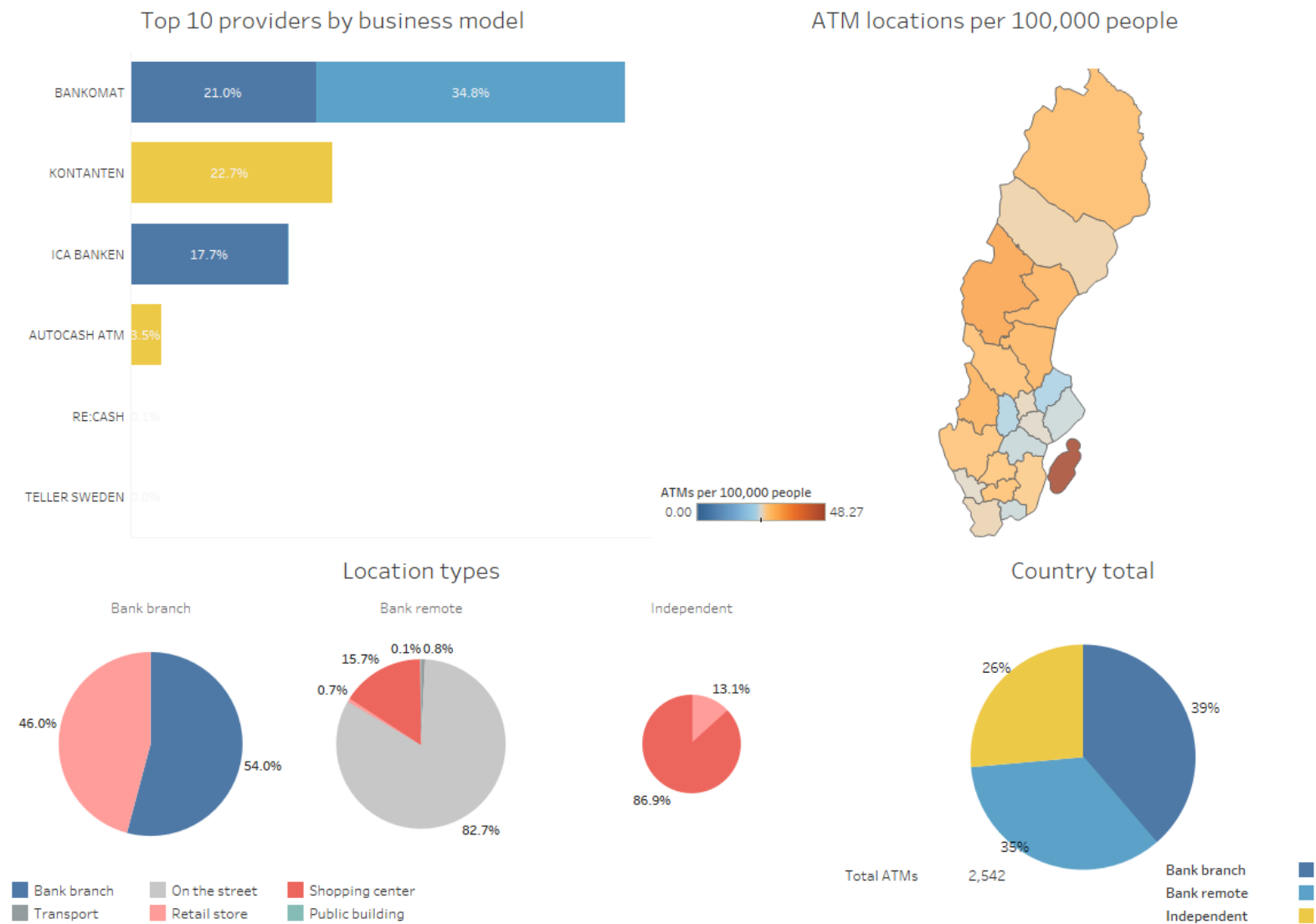
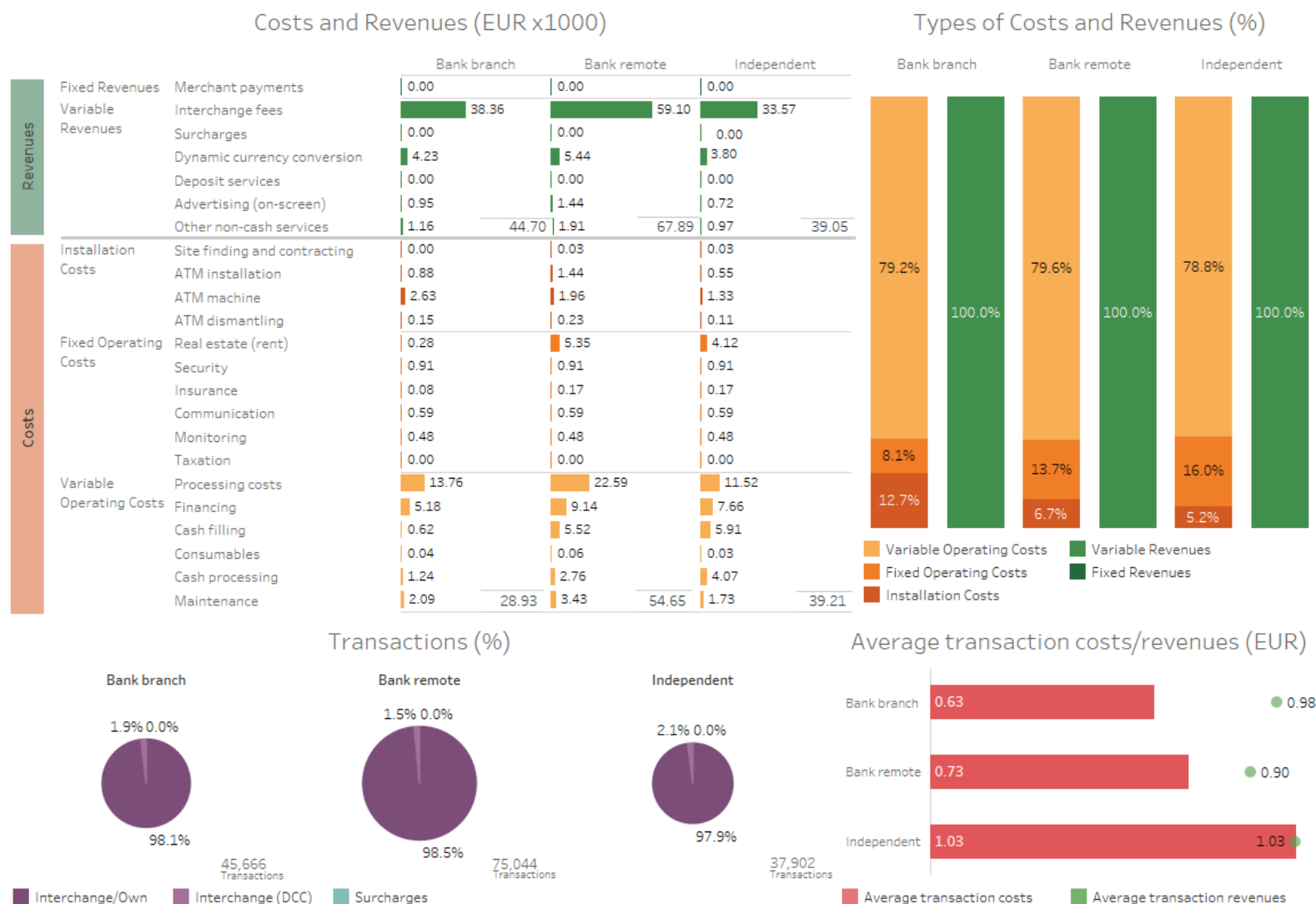


Figure 10.3 Annual costs and revenues by business model in Sweden



10.3 Costs and Revenues

Cash withdrawal in Sweden is generally free of charge, as ATMs do not add disloyalty fees or surcharges (BIS, 2011). However, banks sometimes add fees to non-cash ATM transactions. Swedbank, for example, charges €0.16 for intra-bank payments from ATMs (with the fee waved for clients aged 65 and over), and €0.38 for domestic payments. Additionally, ATM providers utilise DCC in Sweden. For example, Kontanten has used DCC since late 2013.

10.3.1 Transactions

The average bank branch ATM processes 45,666 transactions per year, which are all either interchange or own customer. Of these about 1.9% are DCC. The average bank remote ATM handles substantially more transactions per year at 75,044, of which 1.5% are DCC. The average independent ATM handles almost 37,902 transactions per year, of which 2.1% are DCC. The difference between the bank branch, bank remote and independent ATMs is primarily due to the location. Bank remote ATMs are almost exclusively TTW, which in general attract more customers due to a greater visibility than lobby ATMs.

10.3.2 Revenues

Interchange fees are largest source of ATM revenue in Sweden. DCC revenues are quite low for all types of ATMs and significantly lower than in most other selected countries. Other non-cash services and advertising represent small revenue sources for each ATM business model. Overall, bank branch ATMs generate an average annual revenue of €44,700. Bank remote ATMs average €67,890 annually, while independent ATMs generate the lowest revenue at €39,050.

10.3.3 Costs

Overall installation costs in Sweden are highest for remote ATMs. This is due to the high portion of locations on the street, which requires a more expensive machine and installation process. As in all selected countries, bank branch ATMs have the lowest real estate costs, while bank remote and independent ATMs have the highest. In variable operating costs, cash filling costs are markedly higher for bank remote and independent ATMs, and cash processing is more costly for independent ATMs than the other two business models.

Overall, bank branch and bank remote ATMs are profitable, whereas independent ATMs operate around the break-even point. Bank branch ATMs generate an average profit of €15,769 per year or €0.35 per transaction and bank remote ATMs €13,236 per year or €0.17 per transaction, while independent ATMs have a negative margin of -€168 per year, or less than €0.01 per transaction.

