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Impact of Digital Payment Methods on Traditional Payment Transactions

An Analysis of the Effects on the Swiss Financial Market

Colin Bolli

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An Analysis of the Effects on the Swiss Financial Market

Colin Bolli

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Abstract

In a digital age, new payment methods are challenging traditional means such as cash and card products. These new challengers come in the form of digital banks and mobile payment solutions. The last couple of years have seen a sweeping increase of customer base. Most traditional players, like banks or credit card providers, do not know the reach and possible future effects the challengers have on their business model.

The main objective of this thesis was to discover effects on the traditional transactional system and answer following scientific question:

> *“Do digital payment methods have an impact on traditional payment transactions?”*

Through analysis of literature and actual transactional data of a Swiss retail bank, it was proven that new players and methods do impact the current system. A disruptive effect was detected for traditional products used abroad. Responsible for this were mainly digital banks. Mobile payments were found to be more of a substituting and not disruptive nature.

Kurzfassung

Im digitalen Zeitalter stellen neue Zahlungsmethoden traditionelle Mittel wie Bargeld und Kartenprodukte in Frage. Diese neuen Herausforderer kommen in Form von digitalen Banken und mobilen Zahlungslösungen. In den letzten Jahren hat der Kundenstamm stark zugenommen. Die meisten traditionellen Akteure, wie Banken oder Kreditkartenanbieter, wissen nicht, welche Reichweite und möglichen zukünftigen Auswirkungen die Herausforderer auf ihr Geschäftsmodell haben.

Das Hauptziel dieser Arbeit war es, die Auswirkungen auf das traditionelle Transaktionssystem zu finden und folgende wissenschaftliche Frage zu beantworten:

> *"Haben digitale Zahlungsmethoden einen Einfluss auf den traditionellen Zahlungsverkehr?"*

Durch die Analyse der Literatur und effektiver Transaktionsdaten einer Schweizer Retail Bank wurde nachgewiesen, dass neue Akteure und Methoden einen Einfluss auf das gegenwärtige System haben. Für traditionelle Produkte, die im Ausland verwendet werden, wurde ein disruptiver Effekt festgestellt. Verantwortlich dafür waren vor allem digitale Banken. Mobile Zahlungen erwiesen sich als eher substituierend und nicht störend.

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Abbreviations

API	application programming interface
ATM	automated teller machine
B2B	business-to-business
B2C	business-to-customer
Big Tech	big technology
CHF	Swiss franc (currency)
CSV	comma-separated values file
EUR	euro (currency)
FinTech	financial technology
IBAN	international bank account number
ID	identifier
IT	information technology
KPI	key performance indicator
P2P	peer-to-peer
POS	point of sale
QR	quick response
SEPA	single euro payments area
USD	United States dollar (currency)

1 Introduction

Since the very beginning people have been exchanging valuables or placeholder of value with each other. During the Neolithic and Bronze Age this could mean that you traded food for an object of use, or more likely, bought something on credit and paid the other party back later. This was due to the short harvesting seasons which led to a lot of purchases on credit. So even over 7000 years ago there were different means of transactions already (Hudson, 2020, pp. 46-49). Over the following millennia the monetary and transactional system was transformed multiple times and different payment methods were added. From coins, currencies exchanges, promissory notes, bank notes, up to credit cards and online and mobile banking, the system and means of transaction were always subject to change. Usually these changes are driven by technological or social innovations (Battilossi, 2020, pp. 26-29).

Right now, there is another revolution happening. As other industries, banking is in the middle of digitalizing its business models, which in some regards is labeled banking 4.0. From restructuring its underlying IT frameworks to adapting new technologies such as Artificial Intelligence, the financial sector is experimenting and adapting new technology in the face of the fourth industrial revolution (Brühl, 2018, pp. 5-6). This also includes methods of payment and transactions. Digital wallets, direct transactions, mobile payments, crypto currencies or new card services stand to challenge the current status quo of transactions (Lerner, 2013, pp. 7-13).

1.1 Purpose

The main purpose of the thesis is to examine the impact of digital payment methods on traditional ways of payment excluding cash. For this, the current state of traditional payment services from retail banks and alternatives will be analyzed, compared and finally verified by analyzing actual transaction data from a Swiss retail bank.

Traditionally speaking, banking is not a market with a high rate of innovation unless there is an external push. The progress in consumer technology and social acceptance thereof is pushing banks and transaction methods into an ever more digital framework. The transition of customers into a more digital adept users means, that the expectations for banking services have changed dramatically from the client's point of view (Brühl, 2018). A survey by Capgemini in 2018 with retail banking executives showed, that customer expectations was seen as the biggest force pushing for change and is disrupting the market. The shift in client's behaviors and the need to create a satisfying user experience put the transactional system with all its tools into the spotlight. Especially as digital pure players such as Amazon and Apple are now delivering simple, immediate and personalized financial services (Capgemini, 2018, p. 21).

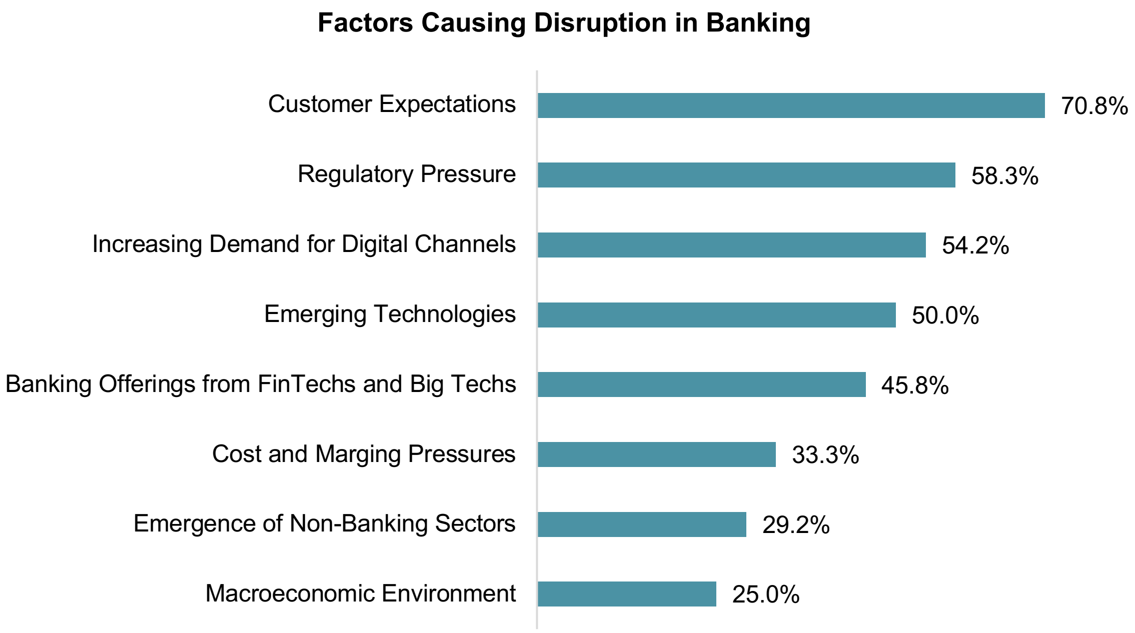

Figure 1 – Factors Causing Disruption in Banking (Capgemini, p. 21, 2018)

This led to a shift in product development for traditional financial providers. Not the product but the client is now the focal point, as positive interactions with other industries set the bar for user satisfaction (Capgemini, 2018, pp. 20-22). The main sector that needs change in this regard is the B2C sector with the main focus on retail banking. Many new players have emerged in this area and have started to redefine how interactions with your financial institution could look like and how transactions are made (Brühl, 2018, pp. 4-5). Possible solutions range from P2P platforms to digital currencies and mobile payments. Most likely a mixture of those approaches and others will replace or supplement the current market (Lerner,2013, pp. 133-138). By analyzing actual transactional data this thesis aims to confirm or falsify one main thesis and three subordinate research issues. To make this possible, the thesis is written in cooperation with said bank, which will remain anonymous. In this thesis the bank will be referred to as “research partner”.

1.1.1 Main Thesis

This thesis focuses on the effects these new methods have or have not on the current system and get a better understanding of what the future of money transactions looks like. The primary scientific question

Do digital payment methods have an impact on traditional payment transactions?

1. Alternative payment methods have a net-zero or positive effect on traditional payment transactions.
2. Alternative payment methods only affect the use of credit and debit cards from traditional banks.

The hypothesis is, that alternative methods base on the same underlying system. Therefore, digital payment methods represent a challenge from a product point of view and are no disruptive force to the traditional transactional system as a whole.

1.1.2 Research Issues

To answer the main thesis, three research issues were formed. Each research issue focuses on a specific way in which digital payment methods might impact traditional payment transactions.

Does the rise of alternative payment methods affect the traditional payment system for transactions nationally?

1. Alternative payment transactions are similar to the products of traditional payment providers and therefore do not convert enough customers to cannibalize the national market.
2. Digital banks do not possess a disruptive nature on other banks, they are just normal competitors with a digital more mature product.

The first research issue targets the effect of digital banks on the national market and products. The hypothesis is, that on a national level new players and methods are competitors and not disruptors.

Does the rise of alternative payment methods affect the traditional payment system for transactions abroad?

1. Alternate payment transactions are superior to the products of traditional payment providers and therefore impact the traditional system negatively.
2. Users of alternatives use their banking products less abroad than the average of the majority of the clients.

The second research issue analyzes the influence of alternate payment transactions with traditional means of payment abroad. As the hypothesis suggests, new players affect traditional providers negatively and therefore result in a drop of usage from traditional services abroad.

Are mobile payment methods growing faster than traditional payment trans-actions?

1. Mobile payments grow at the same rate as traditional means of transactions.
2. Mobile payments are more complimentary than disruptive to normal means of transactions.

The last research issue focuses on mobile payments and mobile banking. By comparing scientific studies and hard data on growth patterns and indicators the hypothesis that mobile payments are not a disruptive force shall be answered.

1.2 Thematic Delimitation

The field of transactions and payment systems has developed many different means of transactions (Lerner, 2013, pp. 3-6). This thesis focuses mainly on the traditional means of transaction by a retail bank. This includes debit cards, mobile- and online banking, own mobile payment solutions, such as Twint, and automated teller machine (ATM) transactions. For new methods there were mainly two players identified. N26 and Revolut are both digital banks (Arslanian, 2019, p. 43) and have seen large popularity in Switzerland over the last years. Other methods are briefly discussed but no indebt analysis was made. This is due the fact that other methods are not as visible in the datasets from the research partner. Also distributed ledger technologies (Brühl, 2018, p. 11) are only briefly discussed, as the technological aspect would take away the focus of the different payment methods itself.

The geographical limitation is set to mainly the Swiss market. This is due to the fact that the transactional data from the research partner only shows the marketplace Switzerland. Marked segmentation wise, the focus is on B2C clients and their usage rate of the aforementioned products. Due to complex payment structures of business-to-business (B2B) clients they are less flexible and free in choosing of their tools of payment because of compliance and security concerns.

Due to the SARS-Cov-2 outbreak, which was declared a pandemic by the world health organization on 11 of March 2020, (Saxena, 2020, p. 2) the transactional data and customer behavior have changed within a short period of time. The federal council of Switzerland closed down and enforced different measures impacting many parts of public live as of the 13, 16 and 20 of March 2020 (BABS, 2020, p. 15). Due to the highly contagious nature of SARS-Cov-2 (Saxena, 2020, p. 3) the majority of people have reduced their normal traveling and spending behavior (BABS, 2020, p. 15), which has an impact on the data from the research partner. This thesis analyzes the impact of SARS-

Cov-2 but does not focus on this particular time period. For the period is too short to find meaningful long-term impact of payment behaviors.

1.3 Outline

In this first chapter the purpose and thematic delimitation are defined. The second chapter builds the theoretical basis on transaction of money and different means thereof. Furthermore, the current system and new players are introduced. The next chapter describes the methodology of analysis of transactional data as well as describing the research partner and defining the data queries. In the fourth chapter is dedicated to the findings of the empirical data analysis. In chapter five the results are presented, conclusions for each research issue are drawn and future scenarios for traditional and new players are introduced. The last chapter reflects and discusses the findings of this thesis.