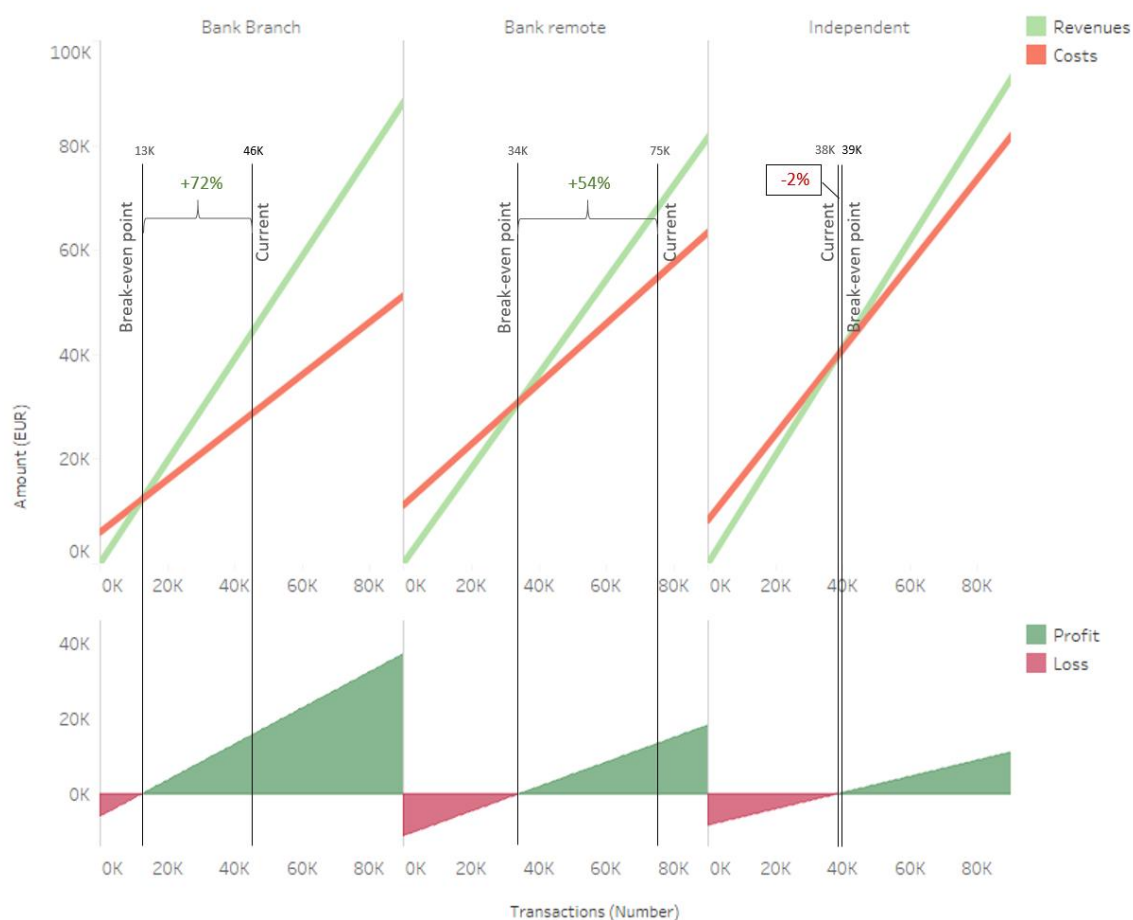
10.4 Sensitivity and trends

Sweden has largely moved away from cash to cashless payments. The share of cash transactions is only 15% of the total number of point of sale transactions (Wheatley, 2017). In a recent

survey, 40% of Swedish respondents claimed not to have used cash in the past month (Riksbank, 2018). Only around 6% of Swedish respondents withdraw cash from ATMs or cash desks at a bank one or more times per week, and 20% never do so (Riksbank, 2018).

The shift away from cash has been spurred by a variety of stakeholders and concerns. The Bank Teller's Union lobbied against holding cash in bank branches, in part due to safety concerns following several high-profile robberies. Banks have sought to reduce the costs associated with moving, handling and securing cash. Swedish residents have readily changed their spending habits and adopted electronic means of payment, primarily using cards such as Swish and mobile payment services.

Figure 10.4 Costs and revenues by number of transactions in Sweden



The Swedish ATM market is relatively small and concentrated, with just a couple of providers that operate a small number of ATMs. This makes it more difficult to obtain cash, in particular in some rural areas. In response, the Swedish Parliament's Riksbank committee has recently proposed a measure which would ensure access to cash withdrawals and handling of daily receipts for all Swedes. The law would require that 99% of Swedes should have a maximum distance of 25 kilometres to the nearest cash withdrawal point. The largest Swedish banks would be required to provide the withdrawal points (Riksdagen, 2018). ATMs may play a role

in fulfilling the requirement. Other alternatives include cash back at supermarkets and other points of sale, which is already a relatively popular option in rural areas.

Looking at the various business models, only the viability of the independent ATMs in Sweden is immediately contested by a further reduction in withdrawals. Bank branch ATMs could process 72% fewer transactions, and bank remote ATMs 54% fewer, and still break even. Bank branch ATMs are profitable at a relatively low number of transactions: 12,500. This is well below the actual number of transactions, 45,666. Bank remote ATMs require 34,500 transactions per ATM per year, a much higher number of transactions to remain profitable. Independent ATMs are very close to the break-even point at the current number of transactions: they would need to add a couple of transactions per day to become economically viable. The independents therefore might have to adjust their business model (merchant refilled machines) or reduce their number of ATMs to remain profitable in the future.

Although the average independent ATM handles very few DCC transactions, independent ATMs are somewhat sensitive to changes in DCC fees. With a fairly low cap, by percent or fixed amount, independent ATMs would be profitable as DCC only accounts for around 10% of independent ATM revenues.

All business models depend on interchange fees, where revenues only surpass costs at a high number of transactions.

11. CROSS-COUNTRY COMPARISON

This section provides a comparison of the business models across the eight EU member states selected for this report, focusing on the importance of various business models, locations and characteristics as well as the differences in costs and revenues and sensitivity to changes in DCC revenues.

11.1 Business models

The large majority of ATMs are provided by banks. This can be by individual banks like in countries like Belgium and France, but also collectively like in Spain and Sweden.

Traditionally most ATMs are located in bank branches, whereas bank remote locations have been gaining prominence more recently. In Belgium, France, Germany and Spain the large majority of bank operated ATMs are still located in bank branches, whereas in Greece, Portugal and Sweden roughly half of bank ATM locations are remote. The branches also include post offices (Belgium, France, Germany, Greece and Portugal) and supermarkets (France and Sweden).

The ATM markets in all the eight selected countries are concentrated at national level. Spain is the least concentrated with 60% of the ATM locations operated by five providers. In five other countries, the top five providers operate between 70% and 91% of the ATM locations (Portugal [70%], Belgium [76%], Poland [79%], Germany [88%] and France [91%]). The Greek [96%] and Swedish [100%] ATM markets are almost entirely controlled by the top five providers. Except for Sweden, where Bankomat operates 56% of the ATMs, there is no single provider that operates more than half of the ATMs in a single country.

The large majority of banks with a sizable number of ATM are domestic. About 70% of the providers in the top 5 are domestic banks. In fact, there are only five foreign banks in the top five ATM providers in any of the countries. Most of those are active in Belgium, where AXA, BNP Paribas and ING have a position in the top five. Moreover, ING (Germany), Santander (Portugal) and Unicredit (Bank Pekao in Poland) are also active in one of the other countries.

Poland is the only country in the selected countries where independents are responsible for operating the majority of the ATMs. Besides Poland and Sweden, the independents operate less than 10% of ATMs in all selected countries. Euronet (Germany, Greece, Poland and Portugal), Planet Cash (Poland) and Kontanten, Autocash ATM and RE:Cash in Sweden are the only independent providers with a top five position in one of the selected countries.

11.2 Locations and characteristics

In total, the eight selected countries have 146,821 ATM locations. There is a large difference in the number of ATM locations per country. The total number of ATM locations per country varies from 2,542 in Sweden to 38,317 in Germany. Differences in population only partially explain this large disparity, as the number of ATMs per capita shows. The number of ATM locations per 100,000 people ranges between 26 in Sweden and 89 in Portugal.

A wide range of factors contribute to variations in ATM numbers and types between the selected countries. These include the dynamics of the market structure (business models, ownership structure, etc.), payment preferences, use of ATMs for non-cash transactions, sharing agreements between ATM providers, pricing models, tourism, geographical characteristics, security requirements, etc.

Figure 11.1 Cross-comparison of ATM locations (2018)

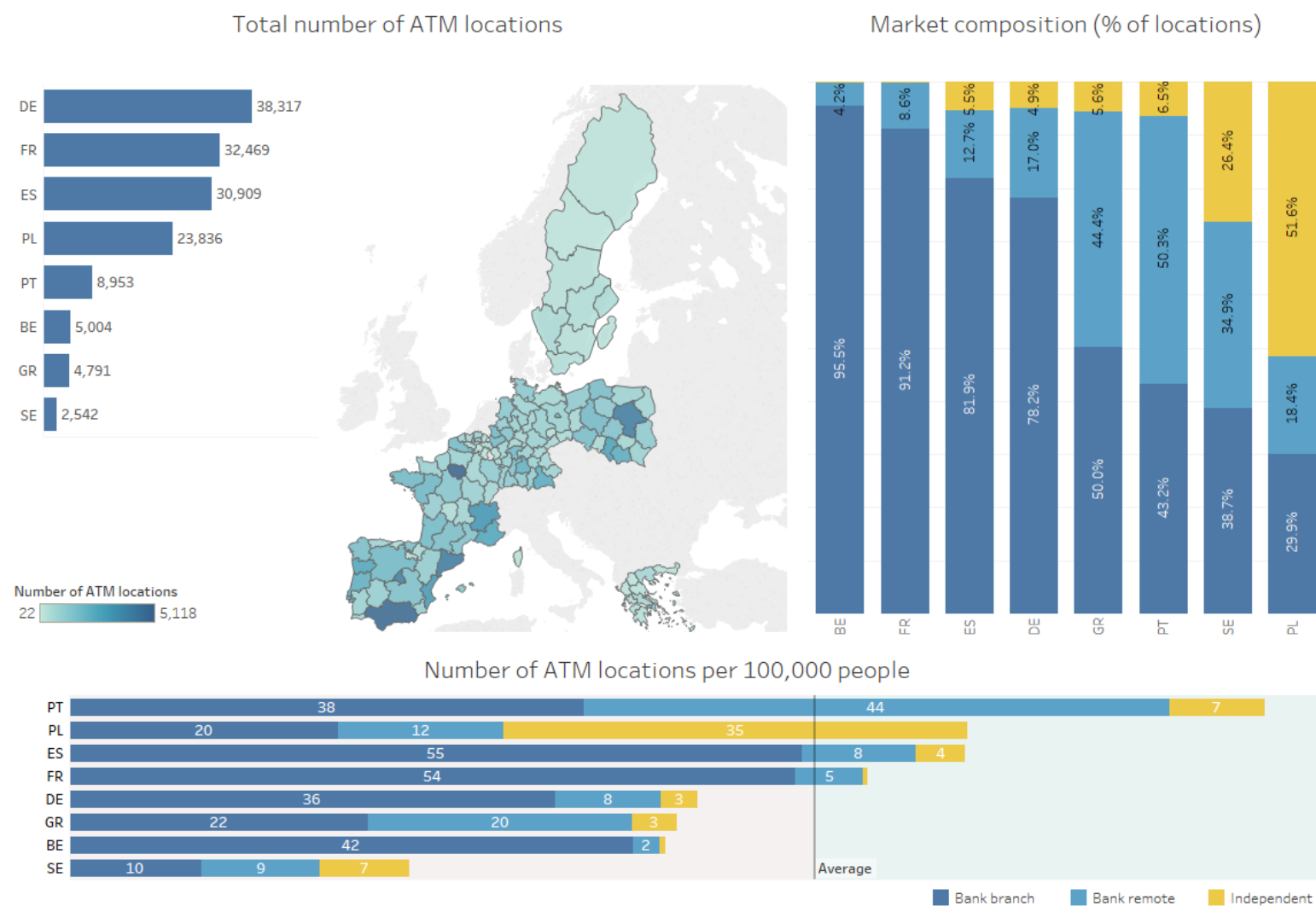
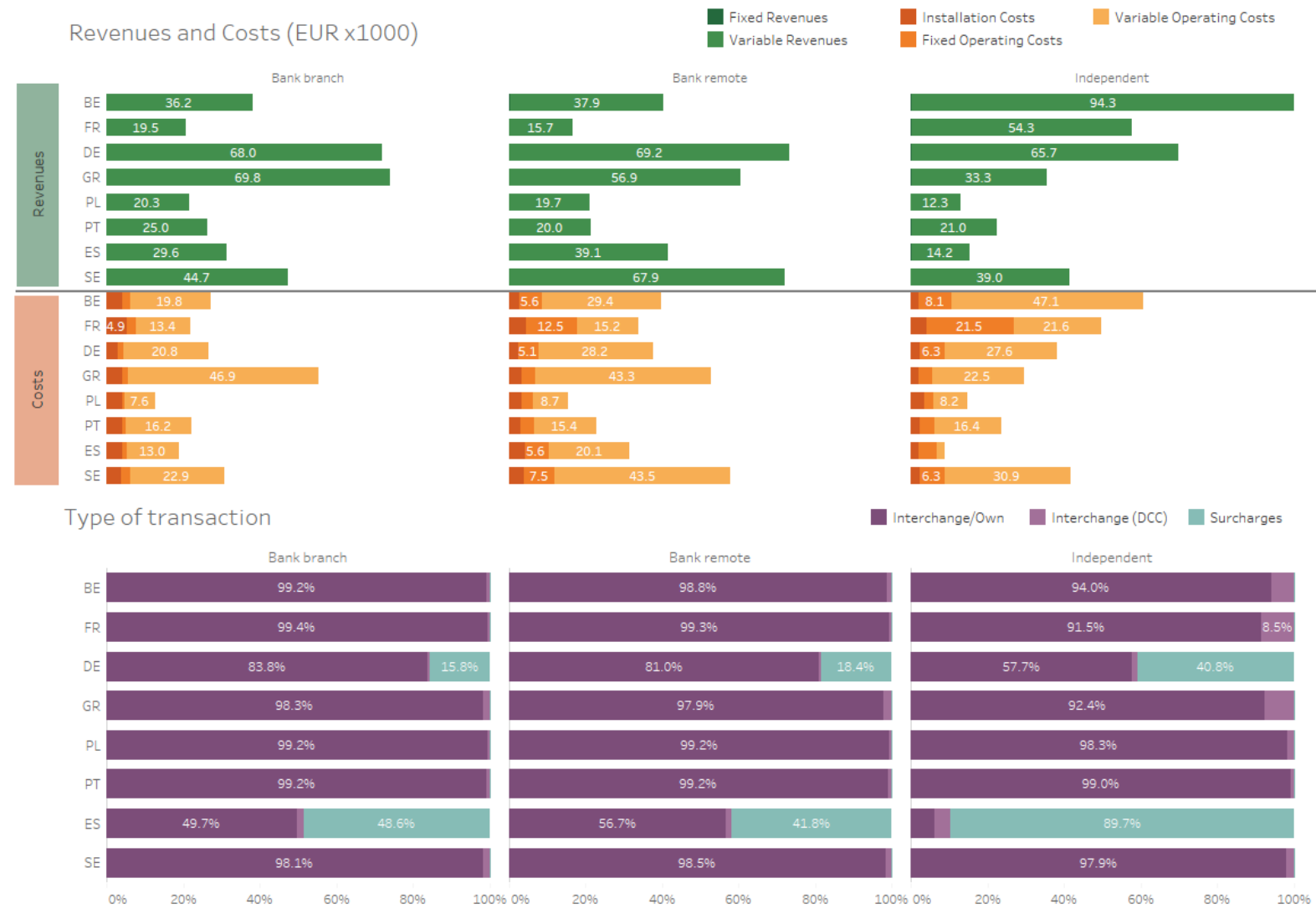