2 Theoretical Basis

In this chapter the theoretical basis of this work is conveyed. This also includes the definition and delimitation of terms used to describe the term transaction of money as well as the analysis of different methods and players. The following subchapters are based on literature research and the result thereof.

2.1 Transaction of Money

This thesis uses the word transaction as a description of transaction of money. This always characterizes the transfer of funds but does not specify by which means. From direct deposits, over card products to traditional transactions in cash, there are many ways of sending and receiving money (Lerner, 2013, pp. 2-7). Even more so in today's digital landscape.

2.2 Traditional Payment Transactions

The terms in the world of financial transactions are often defined differently from each company or study to the next. For this thesis the term traditional payment transactions describes the means a customer of a traditional retail bank has to spend or receive money. In the course of this thesis traditional payment methods include interactions at ATMs, use of card products as well as online solutions by banks. The use of mobile payment services by traditional service providers are omitted and are counted to the new methods of payment. Also excluded are all transactions made in cash, as they do not register a data entry and are therefore hard to track. Only when cash is being paid in or out of a bank, does it leave a trace within the payment transactions system.

2.2.1 Traditional Players

Traditional players define the group of financial companies that do not focus on digital products completely. Usually those companies have been around for over a decade. Today they face the challenge of new players and often have to adapt the disruptors strategy in the fight for market share (Arslanian, 2019, pp. 43-45). Examples of traditional players are retail banks and credit card providers.

Retail Banks

Retail banks and retail banking describes a business model for banks focusing on low to middle income customers. They offer mass solutions to the broadest B2C demographic and are a main pillar of the global transactional market. Traditional products for retail bank customers are payroll and saving accounts, online banking and card services.

In the subchapter 3.1.1 the functions and offerings of a retail bank are further elaborated as part of the description of the research partner.

Credit Card Providers

The 1970s saw the rise of a new payment method, which aimed to make consumption more convenient. Instead of having to carry cash or wait until your next pay day, you could buy instantly. This was made possible through short time credit with a plastic card. These cards were not issued by banks but by a new group of players within the financial market; the credit card providers. Credit card companies provide their customers with cards and set a limit according to different evaluation criteria. This could be the income or financial assets for example. On the other hand, those companies need to earn the trust of merchants, so that they accept payment with their cards. In return the credit card providers give a guarantee on money spent with their cards to those vendors. As a consequence, credit card companies operate in a two-sided market (Stango, 2018, p. 2440).

To make money, credit card companies charge different kind of fees. There are some credit cards with higher credit limits and added offerings that warrant a yearly card fee. Then there are fees for the accounting process itself. Most profitable are however fees for the use of the card itself. One doctrine is to charge fees to the merchant, when they accepted a card payment. Card companies can only do so, because customers prefer to pay with a credit card. If there are enough customers of one credit card company in one demographic group, the businesses are sort of getting bullied into accepting those cards. The other school of thought is to charge the customers for the usage of the card. A negative of this pricing strategy is, that the convenience now stands against the cost of the transaction itself (Stango, 2018, pp.2440-2441). This could be seen as providing a client with a pro and a contra point for each use of the card. This can hinder card usage drastically. Exchange rate fees is another income source of card providers. Since 1970s international travel has exploded. The international expansion and acceptance of card companies such as Master Card or Visa has made credit cards a preferred method of payment while abroad. This spares the customer the trip to a currency exchange office or bank and offers more convenience for him (Stango, 2018, pp. 2440-2441).

All these different fees and rates offer new and innovative payment providers a point of attack in their attempt to try and poach customers from their client base (Arslanian, 2019, p. 44). Some of these card issuing companies have joined up with digital banks, so that their company stays relevant in this transforming economy. An example are the cards of N26, which are provided by Master Card (N26, 2020).

In the following chapters, there are mentions of payment with cards. If not explicitly stated, that these transaction stem from a credit card, the term cards refer to debit or bank account cards not issued by a credit card provider but the bank itself.

2.2.2 Structure of the Current Payment Transaction System

The current payment system was born out of the industrialization of payments during the late 1950s and the early 1960s (Bott, 2016, p. 2). As pictured below, this meant the introduction of a so called four-party payment system. In this system, customers and shops did not need to be at the same bank to virtually transfer funds to each other or rely on instant cash transactions. Instead, the banks started to communicate with each other and transfer funds automatically (Bott, 2016, p. 4).

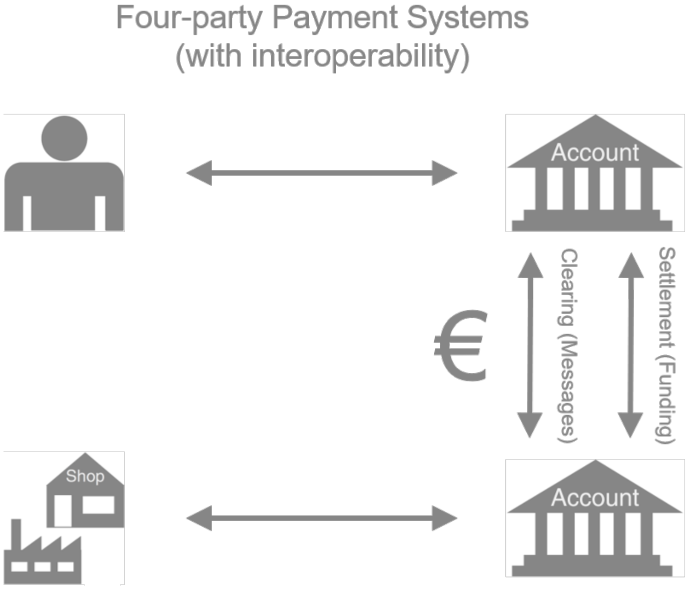

Figure 2 – Four-party payment systems (Bott, 2016, p. 4)

The communication consists of two parts. Clearing or the messaging between the banks, transfer information about the amount owed or to be sent and state the beneficiary and creditor of the transaction. The settlement describes the transfer of funds between the banks (Bott, 2016, pp. 3-4). This system allowed players such as credit card providers and others to insert themselves into this ecosystem and build new business models (Stango, 2018, pp. 2440). A challenge was, that each bank and each country could implement different systems that required different types of information. This resulted in the need of more standardized proceedings and formats for transactions as efficiency was hindered by the vast landscape of different systems (Bott, 2016, pp. 4-6).

Today, there are different standards for the exchange of money by banks between each other and their clients. In the last couple of decades, banks and governing institutions have pushed for more standardization to facilitate more automated and efficient exchange of funds nationally and abroad. An example for this is the single euro payments area (SEPA) which introduced uniformed cashless transactions all across Europe with substantially reduced transaction fees. This reduces the number of transactions to be processed manually due to system errors or insufficient information about the transaction (Brühl, 2018, p. 11).

Also, the surge in popularity of quick response (QR) payments made many countries and financial providers adopt this technology in an effort to simplify the registration of payment. An example of this is the collaboration of different institutions from Norway, Spain and other European countries in an effort to standardize the regions fragmented invoicing and payment landscape (Capgemini, 2019b, p. 13). On the 30th of June 2020, Switzerland also introduced a new payment slip which features a QR code. This gives Swiss banks the opportunity to further automize payments and enhances the convenience for mobile payers (Six, 2020).

In general, Swiss retail banks see the transactional divisions as the ones most affected by upcoming structural change and the emergence of new players. For as retail banks still profit of the current system, they are slow to adapt and hesitant to move off current fee structures. This leaves them vulnerable to competitors who advertise with lower or no fees for the same services (Schwaller, 2019, p.42).

2.3 New Methods of Payment

New payment methods is a collective term for all new types of transaction methods. This includes mobile payment solutions, digital banks, peer-to-peer (p2p) transactions, crypto currencies and other means, that are not offered by a traditional financial service provider. New payment methods are often based on new and especially on mobile technology (Lerner, 2013, pp. 3-12).

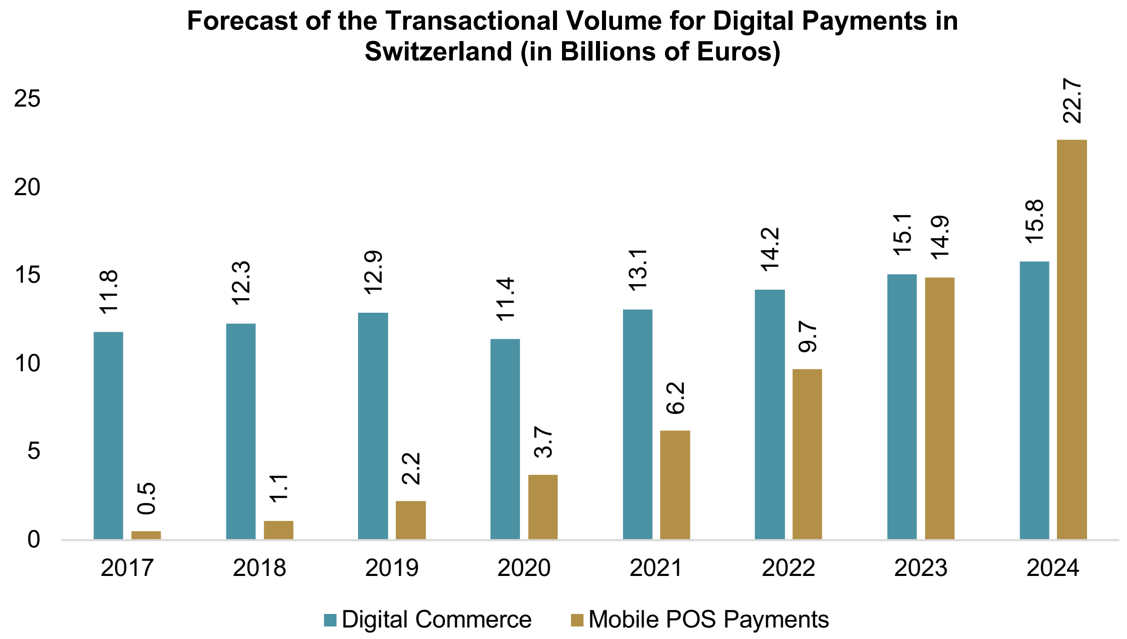

Figure 3 – Forecast Digital Payments (Statista, 2020)

As the forecast by Statista shows, mobile payment methods will overtake traditional means of transaction within the field of digital commerce by 2024. This further encourages the development of more mobile solutions. Not only by new startup companies but also by established companies who are non-native to the financial sector. Examples thereof are Apple, Google and Amazon. These Big Tech companies heavily invest into mobile payment solutions by forming partnerships with financial partners or create their own solution (Arslanian, 2019, pp. 74-75). One such solution is Apple Pay, which lets its user digitalize cards from their current banking provider and pay with their phone or other digital accessories (Arslanian, 2019, pp. 32-34). This thesis will take a closer look at mobile payments in the form of analyzing data from the mobile payment application.

As mentioned before, another technology on the rise are so called P2P transactional systems, where people can send money directly to each other without the need of a bank as an intermediary facilitator. Cryptocurrencies, which are based on their own distributed system, are true P2P payment options (Arslanian, 2019, p. 157). However, the exchange for crypto currencies and general the transfer of funds to start paying with this new solution, often require traditional means of payment, such as a credit card or direct deposit from a bank account. An example for this is Pay Pal, which still relies on banks and credit card companies to work (Brühl, 2018, p. 11). The same goes for other similar solutions that offer a kind of digital wallet as storage of assets. Though not reliant on banks and their system when funds are available (Capgemini, 2019a, pp. 16-19), digital wallets still need a connection to the current system for users and non-wallet users to transfer money to these digital accounts (Arslanian, 2019, p. 98).

Within the traditional transactional system, new financial providers also emerge to challenge the current status quo. Namely in the form of digital banks (Arslanian, 2019, p. 44), which are describe in more detail in the subchapter 2.4.1.

2.4 The Swiss Market

Due to the geographical limitation of this thesis, the following sections focus on new players, that are active within Switzerland.

The Swiss market itself is host to over 240 banks which manage assets over CHF 3,300 billion and is therefore an important financial market-place (SNB,2019). The financial market is dominated by the following three distinct player groups. There are banks focused on wealth and asset management, two large universal banks and banks that are focused on mainly the Swiss market. With over 8.5 million inhabitants (BFS,2020b, p. 4) Switzerland is a relatively small country. Most of its people live in urbanized areas (BFS, 2020b, p. 4) and work in the service sector (BFS, 2020b, p. 11) with an average monthly income before taxes of CHF 6502 (BFS, 2020a, p. 4). Around CHF 367,250 million are being spent by Swiss residents on consumer products every year. This accumulates to an average of CHF 43,133 in spending per resident. (BFS, 2020a, p.5). On the spending itself, Swiss people seem to be in disagreement which payment method is superior. Gehring in the 2019 Swiss payment monitor points out, the majority of its people are so called hybrid payers which change their payment behavior depending on different situations (Gehring, 2019, p. 4).

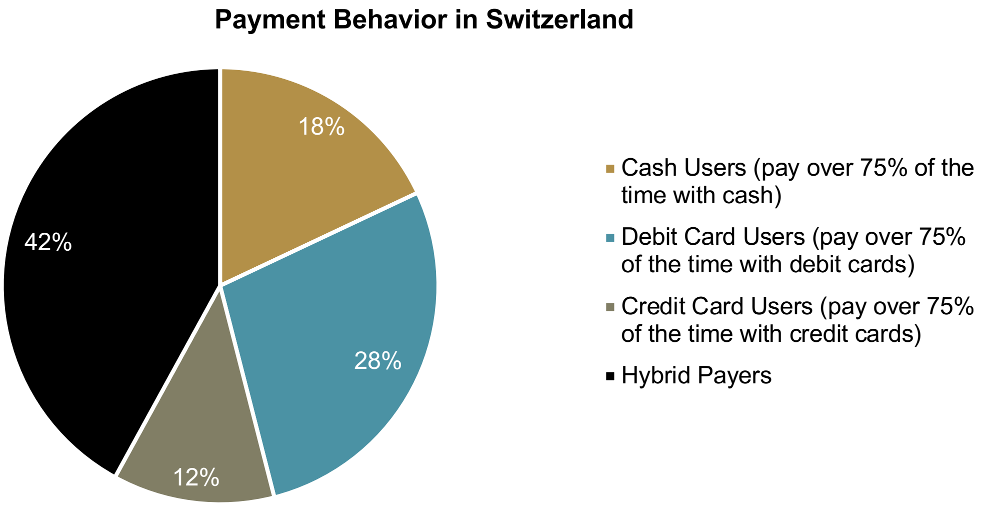

Figure 4 – Payment Behavior in Switzerland (Gehring, 2019, p. 16)

As figure 4. shows, 58% of Swiss residence use one payment instrument over 75% percent of the time. Still 18% percent favor cash, which comes as a surprise in a digital age. It could be explained with the high confidentiality score attributed to cash by its users (Gehring, 2019, p.13). In total CHF 95,9 billion in cash is currently in circulation (BFS, 2020a, p.13).

Nonetheless the average Swiss resident owns at least three different card payment instruments, which are usually a combination of a credit and debit card. (Gehring, 2019, p. 14). The study by Gehring indicates, that debit cards are less used internationally. It reasoned, that high rates for debit cards and their low acceptance abroad could be the reason for this behavior by Swiss clients. Credit Cards, which are not so heavily affected by exchange rates and fees for the use abroad, fare better at the POS and online as shown in the table below (Gehring, 2019, p.27).

	Use of Debit Card at POS	**Use of Debit Card Online**	**Use of Credit Card at POS**	**Use of Credit Card Online**
Nationally	90%	82%	73%	67%
Abroad	85%	67%	78%	68%

Table 1 – Difference in Use of Debit and Credit Cards (Gehring, 2019, p. 27)

The topic of mobile payment is an interesting one in the Swiss market. Through the creation of a solely Swiss application and the barring of competitors like Apple Pay for many years, Twint has become one of the market leaders. Since the opening of this marked for competitors, users have shifted to different solutions as well (Maeder, 2020). Because of it’s backing by and integration into the Swiss banks and their respective banking systems, Twint transactions create data entries that are visible in the data set provided by the research partner. This is the reason that mobile payments in Switzerland will be represented in this thesis by Twint. This is explained in more detail in the next subsection.

2.4.1 New Players

There are many different providers which have entered the financial marked in the last couple of years. These new players, who stand to disrupt and challenge the traditional financial industry within Switzerland are defined and further explained within this subsection. Approaches and technologies like P2P transactions or crypto currencies will not be discussed in detail, as empirical data for an in-depth analysis is not available.

Digital Banks

Digital banks are banks that try to reinvent customer experience for their clients. The focus on delivering a digitally native, data-driven and user-centric product is the main difference and selling point to traditional banking providers. Frequently used synonyms to describe this category of new competitors are neo-banks, virtual banks or challenger banks. In this thesis they will be referred to as digital banks. Examples for digital banks are N26, Monzo, Starling Bank or Revolut (Arslanian, 2019, p. 43). Arslanian found that most of those digital banks possess similar traits to attract customers. Those are low or no fees for basic accounts and usage of products abroad as well as an easy to use mobile application for the main point of interaction for the customer. In short, low fees and convenience drive customer acquisition. What they lack, seems to be trust or social acceptance. Many of their clients use these services as a secondary account. For example, British based Monzo boasted nearly 900,000 clients as of August 2018. But only 20% of them used their accounts as a payroll account (Arslanian, 2019, pp. 43-45).

The data from the research partner shows, that N26 and Revolut are the main digital banks active in Switzerland. For that those two actors are describe further.

Revolut

Founded back in 2013, Revolut is a digital bank based out of London in the United Kingdom. In 2015 Revolut went live with its application and has grown rapidly every year since. Today they service over 12 million private customers and over 400,000 corporations. Their products range from prepaid debit cards, currency and cryptocurrency exchanges, P2P payments, stock and commodity trading, budgeting features and normal private accounts (Revolut, 2020). All this led to an estimated transfer of assets worth around two billion United States dollars (USD) per month back in 2018 (Arslanian, 2019, pp 43-44). Today they officially operate with a banking license out of 35 countries including the United States and Singapore. Customers from other countries all over the world can still use the services of Revolut through workarounds (Revolut, 2020).

But that does not mean, that people from other countries miss out on Revolut’s services. An example of this is the Swiss market. As Revolut does currently not possess a Swiss banking license, users from Switzerland cannot directly transfer money to their Revolut account without having to make an expensive transfer abroad. Revolut provides in general three alternatives to this. You could either charge your current debit or credit card and pay for a debit amount, like one would charge a prepaid mobile card. They also offer the alternative of doing this sort of transaction through Google pay and Apple pay. A third option involves a local intermediate bank. In Switzerland they use Credit Suisse as correspondent bank where clients can transfer their money to. Revolut can then identify individual transactions by the reference number, which is equal to the ID number of the account holder at Revolut. Through this, users do not have to pay fees for international transactions or high foreign exchange rates.

The direct transfer to a local bank is rather popular with Swiss clients. This makes it possible to identify transactions to Revolut by its customers. By isolating all transactions to the international bank account number (IBAN) CH37 0483 5284 2385 2300, other banks have the opportunity to monitor the cash flow to Revolut and get an estimate on how many of their own clients might use the new competitors services.

N26

German based N26 was founded back in 2013 and launched their first product in the same year as Revolut went live with their mobile application. Back in 2015 the services provided by N26 were a free current account and debit card for the German and Austrian market. This went along with their digital interfaces on the web and applications in different app stores. Since then they gained over five million customers and expanded to 25 different countries including the United States, Brazil and Switzerland. However, their products have not changed much. You can still get the euro current account and a debit card for free. Added to their portfolio were different saving accounts, offerings for companies and integration of different technology for more user convenience (N26, 2020). This includes the partnership with the FinTech company Transfer Wise. They specialize in facilitating cost efficient international transfers. This lets N26 provide their customers with low rates and fees while using their products internationally (Arslanian, 2019, pp. 43-44).

As N26 has an official banking license to operate in Switzerland, customers can easily transfer money from their Swiss bank account to N26. This and the fact that N26 promotes its product as a more traditional account (N26, 2020) could be the reason why it is popular with Swiss residents. For other banks to identify transactions to and from N26 clients, the traditional method of a bank identifier code (BIC) can be used.

Mobile Payment Solutions

Mobile payments as a general term, can be split into four different subcategories. Lerner defines in his book the first one as the payment of virtual goods. It stands for digital products such as music, movies or virtual currencies, for example in mobile games.

These payments can either be made through billing to your mobile service provider or virtual currency that was bought beforehand, like a redeemable gift card (Lerner, 2013, p. 10).

The second group of mobile transactions focus on the consumption of mobile commerce and travel services (Lerner, 2013, p. 11). These usually can be bought by granting your phone access to digital wallets, card products or specialized solutions by banks. This often results in an option within a mobile application to safe a payment method for use in the future, just like e-commerce sites offer (Lerner, 2013, p. 11).

The third form of mobile payment describes the ways in which a mobile phone can be used to pay at a POS or online as a substitute for cash or a physical card. Through the creation of digital cards and the use of built in NCF technology in smart phones, it is no longer necessary to carry a physical card with you (Lerner, 2013, pp. 11). The rise of QR payments also includes the scanning capabilities of phones to trigger payments (Capgemini, 2019b, p. 13). Mobile phones can also be turned into mobile POS terminals by applying the same technologies mentioned before, to cast a NFC signal or display a scannable code (Lerner, 2013, pp. 12). Twint as a mobile payment solution belongs to this category. Because of this, the thesis focuses on this kind of transactions and will be investigated it further in the chapters 4. and 5.

The fourth and last category of mobile payments comprises of all the possibilities in which users can exchange money directly with each other. Lerner points out that this spectrum of payments could be categorized as P2P transactions. (Lerner, 2013, p. 12).

Twint

Twint is a Swiss joint venture by the big players of the Swiss financial market. Live since 2016, the mobile payment solution is offered on the popular mobile platforms Android and iOS. The official goal is to offer mobile payments in all of lives situations. Thanks to the cooperation with Swiss banks, users can directly connect their accounts to Twint. Even customer of banks that do not participate in the Twint system are not left out entirely. Through the integration of a credit card, foreigners or clients of non-participant banks can use the application as well. Since its launch Twint offers a solution for the following five different payment scenarios (Twint, 2017):

- Sending and receiving money between private parties,
- Payment in E-Commerce,
- Payment at mobile terminals by scanning of QR codes (static and dynamic),

- Payment at commercial POS through QR codes or Twint beacon based on NFC technology,
- Payment at vending machines through scanning of QR codes or Twint beacon.

If the QR code is not recognized, Twint usually displays a numerical code for the transaction, which can be entered manually by the user as an alternative method for registration of a payment (Twint, 2017).

With over five million transactions each month and two million users, Twint has cemented itself as the mobile payment solution for Switzerland (Twint, 2020). Nonetheless competition in 2020 grows stronger, as regulation for foreign solutions were weakened and the future could look different (Maeder, 2020).

As of the writing of this thesis, data from the research partner indicates, that Twint still is the market leader. For this reason, other competitors will not be elaborated further, as data for an empirical evaluation in further chapters are too small at this point.

2.4.2 Potential Impact on Traditional Payment Transaction Providers

As traditional players fall behind in their product development, many new providers attack dissatisfied customers and try to convince them. As mentioned earlier, customer expectations and interactions are the new drivers for product development (Capgemini, 2018, p. 21). This combined with the reluctance of traditional players to change current business models (Schwaller, 2019, p. 42) creates an environment which favors bold strategies taken by used challengers (Arslanian, 2019, pp. 43-44).

Digital banks now target not just early adopters, but start to concentrate on normal retail banking clients. This could result in a drop of volume within the transactional system of retail banks and card providers alike. A possible outcome could be a higher cost-per-transaction ratio (Brühl, 2018, p. 6). More costs and less users will result in a drastic drop in profitability for transactional divisions and business models relying on fees earned by the amount of transactions. Digital banks also undermine the intermediary market, by offering P2P solutions (Revolut, 2020), that results in more transactions diverted away from the current system. The problem for new players is the low numbers of primary accounts. For this they seek to convert secondary accounts through adding more products often associated by established providers. This makes it even harder for traditional providers to compete and distinguish themselves in the battle for current and new customers (Arslanian, 2019, pp. 43-45).