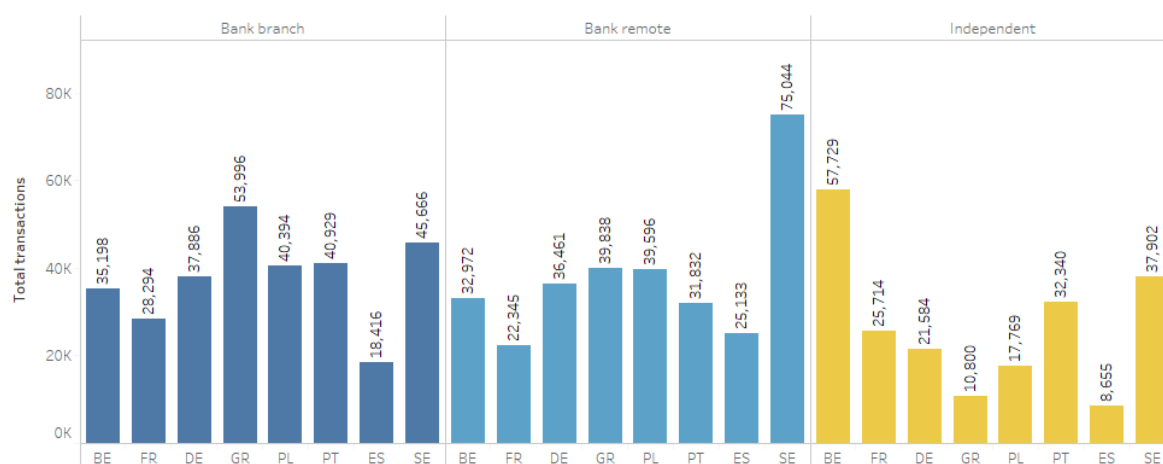
Figure 11.2 Cross-country comparison of annual revenues and costs



11.3 Costs and revenues

Estimations of the costs and revenues reveal significant differences in profitability between the selected countries. To varying degrees, the average ATM machine of all three business models is expected to be profitable. For France, Poland, Portugal and Sweden, at least one of the business models is estimated to be loss-making in economic terms, i.e. not covering costs of capital.

Figure 11.3 Total number of transactions across business models per year



Typically, revenues only exceed costs at a certain number of transactions. ATM revenues are primarily variable in nature, whereas the costs are a combination of fixed and variable factors. The variable revenues of all business models in all countries exceed the variable operating revenues. The profitability of ATMs thus primarily depends on the fixed costs, margin per transaction and number of transactions.

The absolute number of transactions and the type of ATM have substantial effects on costs and revenues. Across the selected countries and business models, transactions vary by absolute number and type. For example, the average independent ATM in Spain processes 8,655 transactions per year, while a bank remote ATM in Sweden processes around 9 times as many. In general, bank remote ATMs process more transactions than bank branch ATMs. The relative number of transactions for independent ATMs strongly depends on the location and pricing of cash withdrawals. In countries with disloyalty or surcharges, the number of transactions is substantially lower, whereas it is higher in countries where ATMs are located at transport locations such as airports.

Interchange and own customer withdrawals form the majority of transactions for each ATM business model in each country, and are a source of variable revenues and costs. Surcharge transactions make up a significant share of the transactions of all business models in Germany and Spain. The share of DCC transactions ranges from under 0.4% to around 8.5% of transactions, and independent ATMs have a higher share of DCC transactions than bank branch and bank remote ATMs for every selected country. The ATMs of independent providers are more often located at airports and other places to target international travellers.

The margins per transaction strongly depend on the type of revenues. DCC transactions generate the highest fees per transaction, followed by surcharges and interchange fees. The DCC fees are determined by the ATM provider (see Box on DCC, page 71). DCC is a source of revenue for all business models and countries. For example, DCC transactions account for under 2% of total Polish independent ATM transactions, but about 40% of total revenues. Surcharges are also set by the banks and represent a large source of revenue – particularly for bank branch and independent ATMs in Germany and Spain. For German bank branch ATMs, surcharges apply to around 16% of transactions and account for 36% of revenues, while in Spain surcharges apply to almost half of the transactions of bank branch ATMs and account for a similar share in revenues. The difference between Germany and Spain is primarily that the ATMs in Spain also benefit from substantial DCC revenues. The interchange fees on cash withdrawals are set by the card schemes and in most cases are not publicly disclosed. The fees vary greatly between countries.

Other variable revenues are deposit services, advertising (on-screen) and other non-cash services. Deposit services only generate revenues in Spain and Poland, but non-cash services and advertising are present in every country. These are typically minor sources of revenue.

For most ATM business models in the selected countries, the majority of costs are variable, rising with the number of transactions and amount of cash processed. These also differ somewhat between business models. While cash filling is a negligible expense for bank branch ATMs, it is far higher for bank remote and independent ATMs. Cash processing is more expensive for independent than bank branch or remote ATMs, since they obtain no or less cash from deposits and rely on third parties.

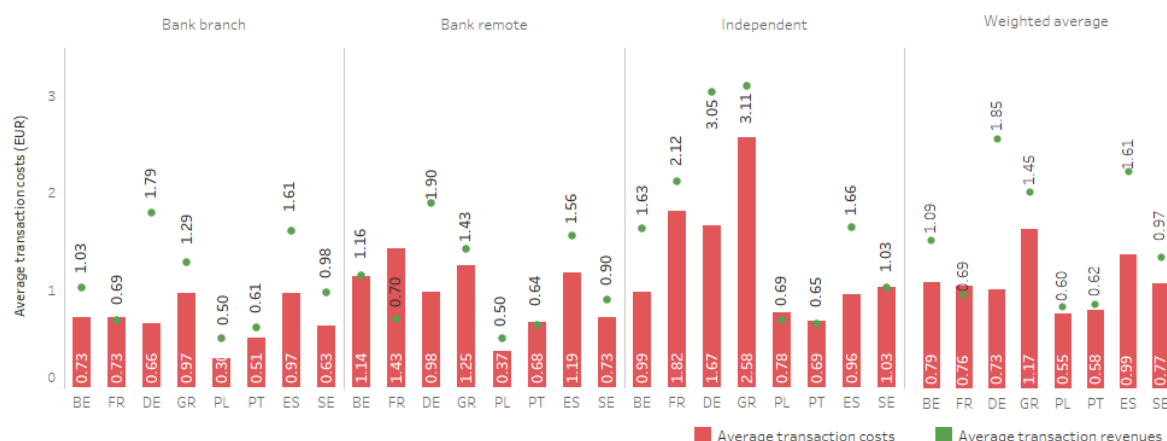
Fixed revenue is a minor consideration. The only fixed revenue is merchant payments, which are only relevant for bank remote and independent ATMs, and represent a small portion of total revenue.

Fixed costs are fairly low across the selected business models and countries. ATM installation, machine, dismantling, and insurance costs are highest for bank branch ATMs for all countries. This is due to the higher cost of TTW machine installations. Real estate rental costs are higher for bank remote and independent ATMs due to more expensive locations. The other fixed operating costs are the same regardless of business model.

11.4 Sensitivity and trends

A few ATM markets are highly sensitive to any fluctuations in type or absolute number of transactions, retail banking market conditions, etc. Currently, bank branch ATMs in France and Portugal, bank remote ATMs in France and Portugal and independent ATMs in Poland, Portugal and Sweden seem to be most under pressure based on the profits estimated in this study.

Figure 11.4 Average costs and revenues per transaction across business models



The operation of these ATMs is already loss-making based on economic terms, or a small drop in total transactions could result in a loss. In this regard, it is important to consider trends with potential impacts on the ATM market such as bank branch closures, the shift from cash to cashless payments, or changes in fees (see Box on DCC, below).

Box. Impact of DCC-cap on viability of ATMs

In March 2018, the European Commission proposed to amend Regulation (EC) No 924/2009 to equalise the fees on cross-border payments and ATM withdrawals in the EU.¹¹ These are currently the same for cross-border payments in the euro area and Sweden, but not for transfers to and from EU member states outside the euro. In addition, the proposed amendments to the regulation make the currency conversion fees more transparent and comparable as well as limiting fees to a maximum. The currency conversion fees are currently often unclear to customers at the moment that they make a payment or withdraw cash at an ATM.

When withdrawing cash in EU member states with another local currency, customers have the option to be charged for the cash in their local currency or their own currency (i.e. dynamic currency conversion - DCC). In cases where customers choose to be charged in their own currency, the ATM provider will receive both an interchange fee or surcharge fee and the DCC fee. Otherwise, the ATM provider only receives an interchange fee or surcharge fee.