Another area which could face disruption are debit and credit cards offered by retail banks and credit card providers. Similar to retail banks themselves, their products are being copied, simplified and optimized for a more convenient digital use and interaction (Arslanian, 2019, p. 44).

Mobile payments could also influence card products and the general transactional market. For many mobile solutions have opened up to traditional players, this technology seems not to have a huge impact at first sight (Brühl, 2018, p. 5).

Summarizing, the presumed impact of digital payment methods on traditional payment transactions results mainly of a drop in transactional volume. This could mean one of two things. Retail banks and card providers still grow their total volume but lose market share in the transactional business. Or even worse, the total amount of transactions tapers off of current levels.

3 Methodology and Data Evaluation

This chapter will touch on the methods of data analysis and tools used for answering the hypotheses. Furthermore, it describes the source of data, namely the research partner and its client base. The data queries that were defined in cooperation with the research partner are explained and the different data sets stemming from those queries are described, analyzed and evaluated before immerging into the data itself in the next chapter.

3.1 Data Analysis

This work is mainly based on data sets provided by the research partner and supported by public data from research institutes and publications by companies operating within or in the vicinity of the financial sector. The main category of data analytics used was of the descriptive type by trying to answer questions to what has happened. Where possible, an outlook and therefore predictive analysis (Ghoshal, 2018, p. 43) was provided. For this, monthly, quarterly and yearly growth rates were calculated, compared and possible trends identified.

For the analysis the formatted data tables were directly analyzed within excel. To better identify and comprehend possible connections and trends, the data was further visualized with Tableau, a data visualization and analytics software.

To get a broader understanding or to verify certain assumptions based upon the analysis of the data from the research partner, data and findings from published papers were used.

3.1.1 Research Partner

The research partner is an established Swiss retail bank with a wide spectrum of services for their clients. Services are mainly dived into two main categories: private and corporate customers. In this thesis private customers are represented under the term B2C and the corporate clients are united under the B2B label. For the B2B customers provided services include payment transactions, liquidity management, corporate financing as well as different consulting services like advice on mergers and acquisitions. The offers for B2C clients include the managing of accounts, payments and transfers, online banking, mortgages, investment and retirement products. With branches spread out all across Switzerland the research partner has one of the densest branch networks in the Swiss market. 98 percent of B2C and over 99 percent of B2B clients have their domicile within Switzerland. These numbers show the determination to a national strategy and absence on the international stage. In total the research partner provides financial services for nearly 3.5 million customers combined in both markets.

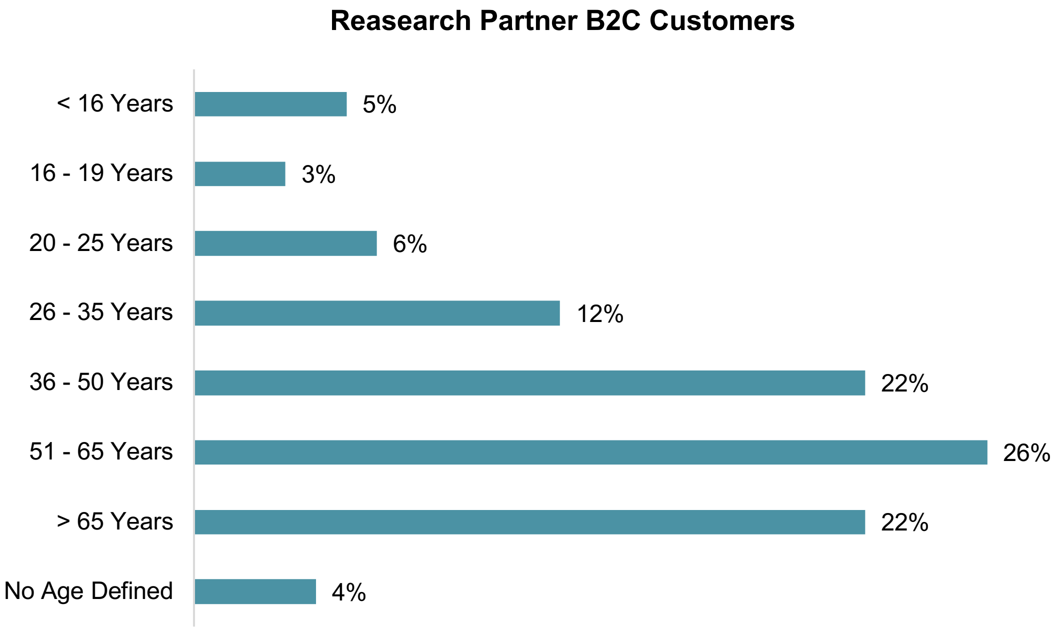

Figure 5 – Research Partner B2C Customers

The age group of 51 years and older represents 48 percent of B2C clients. Only 27 percent are aged 35 or younger. The female-to-male ratio of customers is nearly 1:1 with a slight lean to more female customers. This means, that the majority of customers belong to the cohort of digital immigrants, which are more prone to stick to old, analog ways of doing things and distrusting digital innovations. (Dingli, 2015, pp. 13-17).

The increasing digitalization of the world, the establishment of new technologies within society, a shift in the general demography and the entry of new players stand to upset the current market of retail banks. Included therein are the underlying transactional ecosystems. The research partner has published a thesis project for students under following working title "Digitization in payment transaction - potentials and risks for the business model of retail banks". The goal was to analyze the current state of transactions and identify risks and opportunities as well as draw up possible recommendations for future actions. This present thesis sets out to answer the aforementioned goals by the research partner's payment transaction division on the basis of its own data.

As one would come to expect from a bank of its size, the research partner uses a complex payment infrastructure with different application programming interfaces (API) to their own banking systems, broader transactional market and a central data warehouse with different data-marts for efficient analysis of specific divisions and service areas. This thesis focuses on the data-mart for payment transactions. Each transaction is logged and a record is created within the system for every transactional method. The big exception to this rule are credit cards. Credit cards provided to their customers do not create data entries for each time they are being used as method of payment. Those payments flow through the system of the credit card providers as described in more detail under the subchapter 2.4.1. The transaction that gets logged and is visible in the banks system is the monthly or bi-monthly payment of the credit card invoice. For this reason, the term card, card transaction, card usage and others refer to debit or bank account cards.

3.1.2 Data Queries

To answer the main research issue and its subordinate questions, different data queries had to be defined where standard reports from the research partner where not insightful enough. This excludes the following data sets:

- monthly overview of all payment transactions,
- overview of client base.

For all the other data sets custom queries had to be defined. The focus was set on the banks own B2C customers which use the banks own mobile payment solution Twint or are presumptive Revolut or N26 clients.

The Twint users were easily identifiable within the research partner’s transactional data as this was already a tag within the system. To compare the usage rate of Twint to other means of transactions by Twint users, the first data query focused on the card transactions of the identified customers. This resulted in the “card usage of Twint users” data set. The general usage of Twint itself did not require a query itself, as those numbers are part of the “monthly overview of all payment transactions” report.

To identify potential customers of N26 and Revolut, another method had to be used. As N26 is a bank with a Swiss banking license, Swiss clients can send money directly from their account to N26. This made it easy to identify direct transactions. The BIC of N26 was therefore used to mark those clients believed to be customers of said digital bank. Revolut users in Switzerland cannot transfer money directly to Revolut but have to do so via a credit or debit card transaction or a direct transaction to an account held by Revolut at Credit Suisse, another big Swiss bank. This is due to the fact, that Revolut as of July 2020 does not have a Swiss banking license and operates from its base in the United Kingdom (Revolut, 2020). The identifier (ID) for transactions to Revolut was therefore the IBAN number for this Credit Suisse account held by Revolut. After defining the key attributes for the potential customers of these two digital banks, multiple data queries focused on their behavior were made.

A query was focused on the transactions to Revolut and N26 itself. For this the unique identifiers described in the section above, were used to identify all transactions to those digital banks from the research partner.

Two more queries were made to take a look at the usage rate of card transactions from those digital bank users within Switzerland and abroad. This was made directly to provide data for the second and third research issue in the subchapter 1.1.2. The customer ID used from the query before, was applied. But instead of the transactions to those neo-banks, the client's card transactions were looked at. Two data sets, one showing all transactions of digital bank clients and another one showing all destinations for those transactions were the result of this query. To identify transactions abroad for the first data set, the currency and reference situation was used. The second query took it a step further and looked at the country code of the destination bank.

3.1.3 Data Sets

In this subsection the different data sets from the research partner will be shortly described, analyzed and possible flaws are pointed out.

In general, all data sets stemming from a data query specific to this thesis will not differentiate between single months but only quarters of the year. The quarters begin with the first one on January 1st and lasting exactly three months each. This makes some data sets more convenient to analyze and reduces seasonal influences within all payment data without affecting the significance of the data. This provides better understanding of actual growth rates.

Monthly overview of all payment transactions

The monthly overview of all payment transactions is a standard report in which the quantity of each transactional channel as well as key performance indicators (KPI) are displayed. It is equivalent to a performance record for the payment transaction division and shows not only the transactional volume but also clearing rates and performance of the transactional infrastructure. This report shows all data for each month in a calendar year, as well as the total for the current and past year. It is an excel table which was generated by the data warehouse department. It consists of a general overview of all payment categories and an in depth look at each one of them. For every service category or transactional method there is a specific worksheet within the file.

For this thesis access was granted to the monthly overview of payment transactions from January, 2016 to May, 2020. It is to say, that for May 2020 not all data was ready for extraction at the time of the query.

The data sets provide a complete overview over the payment transactions of the research partner. It is the base for comparison to the other data sets for identifying companywide trends and growth ratios. In contrast to other data sets and the possibility of visualization, key numbers had to be copied into a new excel table, as the formatting did prohibit that in its original state. This limits the instant analysis of all data and might result in an undiscovered pattern within the data set.

Overview of client base

This data set shows the makeup of and demographic intricacies within the client base. B2C clients are differentiated by age groups, gender, nationality, residency and segmentation according to portfolio size. B2B customers are separated into the research partner's spectrum of services and seat of the company. It is an excel-sheet based report with different tables for individual filtering of each attribute.

This data set provides basic information over all customer groups and lays the basis to place the other data sets and the analysis thereof. It does not show however, if customers are living in a more urban or rural setting. This could have an influence on the usage of payment methods which cannot be identified by this thesis.

Card usage of Twint users

Card usage of Twint users were cumulated into the 88 different types of card transactions. This represent all known transactions to the research partner's system. They are aggregated in quarters. The number of different transactional types stem from the combination of five different debit and bank account cards. There are eight reference systems, eight transactional types, two reference situations and two currencies. The currencies are in this case Swiss francs (CHF) and euros (EUR). For each of these 88 transactional types the totals of the credit and debit amounts as well as the amount of debit and credit transactions are displayed. The data reaches from the beginning of the first quarter in 2018 up until the end of the first month of the second quarter in 2020, which is April.

The raw data was formatted into comma-separated values files (CSV) for each year. For the data analysis, those files were converted and merged into one single excel file with one work sheet for each year.

The data itself shows the aforementioned 88 different transactional types and summarizes all transactions within the specific category of all Twint users from the research partner. A shortcoming of this set could be the condensing of the transactions into quarters instead of months. Also, the summary of all client behavior with no view into a single client or averages of those clients could diminish findings and conclusions based on this files content.

Transfers to digital banks

The data showing transfers from the research partner to the digital banks, namely Revolut and N26, consist of columns about the time frame of the transaction, a unique customer ID, information about the destination, amount of transactions within a given timeframe and the amount in Swiss francs or euros. The timeframe for these data sets reaches from the beginning of January 2017 until end of April 2020. The sets are again aggregated into quarters for each individual customer, except for the year 2020, where monthly data is available.

For each year, the query produced a single CSV file. Those were then was converted into a standard excel table and all years were merged into one single excel file with different worksheets.

The data from this query allows a deep insight into the transactional behavior of individual users as well as a representative overview of the interactions with digital banks as a whole. However, the data fails to explain single transactions and merely speculations on the use of the digital bank account are possible. An example would be, if a customer uses the account at a digital bank as a payroll account or if it solely serves the purpose spending.