Looking at the dynamic currency conversion fees on ATM withdrawals, the European Commission proposes to give the European Banking Authority (EBA) the mandate to develop regulatory technical standards. These should outline the transparency and comparability requirements as well as determine the maximum currency conversion fee. After the regulation has entered into force, three years are allowed to develop and adopt the regulatory technical standards. Until then the European Commission will use regulatory technical standards to put a temporary cap on the currency conversion costs.

The introduction of a cap on currency conversion fees is likely to impact the three business models differently in the selected countries. For most business models and countries DCC fees

¹¹ <https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-3372443>

make up only a minority of the revenues, but there are some exceptions. In some countries and for some business models the DCC fees deliver a significant contribution to revenues as well as the profitability of ATMs.

Figure 11.5 and Figure 11.6 indicate the revenues from DCC transactions for various business models and fees as well as various levels of variable and fixed fees respectively. The figures show that at the various levels of DCC fees, DCC revenues in countries with many international travellers such as Greece, Portugal and Spain are higher than of other countries with fewer international travellers such as Belgium, France and Germany. Moreover, DCC revenues are higher in EU member states outside the euro, such as Sweden and Poland, than in most euro area member states with similar levels of foreign visitors.

The DCC revenues of bank branch ATMs are relatively low, except for Greece. Nevertheless, without DCC revenues, the average bank branch ATM in Greece would be operating at a loss and the losses of French bank branch ATMs would be even higher. DCC revenues would have to be at least €24.50 per transaction or 14% of the transaction value for French bank branch ATMs to break even. For Greek ATMs this is just €6.00 per transaction or 2%. DCC fees are a more significant revenue factor for bank remote ATMs, in particular in Greece and to a lesser extent in Belgium, France, Portugal, Spain and Sweden. According to the estimations, the revenues necessary for an average ATM to be profitable in Belgium, Greece and Portugal would require a minimum of between €10.00 and €17.00 per transaction or 7% and 14%. French bank remote ATMs would require a fee well above the maximum in the charts: €129.00 or 97%. DCC fees are most important for independent ATMs. They generate significant revenues in Belgium, France, Germany, Greece, Poland and Spain. They are, however, essential for their viability in France, Greece and Poland, but also in Poland, Portugal and Sweden, even if the revenues there are lower. For an average independent ATM in these countries to break even DCC fees need to be between a minimum of €0.25 and €21.50 per transaction or 4% and 15% of the transaction value. Overall, DCC fees are particularly important for bank remote and independent ATMs in countries where interchange fees are the main source of revenues. Although DCC revenues are more significant in countries with many international card holders, they are also important for the viability of bank remote and independent ATMs in countries with few international travellers.

Figure 11.5 Impact of cap on currency conversion fees on ATM revenues (% of transaction value)

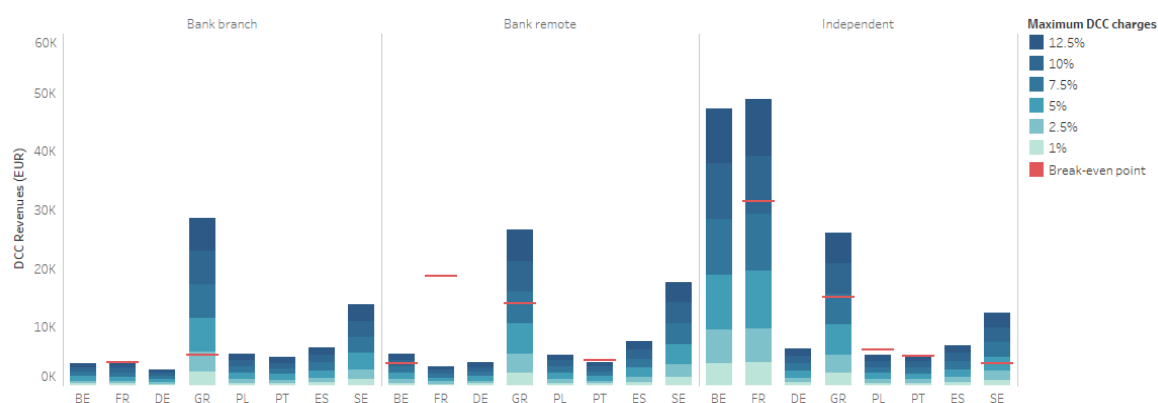
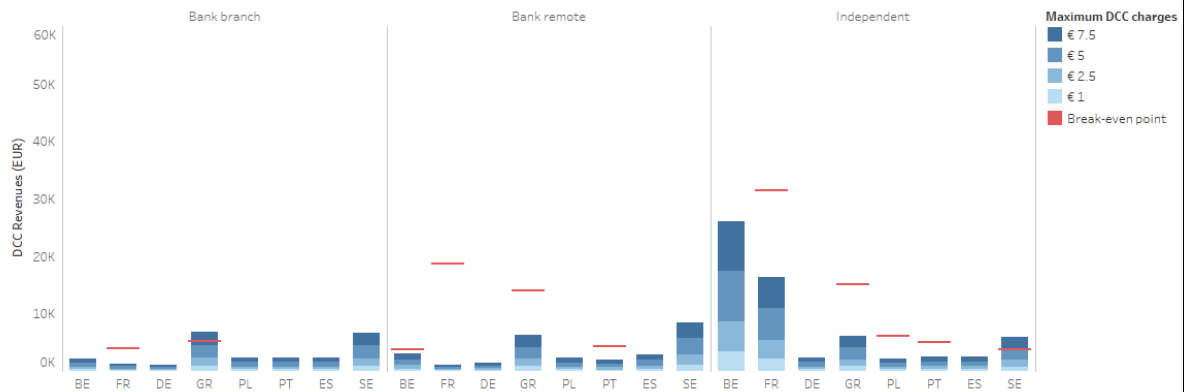


Figure 11.6 Impact of cap on currency conversion fees on ATM revenues (fixed amount per transaction)



Note: For countries and business models without a red line indicating a Break-even point, revenues exceed costs without DCC.

In the estimations of the costs and revenues as well as of the impact of a DCC cap, it is assumed that ATM customers prefer DCC because of the convenience (an average of 60% of international withdrawals using from outside currency area as opposed to 40% non-DCC). However, the introduction of transparency and comparability requirements might lead to a change in customer preference. Moreover, providers might choose to set their fees below the maximum. For example, to ensure that DCC is more attractive for customers than non-DCC.

12. CONCLUSIONS

ATMs remain a critical component in today's infrastructure for facilitating cash payments, but some ATMs in the EU are bound to disappear owing to the increasing importance of cashless payments, e-commerce and the closure of bank branches. ATMs might also become non-viable due to decreasing fees for cash withdrawals (interchange, surcharges and DCC), deposits and non-cash services. This is significant, particularly since cash remains a wide-spread means of payment as well as alternative in case cashless payments are interrupted. This assessment shows that the impact of ongoing digitalisation as well as potential policy changes are likely to impact ATM business models differently in the eight countries selected for this study as representative of the wider EU.

12.1 Business models

The structures of domestic ATM markets in the EU vary considerably. The great majority of ATMs are provided by individual domestic banks, networks of cooperating banks (e.g. cooperative and savings banks) or collective initiatives by larger banks. Banks operate the ATMs either in their branches (branch, post office or supermarket) or at remote locations (on the street, airports, gas stations, etc.).

Bank remote locations are gradually becoming more prevalent with bank branches being closed and partially replaced by remote locations. However, bank branches are still the main location for ATMs in Belgium, France, Germany and Spain. These countries have more stringent security requirements for remote ATMs (Belgium and France) or a practice of levying surcharges for domestic withdrawals (Germany and Spain).

In Greece, Poland, Portugal and Sweden, bank branches and remote locations are more equally prevalent. The countries with the highest proportion of remote ATMs, Portugal and Greece, also saw a large number of bank branches close due to the financial crisis. Banks were forced to rationalise and save costs, resulting in more reliance on bank remote ATMs than staffed bank branches.

Alongside bank branch and bank remote ATMs, independent ATM providers operate in most countries, but at generally less than 10% of domestic ATM locations, except for Poland and Sweden, where they operate respectively at 26.4% and 51.6% of ATM locations.

12.2 Locations and characteristics

In total, Belgium, France, Germany, Greece, Poland, Portugal, Spain and Sweden have 146,821 ATM locations. There are even more ATM machines operated in those countries, as bank branches in particular often house more than one ATM machine. This is no doubt due to the

desire to maintain reasonable waiting times for customers as well as to ensure cash can still be withdrawn when one machine runs out of cash or is unavailable for any other reason, such as for repairs or cash refilling.

Bank branch ATMs vary by type of machine. Bank branch ATMs can be TTW (accessible from the street), inside a lobby accessible at all times with a card swipe, or inside a lobby only accessible during business hours. Many bank branches with more than one machine have a combination of both a TTW and lobby machine. Bank remote and independent ATMs are mostly lobby machines, except for locations on the street. TTW machines are in principle more visible and attract more people to withdraw cash, but they also require a higher initial investment for the machine and installation costs.

Looking at the locations, there are many more ATMs in urban areas than in intermediate and rural areas. Bank branch ATMs are almost exclusively focused on domestic customers, they also make up a relatively more significant proportion of ATM locations in intermediate and rural areas in most countries. Bank remote ATMs mostly target domestic customers and are generally sited in more populated urban areas to generate a sufficient number of transactions to compensate for the higher costs (rent, communications, etc.). In Greece and Portugal however, bank remote locations are also more common in rural and intermediate areas.

The location of independent ATMs depends on the country. In the majority of the selected countries, they either only target international card holders (Belgium and France), a combination of domestic and international card holders (Spain and Portugal) or primarily domestic card holders (Germany, Poland and Sweden). This very much determines the choice of location: domestic-oriented independent ATMs are located across rural, intermediate and urban areas, with a preference for urban areas, while international-oriented independent ATMs are predominantly located at main transport locations (airports, train stations, etc.) and tourist areas, where there are many international card holders.

12.3 Costs and revenues

ATM revenues are mostly variable in nature, depending on the number of transactions that the ATM processes and the fee per transaction. The number of transactions depends on the cash usage, fee structure and number of ATMs. First, when cash is more frequently used for payments, cash withdrawals are likely to be more common. Second, when there are costs associated with the withdrawal, it is likely that withdrawals occur less frequently, though the average transaction amount is higher in countries with surcharges and disloyalty fees. In particular, disloyalty fees charged by banks to incentivise customers to withdraw cash at their own ATMs lead to much fewer withdrawals at ATMs of other providers. This particularly affects the number of transactions at ATMs of smaller banks and independent providers in countries such as France, Greece and Poland. Third, the higher the number of ATMs in a market, the fewer transactions are processed by the average machine.

The results of the estimations based on a comprehensive model and combination of public and private data show that the majority of transactions are interchange or own customer

transactions. For these transactions, interchange fees are paid by the bank that issued the cards to the ATM provider. For some international transactions, a DCC fee is charged to the card holder for immediate currency exchange. DCC transactions are processed in particular by ATMs at transport locations and tourist areas. These are mostly independent ATMs in Belgium, France, Greece, Poland and Spain, but also bank branch and remote ATMs in Greece. Then there are transactions on which a surcharge is charged by the ATM provider, which is paid by the card holder. Traditionally, only ATM providers in Germany and Spain levy a surcharge to transactions by domestic holders of cards from a different bank. However, more recently, surcharges on non-DCC international transactions are being levied by some banks and independents in various countries such as Spain, Germany and Greece. Since this is a relatively new phenomenon, it was not taken into consideration in the estimations of costs and revenues. Non-cash services only constitute a small share of transactions and revenues in most countries, except for Portugal where the number of non-cash transactions is almost as high as the total number of cash withdrawals.

Interchange fees are in general lower than surcharges and DCC fees per transaction. This is also reflected in average transaction revenues, which are higher in Germany and Spain where surcharges apply. Moreover, average revenues per transaction of independent ATMs are higher in Belgium, France, Greece and Spain where there are higher DCC revenues.

The majority of costs are variable, rising with the number of transactions and amount of cash processed. In a few of the selected countries (Belgium and France) fixed costs are higher owing to particular security requirements and taxation. Even so, the majority of costs and revenues are variable, depending on the total number and value of transactions. If transactions are assumed equal, bank branch ATMs are the cheapest to operate, as many costs required to operate ATMs are provided thanks to their location on bank premises. This results in lower real estate, cash filling, cash processing and communication costs.

12.4 Sensitivity and trends

The impact of ongoing digitalisation as well as potential changes in pricing regulations is likely to vary significantly across business models and countries.

On the one hand there is a difference in the likely impact of digitalisation or a cap on DCC fees. In Germany, Greece, Portugal and Spain cash is still preferred for point of sale payments, whereas in Belgium, France, Poland and especially Sweden, cashless payments have become the main method for point of sale payments. These countries might therefore be relatively less affected by a shift to cashless payments, which is likely to result in a similar drop in cash withdrawals.

The closure of bank branches will probably have an impact primarily on countries where most ATMs are established in bank branches. Bank branches account for three-quarters of ATM locations in Belgium, France, Germany and Spain. With the increasing popularity of online banking and the high costs of operating the branches, many are likely to be closed in the coming years. Although this is likely to lead to a drop in ATMs, some might be replaced by ATMs in bank

remote locations. These locations in general require a higher number of transactions than bank branch ATMs to break even, but the overall costs of the bank remote ATM are likely to be lower than operating the entire bank branch including ATMs. However, the closure of some bank branches is likely to increase the number of cash withdrawals at the remaining ATMs.

Table 12.1 Sensitivity of ATMs to main trends and revenue factors

Country	Digitalisation						Revenues								
	Cash			Bank branch			Interchange			Surcharges			DCC		
	BB	BR	IND	BB	BR	IND	BB	BR	IND	BB	BR	IND	BB	BR	IND
Belgium	M	M	M	H			H	H	H	L	L	L	L	L	M
France	M	M	M	H			H	H	M	L	L	L	L	L	H
Germany	H	H	H	H			L	M	M	M	M	H	L	L	L
Greece	H	H	H	M			H	H	M	L	L	L	M	M	H
Poland	M	M	M	M		L	H	H	M	L	L	L	M	M	M
Portugal	H	H	H	M			H	M	M	L	L	L	L	L	L
Spain	H	H	H	H			L	L	L	H	M	M	L	L	M
Sweden	L	L	L	M			H	H	H	L	L	L	L	L	L

Note: The figure above indicates to what extent the business models are dependent on cash, bank branches and various revenue factors for their revenues. The dependencies are presented for bank branches [BB], bank remote [BR] and independent [IND] ATMs. Low [L]: 0-20% of total POS cash transactions, ATM locations and revenues respectively; Medium [M]: 20-50% of total; High [H]: 50-100% of total.

Source: ECB and CEPS (2018).

On the other hand, there is a difference in the ability of the business models in the various countries to absorb these changes. According to the estimations of the revenues and costs, the great majority of ATMs in the eight selected member states are still economically viable. The only exceptions are bank branch and bank remote ATMs in France, bank remote ATMs in Portugal and independent ATMs in Poland, Portugal and Sweden. There are, however, differences in profitability. In general, ATMs in countries relying almost exclusively on interchange fees (Belgium, France, Poland, Portugal and Sweden) are less profitable than ATMs relying more on DCC or surcharges (Germany, Greece and Spain).

The introduction of a cap on DCC fees is likely to affect in particular bank remote and independent ATMs in countries where interchange fees are the main source of revenues. But the average bank branch ATM in Greece would also become non-viable. DCC revenues are most significant in countries with many international travellers, but also important for the viability of bank remote and independent ATMs in some countries with few international travellers. In particular, in Belgium, Greece and France, bank remote and/or independent ATMs will lose significant revenues or fail to break even without DCC revenues. The various business models would require minimum DCC fees ranging between €0.25 and €18.75 per transaction or 0.2% to 9% of the transaction amount to be profitable.

The estimations of costs and revenues as well as the sensitivity and trends assessments are based on the fees and fee structures in place at the end of June 2018. ATM providers might change their fees and fee structure to compensate for the fall in transactions and DCC fees. The

likelihood of such moves is indicated by the recent introduction of surcharges on international ATM withdrawals by various banks and independent providers in Germany, Greece and Spain.

Even when ATMs are no longer economically viable, bank operators might still have reasons to continue operating them. For example, bank might keep the ATMs for customer-service, self-promotion and branding. This, however, does not contribute to the long-term sustainability of the ATM market.

12.5 Policy implications

This report has found that the ATM markets in the EU are highly heterogeneous. New legislation should take this heterogeneity in cash and bank branch dependency as well as revenue and cost structures into account when designing new legislation addressing the ATM markets. This to ensure that an adequate infrastructure remains to facilitate cash payments and constitute an alternative to cashless payments if these would (temporarily) fail. Besides those ATMs that are currently mostly used to bring banknotes into circulation, the more cost-efficient merchant-filled lobby ATMs, cash back systems, etc. should also be considered.

Concretely, with ongoing digitalisation, bank remote ATMs are increasingly important for cash withdrawals. Due to their higher fixed costs they require more transactions to break even. With the number of cash withdrawals decreasing, the population required to maintain a single ATM increases. This means that the shift from bank branch ATMs to bank remote ATMs is likely to lead to a reduction of ATMs, particularly in rural and intermediate areas. This is especially relevant in countries with low cash usage and low margins in ATM operation. Looking at the fees, in particular those countries relying on relatively low interchange fees with a high level of cashless payments might experience ATM closures. It is also therefore not surprising that there are government initiatives or discussions about how to safeguard a minimum number of ATMs in rural areas in countries such as France and Sweden. They tend to seek to ensure this with subsidies from local governments or requirements for the largest domestic banks. Although potentially effective in many countries and regions, it might not be the most efficient manner to ensure access to cash in more rural areas. Ideally, the market would be designed so that there are sufficient incentives for ATM providers to operate ATMs in these rural areas and, in the longer term, potentially also intermediate and urban areas.

For this, in addition to the measures already in the pipeline to restrict DCC fees and enhance their transparency, measures to make the market as a whole more sustainable should be considered, for example:

- Interchange fees on ATM withdrawals. Cash withdrawals are currently exempted from the interchange fee legislation. The fees agreed between domestic and international card schemes and bank ATM providers vary widely between countries. It would be worthwhile assessing whether they should be legislated. For example, the introduction of certain minimum rates (potentially adjusted for the degree of urbanisation). This would incentivise providers to operate ATMs as well as penalise bank account providers that do not contribute to providing the cash infrastructure (for example online banks).

- Ban on disloyalty fees. There are currently several countries in which banks charge their customers when they make withdrawals at another bank. Disloyalty fees not only create a barrier to entry (new and smaller entrants can expect fewer transactions), but the revenues are not for the provider of the ATM that supports the infrastructure. They also limit the possibility to organise the ATM network efficiently, which will become more important with fewer cash withdrawals to process.
- Ability to surcharge. In countries where surcharging is common practice, there is more margin in ATM operation. The application of surcharges is currently limited due to limitations in the rules set by the international card schemes. Although surcharges might improve the viability of ATMs, they might also introduce some consumer protection issues regarding the comparability and transparency of the fees as with the DCC proposal. Moreover, surcharges would potentially put cash payments on an unequal footing with card payments, for which costs are covered by merchants.
- Evaluate security requirements. Legislative security requirements vary between countries. These requirements, such as mandatory cash filling by a cash-in-transit company in Belgium, secure bunker in France or limits on the possibility to recycle cash in Germany, make it more expensive to operate an ATM. This means that more transactions are required to make the operation of the ATM viable. The security requirements should be evaluated to determine whether they are still necessary.

Finally, there is a need for additional research and monitoring of ATM markets in the EU. Historically, there has been limited research about the sustainability of operating ATMs. Now that some of this cash infrastructure is at risk, it has become more important to monitor developments, particularly in those markets and areas where the viability of the business models for operating ATMs is already under pressure. Moreover, there also seems to be a need for further research in the areas of competition policy concerning anticompetitive pricing (disloyalty fees, interchange fees, etc.) as well as consumer protection regarding the limited transparency on the prices of ATM withdrawals on the machines as well as on corporate websites (DCC, surcharges, etc.).

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GLOSSARY

ATM	An automated teller machine is an electronic device used to conduct basic bank transactions such as the withdrawal of cash. For the purpose of this study a distinction is made between ATM machines and ATM locations (several ATM machines can be operated at a single location).
Bank	ATM provider that has a license to conduct banking services and uses this to operate ATMs as well as offer other retail financial services directly to consumers such as payment accounts and cards.
Bank branch	ATM located in or outside of the establishment of the provider, where the ATM provider also offers other (financial) services, i.e. ATM operated by bank or group of banks located at a bank branch, postal office, supermarket, etc.
Bank remote	Non-branch located ATMs that are operated by a bank or group of banks.
Disloyalty fees	Fees charged by banks to their card holders for using another bank's ATM.
Dynamic currency conversion	A fee charged by an ATM provider to a card holder for arranging the currency exchange against a fixed rate.
First Line Maintenance	Maintenance including routine support, replacement and restocking of consumables, and solving minor problems such as jams.
Independent	ATM operated by independent provider, i.e. an ATM provider that offers ATMs without offering other retail financial services for consumers.
Interchange fees	Fees paid by the card issuing bank to the ATM provider. These are set by the interbank/ATM network in question.
Lobby machine	Lobby machines are ATMs installed inside an establishment (non-TTW).
Population density	Share of population living in urban/rural areas. ¹²

¹² The categorisation of the regions in this study follows the OECD approach. Regions are considered urban when less than 15% of the population in the region lives in rural areas. A region is considered intermediate when between 15% and 50% of the population is living in rural areas. Finally, a region is considered rural when more than 50% of the population is living in rural areas.

Second Line Maintenance	More technical maintenance than first line maintenance, including replacing and repairing worn parts, and updating software.
Surcharges	Fees charged by ATM providers to non-customers for using their ATMs.
Tourism intensity	Number of nights spent by tourists from countries with different local currencies. For example, for Germany these are the nights spent by tourists from non-Eurozone member states.
Through-the-wall (TTW) machine	Through-the-wall machines are ATMs installed to operate through an exterior wall or window.

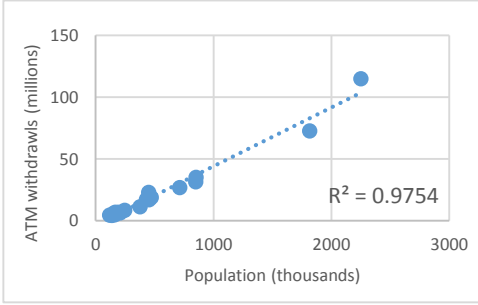
ANNEX I. METHODOLOGY FOR TRANSACTIONS, REVENUES AND COSTS

The table below summarises the methodology used to obtain the costs and revenues for operating ATM machines under the three business models, respectively Bank Branch, Bank Remote and Independent. Given the importance of the number of transactions for various costs and revenues, these are discussed separately. The costs and revenues are all determined per ATM machine per year. When a driver is applicable to several costs and revenues it is only explained the first time it is applicable.