Card usage of users from digital banks within Switzerland and abroad

The data set focusing on card usage from customers of digital banks shows all debit and account card interactions in Switzerland and abroad with the identical data fields like the data set for the card usage of Twint users. So theoretically there could be up to 88 different interactions per quarter for one single customer, but it is not the case. The biggest difference between this data files and those looking at Twint users is, that the transactions are broken down to the level of a single customer. This was only possible because the identified pool of digital bank users was significantly smaller than the one of Twint users.

Again, for each year there was a CSV file, which was converted into standard excel sheets that then were merged to one single file. This was done so it could better be analyzed and compared to the data from the Twint users.

This set does not show single transactions but aggregates identical transactional types into quarters. This leads to questions regarding the total amount of money in those transactions. Average, median or other statistical calculations regarding the amount of money in those transactions are therefore meaningless.

Card usage of users from digital banks focused on payment destination

The last data set shows card transactions of individual customers who were identified as digital bank users. It summarizes transactions according to destination of payment for each customer within a given quarter. The entries start from January 2017 until April of 2020. As in the data sets before, only the entries of 2020 are also differentiated by month, all other entries are added up for each client per quarter.

The original data was again transmitted as four different CSV files which were then again merged and formatted into one single excel file.

Thanks to the data field “destination country” possible interactions with foreign online shops or physical usage outside of Switzerland can be detected. This make it possible to compare usage rates to the general usage by all of the customers clients. Unfortunately, the data does not show in which context the cards were used.

4 Results of Data Analysis

Having established the current situation and overall trends within the previous chapters, this one focuses on the transactional data from the research partner itself. The general use of the previously identified alternative payment methods are analyzed, compared and conclusions are drawn. Following this, a more in depth look into the impact of alternative methods on a national and international level as well as the behavior of Twint users are examined, research issues if possible verified and conclusions drawn.

Before diving into the use of alternative payment methods a base of understanding for the transactional division of the research partner has to be established. As mentioned in subchapter 3.1.1 the retail bank services over 3.5 million customers. Those are responsible for a total volume of over 469 million transactions in 2019. Since 2015 the total volume has seen a steady growth averaging 8.4% from year to year. Expressed differently this means an increase of nearly 130 million transactions within four years. The most popular method of moving funds are the combined card products. They include ATM interactions, debit card usage and credit cards, even though those are serviced by credit card providers and transactions are made at the end of the corresponding billing period. Those combined card usages are responsible for 50% of transactions as of last year. The trend in growth carried over into 2020, but took a hit due to restrictions of the SARS-Cov-2 pandemic (BABS, 2020, p. 15). As of the end of May 2020 the growth rate for overall transactions slowed down to only a 4.76% increase compared to 2019. The most affected were card interactions, which had around 5 million transactions less in April than in January or February. E-banking is another rather popular way to register transactions. Over 126 million transactions were made in 2019. Its steady growth over the last couple of years was slowed down in the first five months of 2020. Next to E-banking, the mobile payment solution supported by the research partner, Twint registered 14 million transactions in 2019. This corresponds to a growth rate of over 300%. In May 2020, the transactions of Twint more than doubled the average of 2019 and breaking the three million mark in one month for the first time ever.

The figures provided by the research partner show that its transactional division is growing and expanding. Nearly all products show growth. The exception are legacy transactions such as checks, which have deteriorated in numbers and have become irrelevant.

4.1 Use of Alternative Payment Methods in General

This subchapter examines the usage rate of alternative methods in general. The focus lies on the two digital banking providers N26 and Revolut.

As of fall 2019, a study by the research partner's customer analytics division has identified approximately 12,000 clients which owned a Revolut account. The number of customers identified for N26 was 4,300 clients. Whereas Revolut seems to be favored heavily by male customers, the gender gap between N26 clients was found to be a lot smaller at only 4%. The age groups of clients using these new methods also showed a big popularity for younger customers, especially as people from the age of 20 to 35 are drawn to Revolut. N26 attracts a broader span of age groups. The majority is made up of people between the ages of 20-50. The usage rate of Twint from customers of these digital banks is way higher than the retail banks average, which amounts to a total of 9%. 32% of N26 and an overwhelming 57% of Revolut customers used the banks integrated mobile payment solution.

The transactional data provided by the research partner shows, that presumed N26 users have a longer history within its own client base. Revolut becomes visible for the first time in the fourth quarter of 2018 but already overtaking N26 in users during the following quarter. Figure 6. shows the amount of single customers which had at least one transaction during a quarter to one of the two neo-banks. During the first quarter in 2020, these numbers climbed new highs, reaching 2,074 or respectively 13,213 customers.

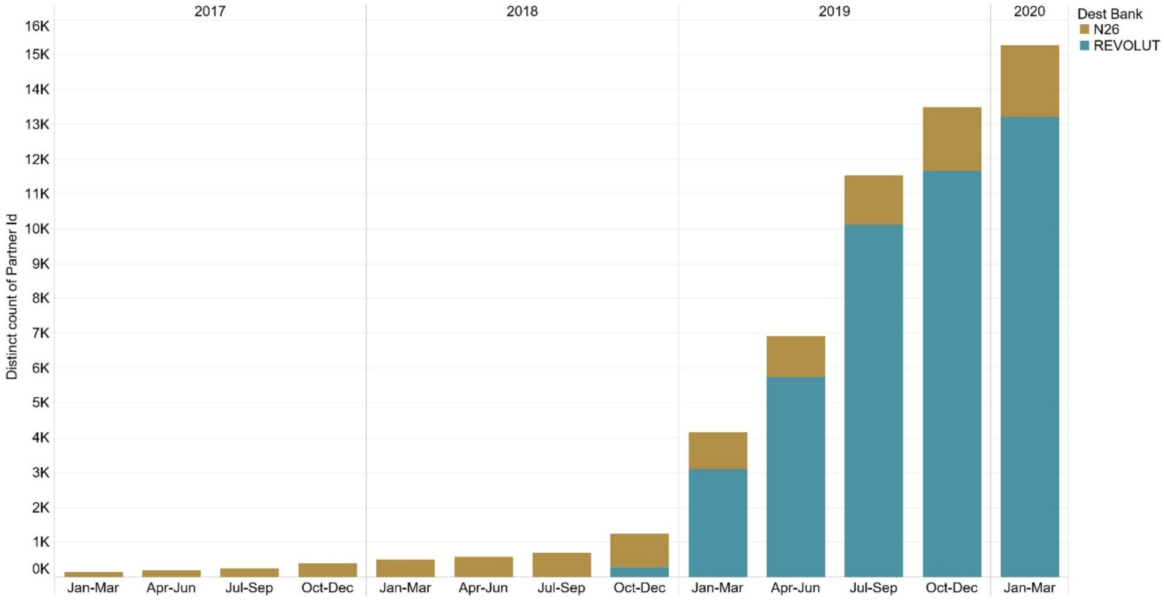

Figure 6– Unique Customer with Quarterly Relations to Digital Banks

After bursting onto the scene during the first three quarters of 2019, the growth rate of Revolut seems to have normalized for now. For the last quarter in 2019 and the first one of 2020 an average of 14% more users were recorded. This aligns more with the growth rate of the N26 customer base, which saw an average increase of close to 18% for the year of 2019. In 2020 N26 boosts an increase of 13% matching the one of Revolut. These quarterly growth indicators seem to be in line with those of other products of the research partner. The difference in growth of total transactions from 2018 to 2019 being 10% or 16.7% for cumulated card services. If compared to the number of downloads of digital banking applications (Cherowbrier, 2020, p. 36), the growth within the research partner's customer base aligns and shows a similar picture.

Unlike the number of customers interacting with these new competitors, the growth in volume and value of the transactions seem to have slumped quite heavily. From a transactional perspective this means, that a total of 37,490 transactions were made in the first quarter of 2020, totaling to CHF 32.16 million. Only 122 more than were recorded from October through December. A reason for this rather abrupt transition into a more stagnate phase could be an influence of the SARS-Cov-2 pandemic (BABS, 2020, p. 15). As numbers from May 2020 indicate, this stagnation turned into a decline. It is unclear at which rate the market is going to develop and if there is a return to the massive growth rates from a transactional standpoint from mid-2019. The prognosed download rate worldwide indicates a steady growth (Cherowbrier, 2020, p. 36). This could indicate first signs of a saturation of the market.

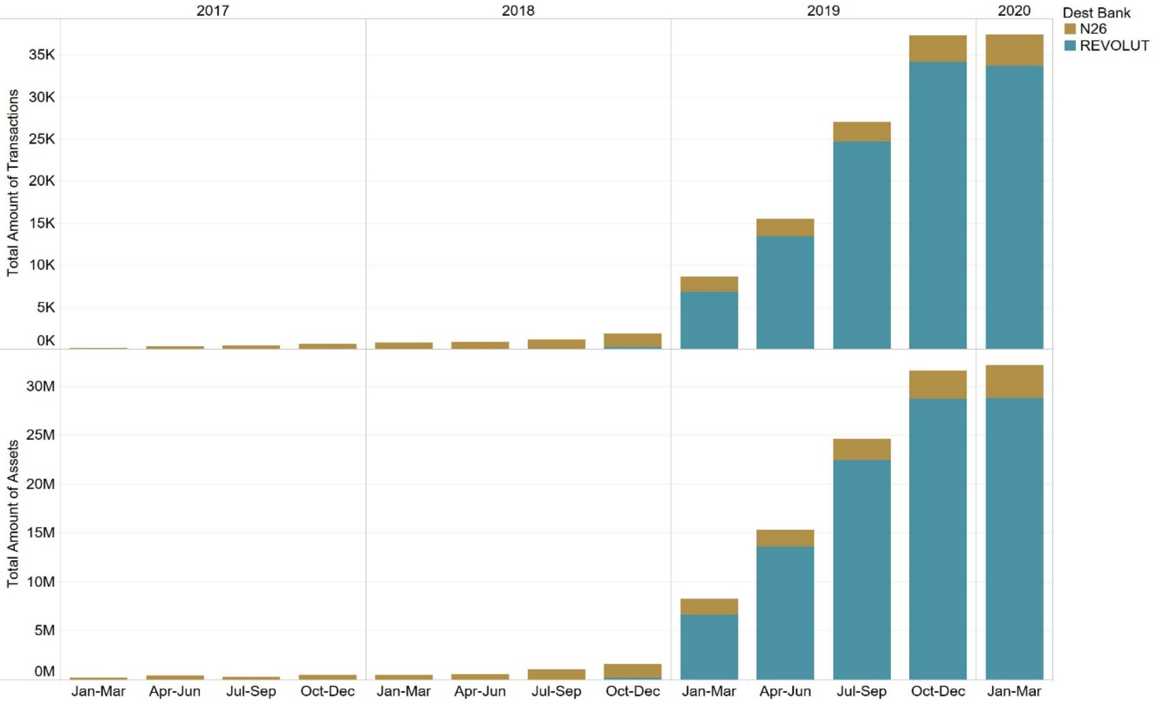

Figure 7 – Total Amount of Numbers of Transactions and Assets

This does not mean, that customers are not supporting their digital banking endeavors in 2020. Coming in at a total of over CHF 32.16 million, the sum transferred is still noteworthy. Especially as a year prior to that, the money total came to only CHF 8.27 million. For the whole year of 2019, 88,654 transactions worth CHF 79.9 million were registered.

On the surface, N26 transactions are on average and median lower than those of Revolut. Bearing in mind the demographic study of those two groups, younger people seem not only to accept and use digital banks more often, but also entrust them with higher amounts of money. But a closer look at the constellations of single transactions show a rather big discrepancy between the average and median.