Table A 1. Transactions, costs and revenues, drivers, data sources and assumptions

Indicators	Drivers	Calculations	Sources	Assumptions
Transactions		Total number or value of transactions / total number of ATM machines		
	Total number of transactions		Total number of ATM withdrawals for 2017 is obtained by country from ECB (2018).	
	Total value of transactions		Total value of ATM withdrawals for 2017 is obtained by country from ECB (2018).	
	Total number of ATM locations		The total number of ATM locations is based on the mapping exercise that provides the locations of all ATMs at NUTS3-level (see methodology section in text for sources).	

Indicators	Drivers	Calculations	Sources	Assumptions
	Number of ATM machines per location		The number of ATM machines per location is based on the actual number when published on the website scraped for the locations, otherwise the number is assumed based on random samples for the largest providers in the countries. The number of machines has been verified against the total number of machines for the market according to the ECB (2018) statistics.	Bank branches have 2 ATM machines per location (except for the Sparkassen and Volks & Raiffeisenbanken in DE where they have 1.7 ATM machines per location and EL, PL and SE where they have 1 ATM machine per location). Other types of location, such as remote ATM machines, have 1 ATM machine per location.
Adjustment for degree of urbanisation				There are more ATM transactions taking place at locations where there are more people and/or commercial activities.
	Population density and economic activity		The total number of domestic transactions has been determined based on the number of residents that the ATM machine services at NUTS3 level. The size of the population at NUTS3 level has been obtained from Eurostat (2018) for 2017 or the latest year available.	The number of domestic transactions at an ATM depends on the population and number of machines in a NUTS3 region, unless surcharge or disloyalty fees are being charged. Similarly it is assumed that the amount of cash withdrawn depends largely on economic activity (GDP).

Indicators	Drivers	Calculations	Sources	Assumptions
				Figures for PT show an almost a linear relation between the number of transactions and the population.  Source: SIBS (2018)
Adjustment for international transactions				The revenues/costs on ATM transactions differ between domestic and international transactions. There is also an important distinction between international transactions conducted in local or foreign currency, which might generate DCC revenues.
	Total domestic vs international transactions		Whether the transaction is national or international is determined based on the statistics on ATM withdrawals with cards issued by resident and non-resident payment service providers respectively. The figures on the number of	

Indicators	Drivers	Calculations	Sources	Assumptions
			withdrawals is obtained for 2017 for all countries from ECB (2018).	
	Airport destinations	(Total passengers at airport * share of international passengers * share of passengers withdrawing cash) / Total number of ATM machines at airport	For the allocation of the international transactions, first the number of transactions at airport locations are calculated, then the remainder of the transactions are allocated among non-airport locations. This to address the fact that a substantially larger share of international card holders withdraw cash at the airport compared to other locations. <i>Passengers:</i> The number of passengers at the airport is obtained for 2017 or the last available year from Eurostat (2018) <i>International passengers:</i> The share of international passengers is based on the relative number of nights spent at tourist accommodation establishments at country	About 5% of the arriving travellers on airports withdrawals cash at an airport. The share of international travellers is pro-rata to the bilateral travel (i.e. domestic vs foreign nights spent at travel accommodations).

Indicators	Drivers	Calculations	Sources	Assumptions
			level, which is obtained from Eurostat (2018). <i>Cash withdrawals:</i> The average number of withdrawals per passenger is around 0.05 based on the number of withdrawals at ABN Amro at Schiphol Airport in 2010 (ABN AMRO, 2011 / Schiphol, 2011). <i>ATM Machines:</i> The number of machines at an airport is the number of ATM locations obtained from the mapping exercise multiplied by the number of machines per location.	
	International travel		The remaining international transactions (non-airport) are allocated to the ATM machines (non-airport located) based on the relative number of nights spent at tourist accommodation establishments, which is obtained from Eurostat (2018) at NUTS2-level for 2016 or latest year available.	The tourism transactions are determined by location, i.e. bank branches have an equal share of international transactions to that at bank remote and independent ATM machines, even when they have multiple machines.

Indicators	Drivers	Calculations	Sources	Assumptions
Adjustment for usage fees				Whether an ATM is free to use or only on payment of a fee has a significant impact on the number of transactions: free-to-use ATMs process many more transactions than those with a fee.
	Surcharges and disloyalty fees	(100% - Market share bank or card scheme) * Impact on transactions	Since in most countries the surcharges and disloyalty fees do not apply to own customers or customers of banks with whom the provider has an alliance, the domestic market shares of the bank providers have been used as a proxy to determine the share of the transactions affected by surcharges or disloyalty fees. <i>Market shares:</i> The bank assets for 2017 or latest year available were obtained from Orbis Europe. <i>Fee structures:</i> The fees charged by the largest bank and independent ATM and card providers have been obtained from corporate websites, supervisors and	Surcharge and disloyalty fees are discouraging customers from withdrawing cash in several countries, as in the UK, where customers are 90% less likely to withdraw cash when an ATM provider or card issuer charges a fee. This might lead not only to a reduction in transactions, but also to more usage of the ATMs of the card issuing bank.

Indicators	Drivers	Calculations	Sources	Assumptions
			mystery shopping sites (e.g. Finanztest) <i>Card schemes:</i> The card schemes that provide free withdrawals to members have been identified based on desk research and inputs from national experts. <i>Impact on transactions:</i> The impact of surcharges and disloyalty is based on figures from the UK interbank network LINK (2018) regarding the number of transactions of machines with and without fee. The figures for the period between 2001 and 2017 show that pay-for-use ATMs in the UK are used on average for a tenth or less of the transactions on free-to-use ATMs.	
Adjustment for visibility/traffic				The visibility of the ATMs largely depends on the location: ATMs that are in the street are likely to be more visible and generate more transactions than ATMs inside a shop.

Indicators	Drivers	Calculations	Sources	Assumptions
	Type of machine	Type of machine and * Impact on transactions	Through-the-wall (TTW) ATMs are in general more visible than lobby ATMs and therefore also generate more transactions. <i>Type of machine:</i> For each of the location types it has been determined whether they are more likely to be TTW or lobby based on random checks of the different types of locations using Google Street View. <i>Impact on transactions:</i> There are no official public statistics on the impact of the type of machines on the number of transactions. According to industry experts, TTW ATMs generate on average twice or almost three times as many transactions in the US (ATM Marketplace, 2002). However, this is less likely to be the case at certain locations such as airports and shopping centres. At these locations TTW and lobby ATMs are expected to generate the same number of transactions.	All ATM machines on the street are considered TTW. All other locations such as post offices (77% TTW), bank branches (60%), transport locations (13%) are a combination of TTW and lobby ATMs. TTW generate twice as many transactions as lobby ATMs, except for ATMs in transport locations (e.g. airports, metro and train stations) and shopping centres.

Indicators	Drivers	Calculations	Sources	Assumptions
Revenues				
Interchange fees		Total number/value of interchange transactions * fee per transaction		When a bank is both issuer of the card used for the withdrawal and receiver as operator of the ATM the transaction is considered as a transaction receiving interchange fees, as this would be the fees that the issuing bank would have to pay in case it would not be the operator of the ATM.
	Total transactions/value of interchange transactions		Various (see Transactions above).	Providers that charge surcharges do not receive interchange fees. Those transactions are therefore deducted from the transactions.
	Market share of card schemes		Since the interchange fees vary between card schemes, the number of transactions are distributed between the two largest cards schemes (Visa and MasterCard) based on their market shares, which have been obtained from various sources including the Swedish Competition Authority (2017) and news reports. For PT and GR, no reliable figures could be obtained, therefore the EU average has been used.	Since more than 95% of the transactions that are subject to surcharges are performed by Visa and/or MasterCard only these are considered.

Indicators	Drivers	Calculations	Sources	Assumptions
	Interchange fee per transaction		The interchange fees on cash withdrawals are not publicly available and protected by non-disclosure agreements, but widely known by market participants in each of the markets. The information on the 2017 interchange fees have been obtained from private sources under the condition not to disclose the source and detailed information on the fee per transaction.	Price sheets of both Visa and MasterCard are the same for all the ATM providers and representative for the domestic card schemes.
Surcharges (Direct Access Fee)		<i>Total number of surcharge transactions * fixed fee per transaction</i>		
	Number of transactions		There are only two of the selected countries with surcharges: DE and ES. In the case of DE, surcharges only apply to the domestic card scheme (GIRO), which means that it does not affect other domestic (approximately 30%; Worldpay 2017) and Mastercard international	Providers that charge surcharges do not receive DCC fees. The DCC transactions are therefore excluded from the transactions subject to surcharges.

Indicators	Drivers	Calculations	Sources	Assumptions
			transactions. In ES, surcharges apply to all international transactions, except for DCC transactions (see DCC). The number of transactions subject to surcharges follows the adjustment for surcharges and disloyalty fees (see Transactions above).	
	Surcharge fee per transaction	Weighted average	The surcharge fees are determined based on the surcharge fees charged by the largest banks or bank networks and independent providers in each of the countries. The information is obtained from the websites of the banks as well as the supervisors. <i>Fee structures:</i> The fees charged by the largest bank and independent ATM and card providers have been obtained from corporate websites, supervisors and mystery shopping sites (e.g. Finanztest). <i>Market shares:</i> The bank assets for 2017 or latest year	Fees charged by the largest providers are taken as representative for the surcharge fee charged.

Indicators	Drivers	Calculations	Sources	Assumptions
			available were obtained from Orbis Europe.	
Dynamic currency conversion (DCC)		<i>Total value of DCC transactions * variable fee for DCC transactions</i>		
	Value of transactions	International transactions * Share of non-local currency transactions * DCC share	Only part of the non-local currency international transactions is subject to DCC. <i>International transactions:</i> The value of international transactions follows the methodology described above (see Transactions). <i>Non-local currency:</i> The share of non-local currency transactions among the international transactions for euro area countries determined based on bilateral travel data for 2016 or last available obtained from Eurostat (2017). The share of nights spent by tourists from non-euro area countries over total nights spent by foreigners is used as proxy.	Bilateral travel is a good proxy for the share of non-euro vs euro transactions. Since customers are expected to prefer conducting transactions in their own currency, more than half of the non-local currency international transactions are assumed to be subject to DCC (60%)

Indicators	Drivers	Calculations	Sources	Assumptions
			<i>Share of DCC-transactions:</i> There is limited information about the share of non-local currency international transactions that is subject to DCC.	
	DCC fee per transaction		The variable DCC fee has been based on the exchange rate observed by Finanztest (2016) and the bilateral reference exchange rate as published by the ECB (2016) on the same days. The fees were available for DE (10.1%), PL (11.8%) and SE (3.8%).	For all the other euro area countries for which no rate was presented in Finanztest (2016) the same rate as for DE (10.1%), the only euro area country in the sample, was assumed.
Merchant payments		Share of ATMs paying merchant fee * merchant fee		Certain businesses such as casinos and offices like to have ATMs in their establishment to facilitate their activities or pay-outs. Since the number of transactions on these ATM machines are often lower, the merchants are expected to pay the ATM provider for placing an ATM machine at their establishment.
	Share of ATMs paying merchant fee		The share of ATM machines for which a merchant fee is paid is based on the mapping exercise that provides the location	For half of ATMs in casinos, restaurants, tourist attractions (55% of hospitality and leisure) and buildings, a merchant fee is charged.