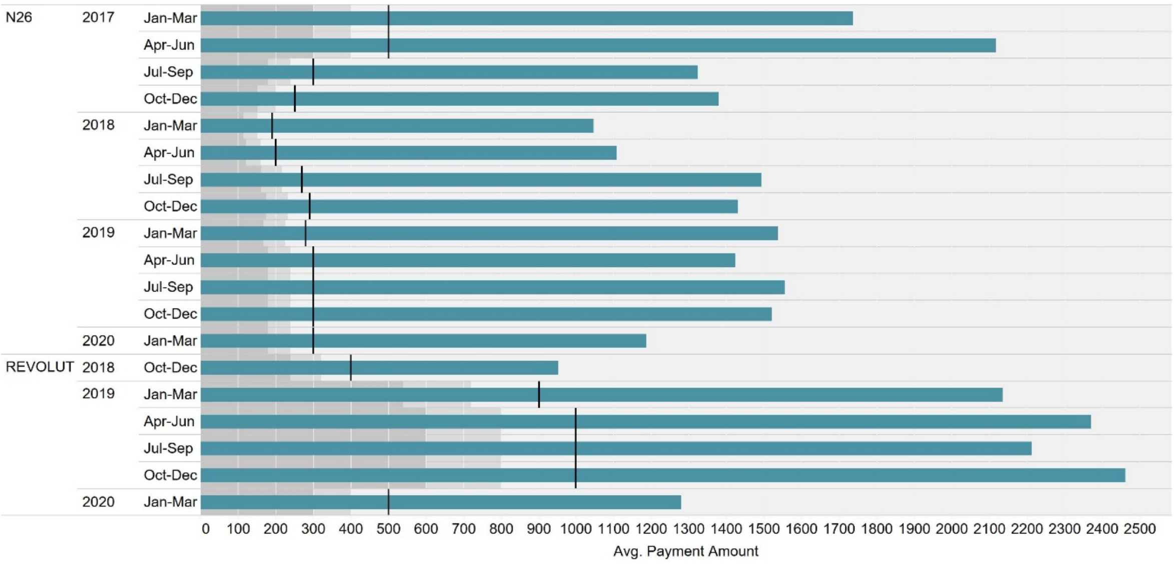

Figure 8 – Average and Median Payment Amount

A search for statistical outliers for the year 2019 has revealed that the top 5% of amounts paid in 2019 were over CHF 8000 per transaction. Even a couple of hundred transactions over CHF 25,000 were identified. The highest amount recorded was in the mid CHF 100,000s. Eliminating the outliers did not impact the median amounts as much as the averages. The gap between median and average however became closer. During the last quarters of 2019 this meant a reduction of the average of around CHF 500.

But what do the users of digital banks do with their remaining retail banking products? As digital banks target the payment methods itself, the analysis focuses now on the usage of card products by digital bank users. For this, multiple annual growth rates are compared. The following table shows the growth rates recorded from 2016 to 2019 and represent all client transactions.

	2016	2017	2018	2019
Growth of all Transactions	6.37%	8.56%	9.07%	9.97%
Growth of Card Transactions	7.72%	7.68%	10.03%	16.72%
Growth of Settlements of Credit Card Statements	-6.16%	-7.34%	-5.86%	-2.46%

Table 2 – Growth Rates of all Client Transactions

As shown above, the research partner enjoys an increase of the growth ratio each year. The same goes for card transactions which have jumped up to 16.72% for 2019. The direct debit settlements of credit card invoices however are in decline for years. In 2019 however, the fall rate has finally slowed.

The following table gives an overview of all the digital banking clients and their use of retail banking products over a three-year period. In an attempt to offset the effect of rapid growth in neo-bank customers, the growth rate for their card usage was calculated based on the average transaction per costumer.

	2017	2018	2019
Total Transactions	105,736	375,300	3,315,904
Total of Customers	645	2,173	17,618
Ø Transactions per User	164	173	188
Transactional Growth per Customer	-	5.4%	8.6%

Table 3 – Overview of the Development of Digital Bank Clients

The 8.6% in 2019 is just 1.37% off of the growth rate of overall transactions. This could indicate that digital banking products are more subsidiary and the products by retail banks are not affected by them. When compared to the 16.72% growth for card transactions, the interactions by digital bank clients show a gap that is nearly twofold. In other words, the research partner is missing out on an approximate 8% additional increase in card transactional volume.

This could have several meanings. It could be argued that customers, that use digital banks, have traditionally a lower rate of transaction. Another possible explanation could be outliers that distort the data. The most dangerous conclusion for retail banks is, that their card products are not competitive enough. So, when a client opens up an account at a digital bank, they favor the transactions with their card products on a daily basis instead.

4.2 Use of Alternative Payment Methods Nationally

After establishing the use of alternative banking providers by customers of the research partner, this subchapter concentrates on detecting possible changes in their payment behavior nationally.

The study by Gehring found, that around 888.25 billion transactions with debit cards within Switzerland were made in 2018. This represents 95% of all transactions made in the Swiss debit card market. This accounts for around CHF 47 billion in assets being transferred. Having said this, it seems odd that the CHF 47 billion only amount to 93% of total assets moved by debit card products (Gehring, 2019, p.21). For credit cards, Gehring lists 60% or 279 million transactions were made within Switzerland. In money terms this results in a movement of CHF 23 billion in 2018. This translates to roughly 53% of money moved by all credit card products (Gehring, 2019, p. 24).

In the case of national POS interactions, a steady rise in transactional volume was recorded with the research partner's clients. Pushing it from 11.3% back in 2016 to 15.1% and a total of 150,173,586 transactions in 2019.

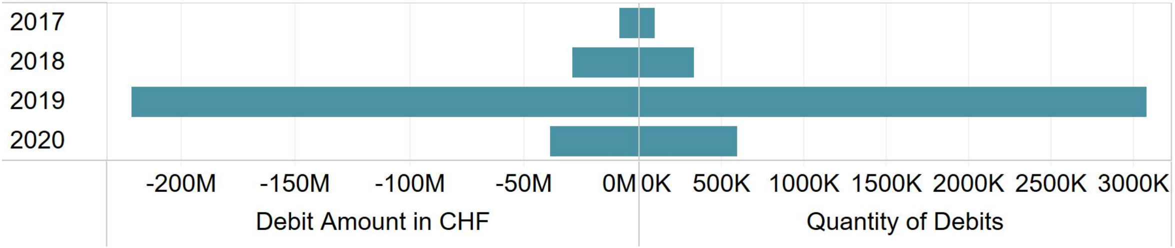

Figure 9 – Quantity and Amount of National Debit Transactions

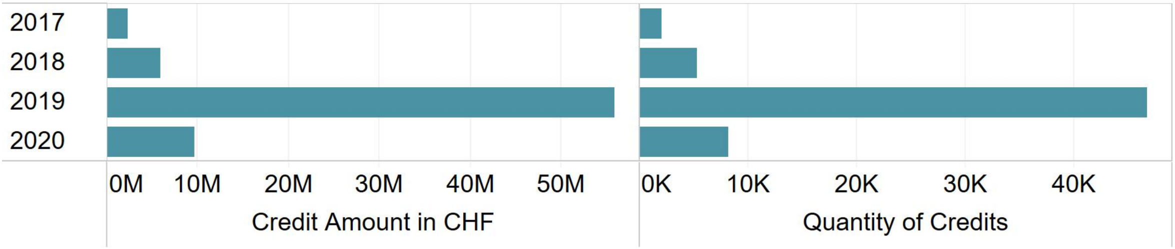

Figure 10 – Quantity and Amount of National Credit Transactions

The figure above shows the amount and quantity of debit and credit transactions made by retail bank customers using card products, that were identified to having relations with the digital banks N26 and Revolut. Debit in this case means money spent by the customer whereas the term credit stands for money deposited. As pointed out in the calculation for table 3, the growth spike in 2019 is a result in massive customer acquisition by the digital banks.

After comparing both debit and credit transactions to the company wide average no big difference could be identified. For 2019, the card national card transactions of digital bank clients grew 13%, 3% less than the average of all consumers.

4.3 Use of Alternative Payment Methods Internationally

After analyzing the behavior of digital banking clients and their usage rate of traditional financial products on a national stage, this subchapter dedicates itself to identify patterns internationally.

The Swiss payment monitor by Gehring also delivers data for the use of credit and debit card products abroad. In 2018 this meant that 40% or 186 million of all transactions by Swiss residents with their credit cards were made abroad. They paid for goods and services around the globe for CHF 21 billion. This represents 47% of assets being moved by credit cards. (Gehring, 2019, p. 24). This amount dwarfs the CHF 4 billion that was spent by debit cards users outside of Switzerland. Counting 46.7 million transactions it is a far less popular method of payment when traveling. With only 5% of all transactions by debit cards and 7% of money spent, Swiss clients do not like their debit cards for when paying abroad (Gehring, 2019, p. 21). A possible reason for this behavior could be the fee structure of debit card products (Gehring, 2019, p. 27).

The transactional data from the research partner shows a slowing increase in international POS interactions from its customer base. After having a record year in terms of growth percentage back in 2017, the rate has dropped to 18.3% in 2018 and 15.8% in 2019.

After analyzing international card transactions by N26 and Revolut customers of the research partner, following countries were on top of the list:

- Germany with 120,490 transaction,
- France with 47,600 transactions,
- Italy with 43,243 transactions,
- Portugal with 24,657 transactions,
- Austria with 19,822 transactions.

Four of the five countries share a boarder with Switzerland and where expected to be in the list of top transactional destination because of their proximity to Switzerland. Portugal however does not share a boarder and is not within a close range of Switzerland. These transactions can be explained by the high number of customers from the research partner that are Portuguese.

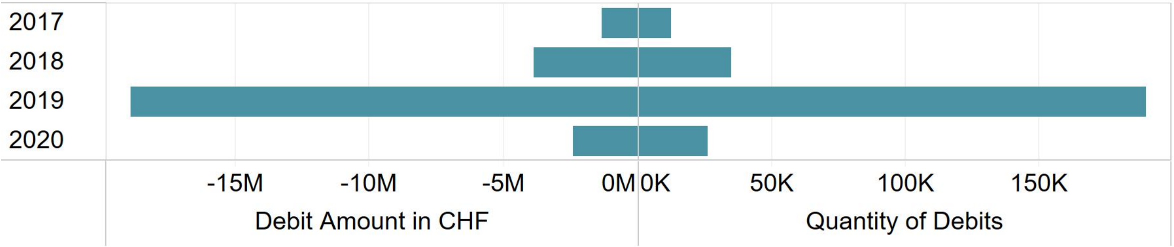

Figure 11 – Quantity and Amount of International Debit Transactions

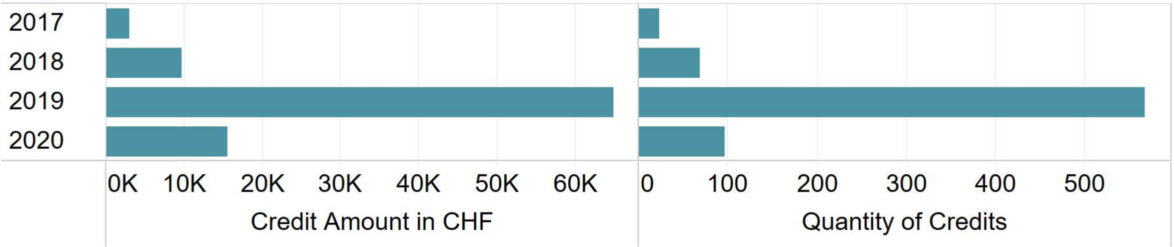

Figure 12 – Quantity and Amount of International Credit Transactions

Equal to subchapter 4.2, where the focus rested on the national card usage, the figures above show the debit and credit amount and quantities of transactions since the emergence of challenger banks. The number and financial amount of credit transactions appear in insignificance to debits. Even more so than on a national scale.

After analyzing both debit and credit transactions to the company wide average a big reduction in the usage rate was detected. The data indicates a growth of -15% for 2018. From 2018 to 2019 a negative growth rate of -32% was recorded. In the first three months of 2020 this even got worse. The numbers of 2020 should be considered with caution, as current travel restrictions relating to the global pandemic (BABS, 2020, p. 15) have a big impact on international transactions.

4.4 Behavior of Twint Users

Twint as a payment solution with its ties to Swiss financial industry, as described on page 16, has made it the number one in transactional volume and users (Twint, 2020). Twint launched back in 2016 (Twint, 2017) and was officially introduced to the product lineup of the research partner by the second quarter of 2017. As of December 2019, the research partner counted 414,104 active users within their client base. They saw an average monthly registration rate of around 20,000 users per month. 51.3% of all customers that are registered for Twint are under the age of 31. The biggest age group of customers from the research partner, people between 50 and 65, only make up 19% of Twint users.

	2018	**2019**	**Q1 2020**
Total Twint Transactions	3,525,103	14,197,824	5,089,031
Share of Twint Transactions in % to Total Card Transactions	9.92%	19.65%	24.32%
Total Card Transactions	35,521,247	72,239,446	20,923,851
National Card Transactions	33,899,824	69,130,581	20,363,382
% of National Card Transactions	95.44%	95.7%	97.32%
International Card Transactions	1,621,423	3,108,865	560,469
% of International Card Transactions	4.56%	4.3%	2.68%

Table 4 –Twint and Card Transactions by Twint Users

The popularity of Twint poses the question if they cannibalize the retail banks own card products. Trying to answer this, the total card transactions by Twint users and their use of the mobile payment solution where confronted with each other. The data shows an increase of the share from 9.92% up to 19.65%. This indicates that Twint is exceeding traditional card offerings. Focusing on the results of 2019, one single customer averaged following transactional statistics:

- 34 Twint transactions,
- 168 Combined Card Transactions,
- 167 National Card Transactions,
- 8 International Card Transactions.

These numbers are comparable to the ones listed in table 3 for the client segment of digital bank users. This leads to the conclusion, that Twint and digital bank users are to be categorized in similar customer segments.

The Cov-Sars-2 pandemic (Saxena, 2020, p. 2) shows its first signs of affecting the transactional system in the rapid rise of the percentage in Twint transactions compared to card transactions, shown in table 4. Also, the reduction in international card transactions is a clear indicator of the impact on the enforced travel restriction (Saxena, 2020, p. 2). It seems however to have positively influenced transactions with Twint. As the figure below shows a spike of transactions from February to May 2020. It could be argued, that Cov-Sars-2 is an adaption accelerator for alternate payment solutions.

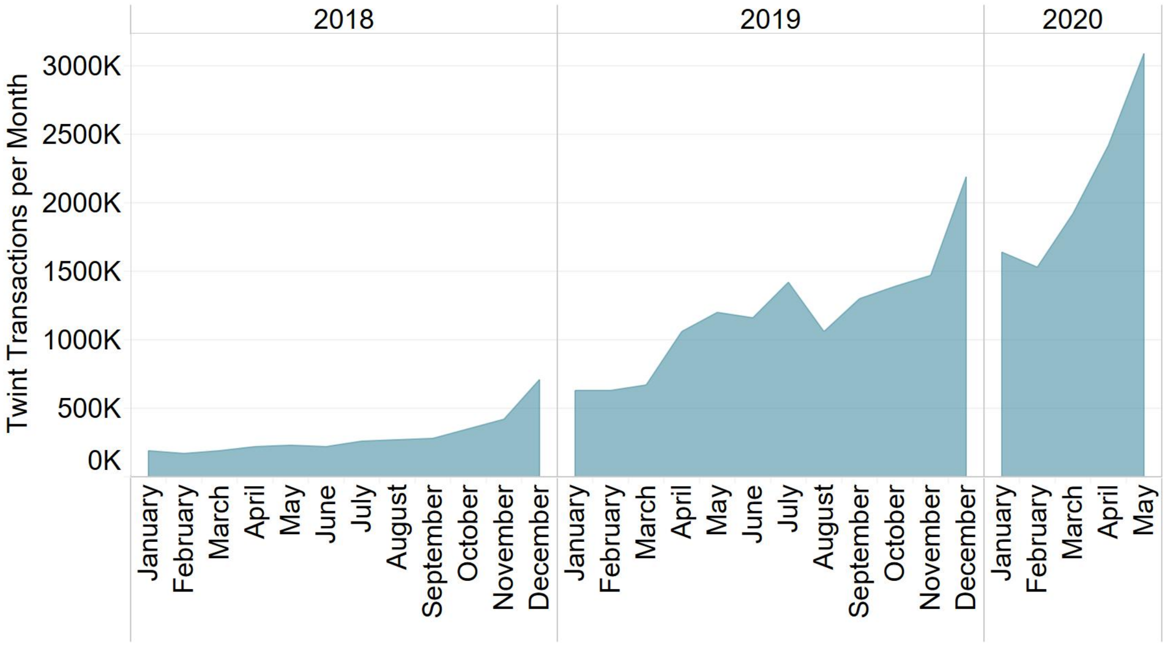

Figure 13 – Twint Transactions per Month

The first two months in second quarter of 2020 alone reached 420,440 more transactions than in the whole first quarter. The mobile payment solution seems to have convinced it’s customers with it’s usability and convenience. If this trend continues, traditional payment methods will have to venture into the realm of mobile payment fast to stay relevant.

5 Summary

This chapter recaps the findings from the data and literature research and answers the questions raised by the main thesis and subordinate research issues. The focus is directed on the four main groups of data analysis stemming from these scientific questions. The main thesis and research issues are answered within the structure of the data analysis in chapter 4. At the end, possible courses of action for digital and retail banks are laid out.

5.1 General Impact of Digital Payment Methods

For the main thesis to be proven right or wrong two hypothesis were formulated. The first hypothesis was that digital payment methods had a net-zero or positive effect. This was proven to be wrong. However not in the form of negative impact in all categories. Nevertheless, a clear indication of growth reduction was found within the transactional data of the research partner compared to the company wide average. So there is still a growth in transactions made by digital bank and mobile payment users with card products by the research partner, but not at the same rate as the rest of the retail bank clients base.

The second hypothesis stated that: "Alternative payment methods only affect the use of credit and debit cards from traditional banks." This could neither be proven right or wrong, as other products were not analyzed as a result of restricted data access due to Cov-Sars-2.

Still an answer to the main research issue was possible. It was verified that there is an effect on traditional payment transactions by digital competitors such as digital banks and mobile payment solutions. The rise in popularity in both of these two new methods showed a decrease of interest in card products.

The following subchapters recap in detail the findings of the three research issues each representing a focus area of the data analysis.

5.1.1 Use of Alternative Payment Methods Nationally

Focusing on the first research issue, only one of two hypotheses was verified. For as the statement that: "Digital banks do not possess a disruptive nature on other banks and just act as normal competitors.", was found to be true. The growth rates of national payments made by customers of digital banks are similar to the company's average.

An explanation to why digital banks cannot convince customers enough of their services to fully convert them was not found. Therefore, the second hypothesis remains non-verified. Reasons for that are the lack of insight into the customer behavior at challenger banks.

Summarizing the findings from this research issue it is to be said, that digital banks do not have an impact on a national level. Mobile payments on the other hand have proven to substitute traditional products and therefore have an impact on the usage rate of cards. Being a supplementary product, mobile payments seem to have no affect on the volume of the transactional system as a whole.

5.1.2 Use of Alternative Payment Methods Internationally

The second research issue set out to answer following question: “Does the rise of alternative payment methods affect the traditional payment system for transactions abroad?” This was proven to be true. Further, both supporting hypotheses were also verified.

This was possible through the discovery of significantly lower growth and usage rates for traditional products abroad. Especially the identified users of digital banks were responsible for the exposed impact.

5.1.3 Behavior of Twint Users

The last research issue focused on mobile payments. For this thesis the provider Twint was analyzed in detail as it is the favorite mobile payment solution for Swiss residents (Twint, 2020). The research issue presented the following question: “Are mobile payment methods growing faster than traditional payment transactions?” This can be answered positively, as a higher rate of growth compared to traditional means of transactions was detected. This led to a falsification of the first hypothesis.

The second hypothesis was verified as mobile payment solutions still flow through the current transactional system and no reductions in transactions were exposed. Instead mobile payments through Twint drove national transactional growth in 2019 and 2020.

5.2 Outlook

There are two possible strategies for traditional and new financial players. While traditional players have to focus on their whole product range and the international market, new players need to take a look at converting customers fully to their company and the development for products designed for the market of Switzerland.

5.2.1 Possible Course of Action for Traditional Players

If a traditional player does not currently provide and focus product development for a digital native customer base, the danger of a standstill within the current situation could be fatal. Following Dingli's logic, the sluggish adaptation of new payment methods by non-digital native generations (Dingli, 2015, pp. 14-16) could result in a low incentive for the traditional players to invest into exactly these new methods of the future. This is because their customer base currently include digital natives in a minority position. With the demographic growth and change within the next couple of years, this group will become larger and of more significance to retail banks and banks in general. As a result, investments into their digital product line are vital. Further integration of alternatives to their own products should be tested.

After analyzing the transactional data, the influx of payments to N26 and Revolut now poses a threat for the research partner and other retail banks product lineup. In regard to understand their situation and outlook into the near and mid-term future better, following questions have to be answered:

- How many transactions are made using with accounts at digital banks (N26 and Revolut)?
- How many transactions does the research partner loose to neo-banks, as these clients might substitute or replace some or all of their payment methods?
- Are the transactions from their own clients to digital banks enough to compensate for the lost transactional volume?
- How much do exchange rates and fees for card transactions have to be lowered so that traditional products can compete for the international use?
- Can N26 and Revolut motivate the research partner's customer base to use the digital banks as their primary banking solution including accounts for salary deposit and wealth management?

These questions should help in evaluating the urgency to come up with new strategies as well as defining the products that need to be changed the most.

5.2.2 Possible Course of Action for New Players

New players are conquering especially international transactions and younger customer segments in Switzerland. Digital banks such as N26 and Revolut should shift their efforts to fully convert customers, so that they do all of their banking with the services provided by these new players. Also, the national transactional market should be analyzed, as their products do not seem to be as popular for use within Switzerland. Possible reasons for that could be trust and personal relationships of the customer to the financial provider (Cherowbrier, 2020, p. 33). A solution for this could be a widespread public relations campaign to seem more legitimate and trustworthy as well as providing more individual advice as a basic service.

Similar to traditional players, an opening of their platform to local solutions such as Twint needs to be checked. This as it has been a fact that customers switch their financial partners often because of a higher convenience and usability (Cherowbrier, 2020, p. 33).

6 Discussion and Reflection

The presented thesis deals with identifying possible impacts of digital payments on traditional payment transactions. This was achieved through analysis of literature and study of empirical data. Combined the results show that not only are digital payment methods on the rise, but also impact current payment transactions.

For this scientific thesis a cooperation with one of the largest retail banks of Switzerland was formed. Through that the analysis of actual transactional data and sharing of market insights was possible. This gives this thesis its relevance for the Swiss private sector.

A major weakness of this thesis is that only one player has agreed to share it's transactional data. Nonetheless, as it was one of the major players for the analyzed market, the transactional data provides an accurate view into the payment behavior of Swiss costumers. The findings of this thesis might only be true for Switzerland, as other markets have different new players and competition aspects.

Another short coming is, that the analysis of mobile payment methods was restricted to one provider, in this case Twint. Due to legal restrictions in the past, other mobile payment solutions only just started to penetrate the market of Switzerland. Also, data from other mobile payment solutions were not available in a qualitative and quantitative sufficient amount.

In retrospect, direct access to the transactional data would have enhanced this thesis insightfulness and correlations might have been detected. This was prevented by the Cov-Sars-2 restrictions implemented by the research partner. As a general work-from-home order was in place, the access to the data warehouse for non-essential personnel and third parties was prohibited. The access to transactional data was only possible through data transfer.

Without direct and constant access for a certain time period, data exploration was limited. All data queries were discussed with the research partner, but the outcome or these were not known beforehand. This resulted in an early focus on specific data categories and prevented in some case verification of findings.

A further increase in the informative value could have been achieved by accessing the transactional data of multiple retail and digital bank. This would provide a basis to verify the findings of this thesis from both sides of the market.