Indicators	Drivers	Calculations	Sources	Assumptions
			types of all ATMs (see methodology section in text for sources).	
	Merchant fee		See machine, installation, dismantling, insurance and monitoring costs for lobby ATMs below.	Since there is a margin in operating an ATM, the merchant would only have to cover the fixed costs. The machine concerned is a lobby machine and the merchant provides the location, security and communication.
Advertising		Total number of transactions * number of advertisements shown * price per view		Many ATM providers use their ATMs to advertise their own or products and services of third-parties. This can be on screen or the outside of the ATM. For this exercise, the on-screen advertising revenues are considered.
	Total number of transactions	Domestic transactions + deposit transactions + other non-cash transactions	See Transactions, Deposit services and Other non-cash services.	
		Number of advertisements shown	Based on observations of the research team at various locations across countries, ATM providers show up to three advertisement pages.	ATM providers show a maximum of three advertisements.

Indicators	Drivers	Calculations	Sources	Assumptions
		Price per view	The price-per-view is based on the price that advertisers pay for a thousand views on Facebook (Nanigans, 2016).	The ATM machines are assumed to receive a similar amount per view as online advertisements.
Deposit services		Total number of deposit transactions * fee per transaction		
	Total number deposit transactions		The total number of deposits at ATM machines is determined based on a methodology that follows the methodology used to allocate domestic transactions across machines with adjustments for population, GDP and disloyalty fees and surcharges. <i>Number of deposits:</i> Total number of deposits at terminals for 2017 is obtained from the ECB (2018). <i>Deposit functionality:</i> Not all ATMs allow to both withdraw and deposit money at the same machine. In DE, deposit machines are completely distinct from ATM machines for cash withdrawals. Since for	When the majority of the ATMs in a business model has the deposit functionality it is assumed that all ATMs belonging to that business model have this functionality.

Indicators	Drivers	Calculations	Sources	Assumptions
			this study only ATMs that allow cash withdrawals are considered, the number of deposits for DE is zero. In most other countries, only the bank branches (FR, SE) or a combination of bank branches and bank remote locations (GR, PT, ES) accept deposits. PL is the only country in which also the independent ATMs accept deposits.	
	Fee per deposit	Weighted average	In most countries depositing money is free of charge for own customers of banks, with the exception of PL. While for clients from other banks it is usually at a cost or not possible/discouraged. The fees are calculated based on the asset-weighted average of the fees charged by the largest providers for each business model in PL and ES. <i>Deposit fees:</i> The fees charged by providers for depositing is obtained from the prices	Fees charged by the largest providers are taken as representative for the deposit fees of the entire market.

Indicators	Drivers	Calculations	Sources	Assumptions
			presented on corporate websites. <i>Market shares:</i> The bank assets for 2017 or latest year available were obtained from Orbis Europe.	
Other non-cash services		Total number of cash withdrawals * share of non-cash services * fee per transaction		
	Total number of transactions		Total number of domestic and international transactions (See Transactions).	
	Share of non-cash services		The relative share of the number of non-cash services not being publicly disclosed, the data for the ServiRed network in ES has been extrapolated to all other countries except for PT. In 2017, non-cash transactions (i.e. balance checks and PIN changes) in ES were equivalent to around 25% of total transactions. In PT, the ATMs have more functions such as the sale of event tickets,	Around 25% of the cash withdrawals are accompanied by checks of the account balance or PIN changes at ATM.

Indicators	Drivers	Calculations	Sources	Assumptions
			mobile phone top-ups, train tickets, etc. Based on data for the SIBS network these non-cash transactions were equivalent to around 80% in 2017.	
	Fee per transaction		The fees for most non-cash transactions are not disclosed, but according to the experts consulted for this study they range from €0.05 to €0.15 per transaction for transactions such as balance checks or PIN changes. For other transactions, average revenues per transaction are often higher. For PT, the average revenues are therefore higher than for the other countries. Based on information on transaction revenues in North America, the average revenues for these other non-cash transactions would be approximately €0.40 per transaction (ATMMarketplace, 2018).	Non-cash transactions deliver on average €0.10 per transaction. For PT, average revenues per transaction are assumed to be €0.30 per transaction.
Costs				

Indicators	Drivers	Calculations	Sources	Assumptions
Installation costs				
Site finding/contracting costs		(Time required for site finding and contracting * wage costs) / life-time ATM location		
	Time required for site-finding and contracting		The time required for finding a location varies largely between locations and providers. The site-finding for bank branch ATMs can be assumed to be an integral part of the finding of a suitable location for the branch. For both bank remote and independent locations, it depends, according to the experts consulted for this study, primarily on whether the parties agree at once for several locations. The time required is estimated at 1.5 working days (10 hrs) for a professional.	Time required for finding a location for bank branches is zero.
	Wage costs		Average hourly earnings (Professional - ISCO 2) plus 25% overhead for 2017 obtained from Eurostat (2018).	

Indicators	Drivers	Calculations	Sources	Assumptions
	Life time location		The average life-time of an ATM location is estimated at 20 years for branches and 10 years for remote and independent locations. These are often dependent on third parties, which also have the ability to switch providers, and mainly concern lobby ATMs, which are easier to relocate.	The average life-time of a branch is 20 years and of bank remote and independent locations is 10 years.
ATM installation		(Installation costs / ATM machine life-time) + financing costs		
	Installation costs	Type of location * type of machine * (Time required * wage costs or capital expenditures + other costs)	The installation of an ATM machine can be performed in-house or outsourced. According to the experts consulted for this study, there is a large variance in the installation costs depending on the type of machine (lobby or TTW). <i>Type of location:</i> The type of location is obtained from the mapping exercise. <i>Type of machine:</i> For each of the types of location it has	

Indicators	Drivers	Calculations	Sources	Assumptions
			been determined whether they are more likely to be TTW or lobby (See Adjustment for visibility/traffic). <i>Time required:</i> The installation of lobby ATMs is more likely to be taking place in-house, since it is in most cases relatively easy: about 3 hours are estimated as sufficient. <i>Wage costs:</i> Average hourly earnings (Technicians - ISCO 3) plus 25% overhead for 2017 obtained from Eurostat (2018). <i>Capital expenditures:</i> The installation costs of TTW machines are more likely to be outsourced and expensive. The costs of the installation of a TTW machine are estimated at €7,500 (excl. VAT). Due to the special and more stringent security requirements (bunker, etc.), installation costs in FR are estimated to include an additional €10,000 (excl. VAT) per location.	

Indicators	Drivers	Calculations	Sources	Assumptions
			<i>Other expenditure:</i> The other expenditures include predominantly transport costs, which have been estimated at €300 on average (excl. VAT).	
	ATM machine life-time		The average life-time of ATM machines based on the internationally accepted depreciation time for deposit-taking and multi-functional ATMs (ATMIA, 2003).	The average life-time is for ATM machines is 7 years.
	Financing costs	Average installation costs over life time * cost of capital	<i>Average installation costs:</i> The average costs of the installation are half the initial installation costs assuming linear depreciation. <i>Cost of capital:</i> The cost of capital for banks (i.e. Bank [Money Center]) and independent (Financial services [Non-bank & Insurance]) is based on Damodaran (2017), which calculated the capital expenditure for listed banks and other financial services (4.8% and 3.8% respectively) at the start of 2017.	The installation costs are depreciated linearly.

Indicators	Drivers	Calculations	Sources	Assumptions
ATM machine		(Machine costs / ATM machine life-time) + financing costs		
	Machine costs	Type of location * type of machine * costs of machine	The prices of ATMs range between €1,000 and €25,000 per machine (excl. VAT), primarily due to differences in types of machine and required functionalities. <i>Type of location:</i> The type of location is based on the type of machine obtained from the mapping exercise. <i>Type of machine:</i> For each of the types it has been determined whether they are more likely to be TTW or lobby (See Adjustment for visibility/traffic) <i>Wage costs:</i> Average hourly earnings (Technicians - ISCO 3) plus 25% overhead for 2017 obtained from Eurostat (2018). <i>Cost of machine:</i> The price of a single lobby machine is based on predominantly American websites that offer these	

Indicators	Drivers	Calculations	Sources	Assumptions
			machines at approximately €5,000 (excl. VAT), whereas an average TTW machine costs about €10,000 (excl. VAT). In countries that allow deposits and cash recycling, the machines are €5,000 more expensive (excl. VAT).	
	ATM machine life-time		ATM machine life-time (see ATM installation).	
	Financing costs	Average installation costs over life time * cost of capital	Financing costs (see ATM installation).	
ATM dismantling		(Dismantling costs / ATM machine life-time) + financing costs		
	Dismantling costs	Type of location * type of machine * (Time required * wage costs or capital expenditures + other costs)	The dismantling of an ATM machine can be performed in-house or outsourced. According to the experts consulted for this study there is a difference in the dismantling costs depending on the type of machine (lobby or TTW).	Dismantling is in general significantly less costly than installation.

Indicators	Drivers	Calculations	Sources	Assumptions
			<i>Type of location:</i> The type of location is based on the type of machine obtained from the mapping exercise. <i>Type of machine:</i> For each of the types it has been determined whether they are more likely to be TTW or lobby (See Adjustment for visibility/traffic). <i>Time required:</i> The dismantling of lobby ATMs is more likely to be taking place in-house, since it is in most cases relatively easy: about 2 hours are estimated as sufficient (slightly less than installation). <i>Wage costs:</i> Average hourly earnings (Technicians - ISCO 3) plus 25% overhead for 2017 obtained from Eurostat (2018). <i>Capital expenditure:</i> The dismantling costs of TTW machines are more likely to be outsourced and expensive. The costs of the dismantling of a TTW machine are estimated at €1,000 (excl. VAT). Due to the	

Indicators	Drivers	Calculations	Sources	Assumptions
			special and more stringent security requirements the dismantling costs in FR are estimated to be 50% higher (€1,500 excl. VAT). <i>Other expenditures:</i> The other expenditures include predominantly transport costs, which have been estimated at €200 excl. VAT on average (slightly lower than for installation).	
	ATM machine life-time		ATM machine life-time (see ATM installation).	
	Financing costs	Average installation costs over life time * cost of capital	Financing costs (see ATM installation).	
Operating costs				
Fixed costs				
Real estate		Number of square metres per ATM machine * rental costs per square metre		Even when the provider processes the location, the costs are assumed based on potential rental costs/revenues. If the provider would not have been exploiting the ATM machine, it might have been able to rent the space to another

Indicators	Drivers	Calculations	Sources	Assumptions
				ATM provider (i.e. opportunity costs).
	Number of square per ATM machine		The placement of an ATM requires in general about 1 square metre. The only exception is FR where in addition to the location of the ATM a technical room of at least 6 square metres is required by law. When a location has several ATM machines this room can be shared.	
	Rental costs per square metre	Office rental costs * location type factor	<i>Office rental costs:</i> Rental prices are very much location specific. Bank branches and ATMs are often located at prominent locations therefore the prime headline rent price per square metre at the end of 2016 have been used as proxy for the rental costs. The prime rental prices have been obtained for the main cities in the selected countries from Colliers International (2017). <i>Extrapolation to other locations:</i> Based on the rates	ATM machines are located at prime locations. Office rental prices are primarily dependent on the price-level and size of the economy. These combined factors explain almost 80% in the variance in prime rental prices.

Indicators	Drivers	Calculations	Sources	Assumptions
			for these locations the rates for all the NUTS3 regions have been estimated using GDP and GDP per capita for 2016 are obtained from Eurostat (2017). <i>Type of location:</i> The type of location is based on the type of machine obtained from the mapping exercise. <i>Type of machine:</i> For each of the location types it has been determined whether they are more likely to be TTW or lobby (See Adjustment for visibility/traffic). <i>Location type factor:</i> The market for remote locations is very specific since only 1 square metre is required and not an entire store such as for a branch. The ATM providers are therefore often sub-letting from merchants, which charge in most cases more than just the price of 1 square metre. Based on a sample of TTW and lobby contracts of independent provider Euronet in ES the average mark ups for	Prime rent (€/M²/Month) GDP (billion €) $R^2 = 0.6154$ Source: Colliers International/Eurostat (2017) Prime rent (€/M²/Month) GDP per capita (€) $R^2 = 0.5874$ Source: Colliers International/Eurostat (2017) The rental prices for the largest independent ATM provider in ES are representative for all providers and selected countries.

Indicators	Drivers	Calculations	Sources	Assumptions
			domestic/international-oriented and TTW and lobby ATMs has been determined. The location type factor ranges between 0 for ATMs rented by merchants (see Merchant payments) and 24 on average for internationally-oriented ATMs (transport location). <i>Discount:</i> Since it is expected that the price per square metre will converge to the prime rental price when the number of square metres increases, a discount of 50% has been applied to the rental costs in FR.	
Security		Time required * wage costs		
	Time required		The security of ATMs in most cases includes monitoring with a camera. The monitoring and follow-up of a single security camera in countries like FR is available from €600 per camera per year, which is equivalent to about 40 person-hours (incl. overhead).	Each ATM has one camera for security, which takes about 40 person-hours per year for monitoring.

Indicators	Drivers	Calculations	Sources	Assumptions
	Wage costs		Average hourly earnings (Service and sales workers - ISCO 5) plus 25% overhead for 2017 obtained from Eurostat (2018).	
Insurance		Insurance premium (ATM Machine + cash ATM * insurance rate)		
	ATM machine		ATM machine costs (see ATM machine).	
	Cash in ATM		Maximum cash in ATM (see cash filling).	
	Insurance rate		The insurance of an ATM machine and cash costs approximately 0.1% of the maximum insured amount. This rate is based on the insurance that the ATM Owners Association in the US offers to its members, i.e. \$9.95 insurance premium for a coverage up to \$10,000 (ATM Marketplace, 2004).	
Communication		Broadband costs / Number of ATM		The ATM machine requires an internet connection to process

Indicators	Drivers	Calculations	Sources	Assumptions
		machines per location		transactions, monitoring and security.
	Broadband subscription		The communication costs are based on the average costs for a broadband package in the country (incl. VAT). The average package cost per month for broadband packages in 2017 has been obtained from Cable (2017).	
	Number of ATM machines per location		The average number of ATM machines per location (see Number of ATM machines per location).	
Monitoring cost		Time required * wage costs		Monitoring cost includes the costs for monitoring the operations of the ATM, but also cash forecasting, cash reconciliation, chargeback handling, etc.
	Time required		The monitoring is usually performed for many ATMs at the same time. According to the experts consulted for this study, a single person should be able to monitor about 100 ATMs, which means that about half a workweek per year is	A single person (FTE) can monitor about 100 ATMs.

Indicators	Drivers	Calculations	Sources	Assumptions
			spent on monitoring (i.e. 2000 hours [1 FTE] / 100 = 20 hours)	
	Wage costs		Average hourly earnings (Clerical support workers - ISCO 4) plus 25% overhead for 2017 obtained from Eurostat (2018).	
Taxation				
	Taxation amount		The placement of ATM machines is only taxed in BE. The tax is charged at local level and is a fixed fee per year. Based on a sample of different local authorities the average amount is about €250 per year.	
Variable costs				
Processing costs		Total number transactions * market share of card schemes * processing costs per transaction		When a bank is both issuer of the card used for the withdrawal and receiver as operator of the ATM the transaction is considered as a transaction receiving interchange fees, as this would be the fees that the issuing bank would have to pay in case it would not be the operator of the ATM.

Indicators	Drivers	Calculations	Sources	Assumptions
	Total transactions	Total transactions subject to interchange fees + total transactions subject to surcharges	Total transactions subject to interchange fees or surcharges (see Transactions).	
	Market share of card schemes		Market shares of cards (see Market share of card schemes).	
	Processing costs per transaction		The processing costs are not publicly available and protected by non-disclosure agreements. The information on the 2017 processing costs could, however, be obtained from a private source under the condition not to disclose the source and detailed information on the fee per transaction.	Price sheets of both Visa and MasterCard are the same for all the ATM providers.
Financing costs		(Average cash in ATM + cash in circulation)* cost of capital		
	Average cash in ATM		The average cash in the machine is equal to half the minimum plus maximum amount in the ATM machine.	The amount of cash in the ATM goes down linearly over time. The ATM is refilled when there is still 10% left in the ATM.

Indicators	Drivers	Calculations	Sources	Assumptions
			<i>Minimum cash in ATM:</i> The ATM is refilled when the cash in the ATM is 10% of the refill amount. <i>Maximum cash in ATM:</i> The amount of cash in the ATM after refill. The average amount of the refill is optimised in combination with cash filling (see cash filling) and rounded to the closest €10,000.	
	Cash in circulation	Number of fillings * circulation and payment time	<i>Number of cash fillings</i> (see Cash filling) <i>Circulation and payment time:</i> There is some time between obtaining the cash from a cash provider and the cash filling of the ATM.	The time between obtaining the cash and cash filling is assumed to be around a week.
	Cost of capital		Cost of capital (see ATM installation).	
Cash filling		(Total value of transactions – total amount deposited) / Average filling amount * Costs per cash filling		

Indicators	Drivers	Calculations	Sources	Assumptions
	Total value of transactions		Total value of transactions subject to interchange fees or surcharges (see Transactions).	
	Total amount deposited		Total amount of deposits (see Deposit services).	The amount deposits is assumed to be equal across business models.
	Average filling amount		The average cash filling amount is optimised by minimising the combined cash filling and financing costs. The optimal amount is rounded at €10,000 and capped at €150,000, addressing the maximum of cash in ATM machines allowed by insurers of CITs.	
	Costs per cash filling	Time required * wage costs	<i>Time required:</i> The time required for refilling an ATM varies depending on the distance and time required to get from the cash centre of the ATM provider, CIT and/or ATM location to the ATM location in addition to the time needed to put the cash in the ATM machine (0.25 hours). Since the branch should already receive cash from deposit taking or require cash	Bank branches are able to recycle their deposits or make use of the cash already provided to the branch. Bank remote and independent ATMs need on average around 1 hour for refilling (incl. transport). This amount is doubled for GR, where the filling of cash machines is more time consuming due to natural barriers.

Indicators	Drivers	Calculations	Sources	Assumptions
			transport for other activities, the cash filling time should just consist of preparing the cash for the cash machine and putting the cash in the ATM. The cash filling always occurs with at least two persons, which means that the time required should be at least doubled. <i>Wage costs:</i> Average hourly earnings (Service and sales workers - ISCO 5) plus 25% overhead for 2017 obtained from Eurostat (2018). The wage costs for bank remote and independent ATMs are tripled to account for the transport costs.	
Consumables		(Total number of transactions / average number of transactions per consumable) * costs of consumable		Consumable (paper, ink, etc.) required for operating ATMs are refilled together with cash refills.
	Total number of transactions	Total number of cash withdrawals +	<i>Total number of cash withdrawals:</i> Total number of	

Indicators	Drivers	Calculations	Sources	Assumptions
	(withdrawal, deposits, other)	non-cash transactions + deposit transactions	transactions subject to interchange fees or surcharges (see Transactions). <i>Non-cash transaction:</i> Total number of non-cash transactions such as balance checks and PIN changes (see Other non-cash services). <i>Deposit transactions:</i> Total number of paid and free-of-charge deposits (see Total Deposit services).	
	Average number of transactions per consumable	Tickets per roll * share requiring ticket	<i>Tickets per roll:</i> The paper rolls for ATMs are about 500m long and a single ticket is about 10cm long, allowing 5,000 tickets to be printed per roll. <i>Share requiring ticket:</i> A substantial minority of ATM users is likely to request a printed ticket.	About 33% of customers require a ticket when withdrawing, depositing or conducting non-cash transactions at the ATM.
	Costs for kit of consumables		The paper roll for the tickets costs around €8 per roll (excl. VAT).	
Cash processing		Bank branch and bank remote ATMs: Number of fillings * time		Independents do not have the same cash recycling abilities and access to central bank cash services as bank

Indicators	Drivers	Calculations	Sources	Assumptions
		required * wage costs Independents: (Total value of transactions – total amount deposited) * costs for obtaining cash		branches. They are therefore assumed to obtain cash from banks.
	Total value of transactions		Total value of transactions subject to interchange fees or surcharges (see Transactions).	
	Total amount deposited		Total amount of deposits (see Deposit services).	
	Number of fillings	Total value of transactions (net of deposits) / average filling amount	Average filling amount (see Cash filling).	
	Time required		For the bank, cash processing mainly involves the counting of the cash before it goes into the ATM machine. According to the experts consulted for this study a single person should be able to prepare the cash in about half an hour.	
	Wage costs		Average hourly earnings (Clerical support workers -	

Indicators	Drivers	Calculations	Sources	Assumptions
			ISCO 4) plus 25% overhead for 2017 obtained from Eurostat (2018).	
	Costs for obtaining cash		There is very limited public information available on the costs for obtaining large amounts of cash from banks. The fee has therefore been estimated based on Brits and Winder (2005), which calculated the costs of payments in the Netherlands for 2002. Taking the costs of the bank cash centres as a share of total transactions corrected for (sales-linked costs), the costs of cash would be around 0.06%.	The costs of cash for independents are 0.06% of the cash amount obtained.
Maintenance		First line maintenance + second line maintenance	The average total maintenance costs for ATMs in Canada have been calculated to be between \$90 and \$165 per month (€950 to €1750 per year excl. VAT) (Deloitte, 2012). The amounts are within this range or lower.	(Replacing consumables, resolving jams, on-site troubleshooting, restoring communications, cleaning, replacing damaged panels, replacement of worn parts, software updates, etc.)
	First line maintenance (FLM)	(Total transactions / Transactions per FLM) * (Time	<i>Total transactions</i> : Total number of transactions, including both transactions	The FLM (routine support) is conducted at a fixed frequency

Indicators	Drivers	Calculations	Sources	Assumptions
		required * Wage costs + other costs)	subject to interchange and surcharge fees (see Transactions). <i>Transactions per FLM:</i> FLM is a transaction that has to be conducted every approximately 2,000 transactions. <i>Time required:</i> The FLM takes about one hour. <i>Wage costs:</i> Average hourly earnings (Service and sales workers - ISCO 5) plus 25% overhead for 2017 obtained from Eurostat (2018). <i>Other costs:</i> The average costs for spare parts for one FLM intervention are budgeted at €25 excl. VAT.	together with the refilling of the ATM machines.
	Second line maintenance (SLM)	(Total transactions / transactions per SLM) * (time required * wage costs + other costs)	<i>Total transactions:</i> Total number of transactions, including both transactions subject to interchange and surcharge fees (see Transactions). <i>Transactions per SLM:</i> SLM is an operation that has to be	The SLM includes larger maintenance as well as non-scheduled maintenance that requires separate transport costs and more specialised knowledge.

Indicators	Drivers	Calculations	Sources	Assumptions
			conducted approximately every 40,000 transactions. <i>Time required:</i> The SLM takes about two hours for two persons (one person to open machine and one to conduct SLM). <i>Wage costs:</i> Average hourly earnings (Technicians and associate professionals - ISCO 3) plus 25% overhead for 2017 obtained from Eurostat (2018). <i>Other costs:</i> The average costs for spare parts and transport for one SLM intervention are budgeted at €500 excl. VAT.	



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