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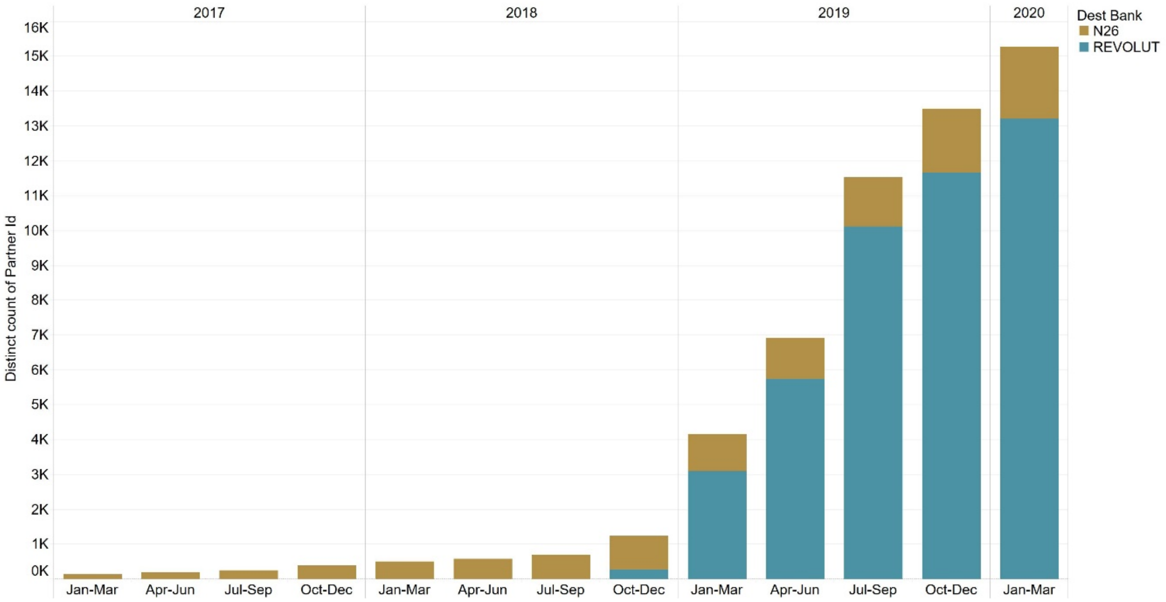
8 Appendix

Appendix I – Data from Research Partner

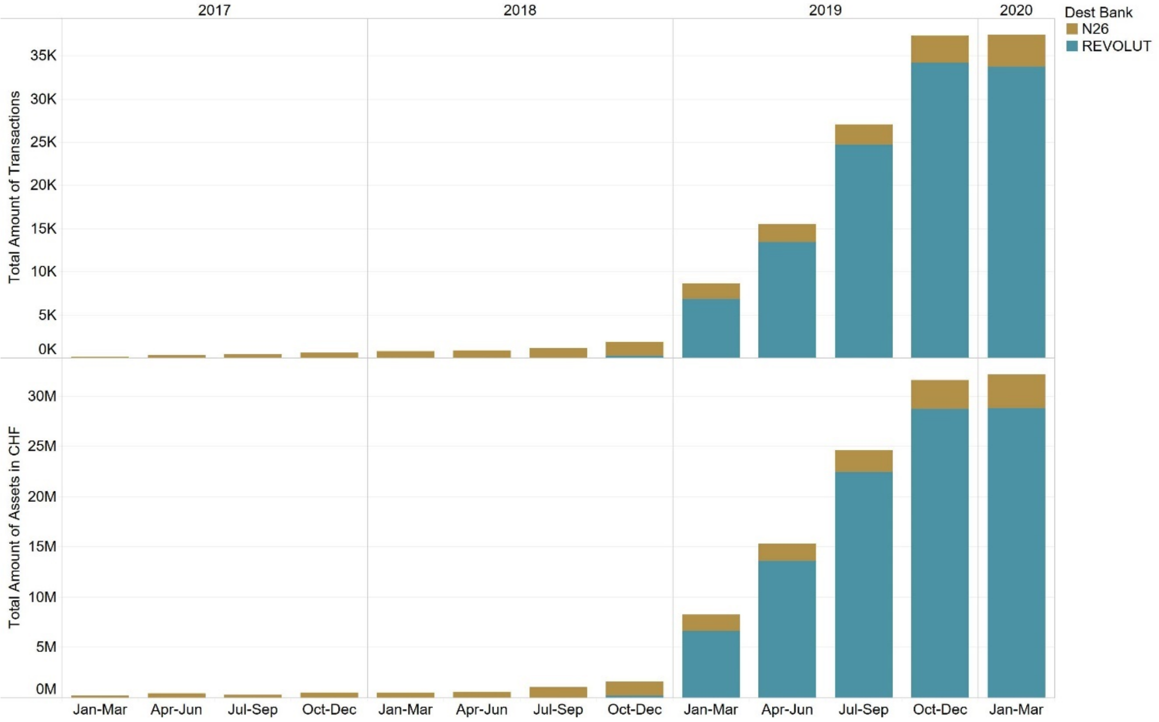
In this appendix, all figures made during the analyzing process of the transactional data are listed with the numbers to the relative figures.

Figure 6 – Unique Customer with Quarterly Relations to Digital Banks



	2017				**2018**				**2019**				**2020**
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
N26	138	203	244	379	507	585	703	970	1045	1185	1407	1841	2074
Revolut	0	0	0	0	0	0	0	265	3104	5735	10120	11657	13213

Figure 7 – Total Amount of Numbers of Transactions and Assets



Total Amount of Transactions

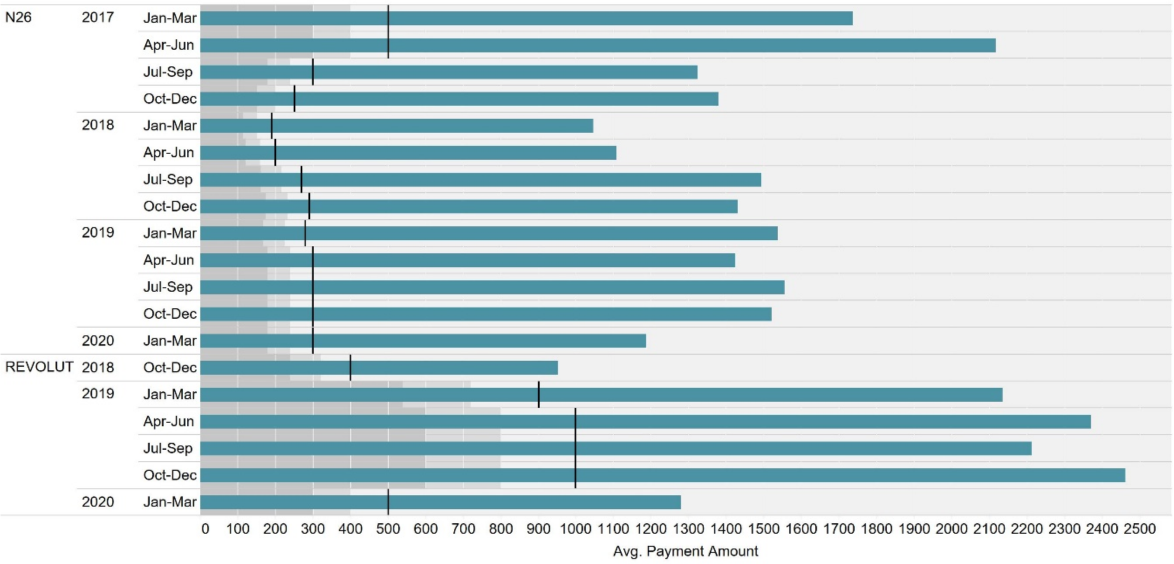
	2017				2018				2019				2020
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
N26	219	329	428	631	780	936	1,143	1,645	1,833	2,024	2,310	3,165	3,710
Revolut	0	0	0	0	0	0	0	285	6,849	13,494	24,776	34,203	33,780

Total Amount of Assets in CHF

	2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
N26	239531	429781	324593	525668	535735	651374	1065726	1406103
Revolut	0	0	0	0	0	0	0	252384

	2019				2020
	Q1	Q2	Q3	Q4	Q1
N26	1,635,615	1709365	2,223,041	2,841,292	3,366,931
Revolut	6,639,767	13,656,076	22,429,359	28,768,097	28,793,534

Figure 8 – Average and Median Amount



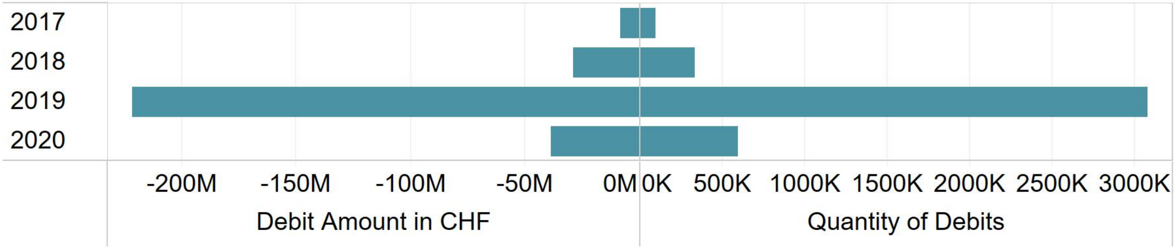
Avg. Payment Amount in CHF

	2017				2018				2019				2020
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
N26	1736	2117	1325	1380	1046	1108	1493	1430	1537	1423	1555	1520	1188
Revolut	0	0	0	0	0	0	0	952	2135	2371	2212	2461	1280

Median Payment Amount in CHF

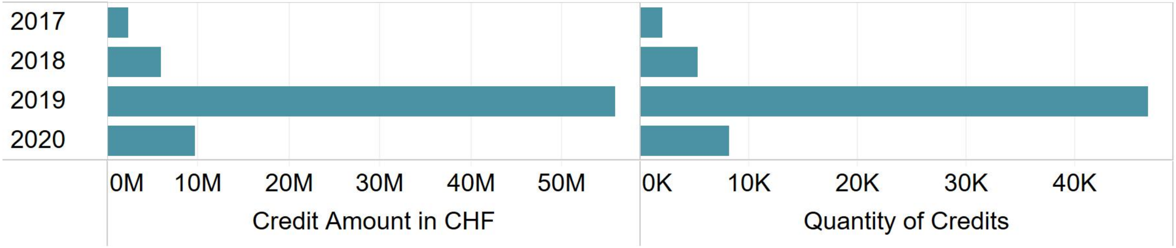
	2017				2018				2019				2020
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
N26	500	500	300	251	190	200	270	290	280	300	300	300	300
Revolut	0	0	0	0	0	0	0	400	900	1000	1000	1000	500

Figure 9 – Quantity and Amount of National Debit Transactions



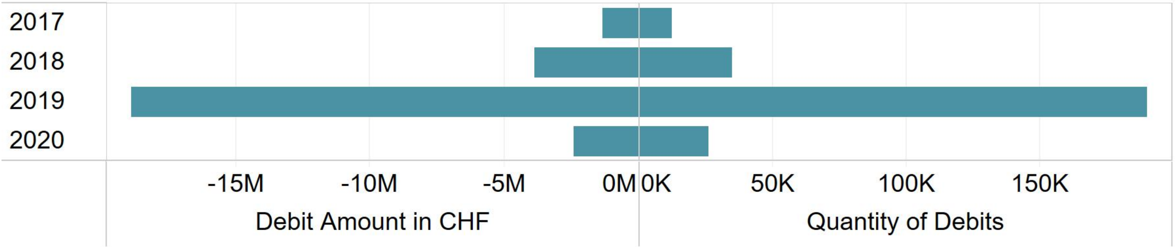
	2017	2018	2019	2020
Debit Amount in CHF	-8,391,374	-29,320,503	-221,402,286	-39,066,055
Quantity of Debits	91,582	335,286	3,078,856	594,147

Figure 9 – Quantity and Amount of National Credit Transactions



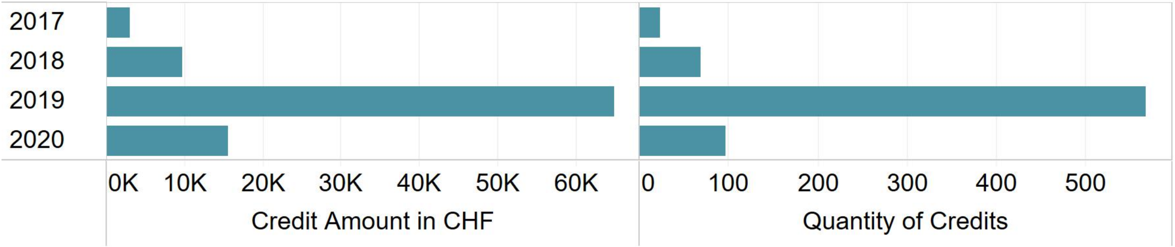
	2017	2018	2019	2020
Credit Amount in CHF	2,306,293	5,941,311	55,838,257	9,697,163
Quantity of Credits	2,056	5,343	46,701	8,174

Figure 11 – Quantity and Amount of International Debit Transactions



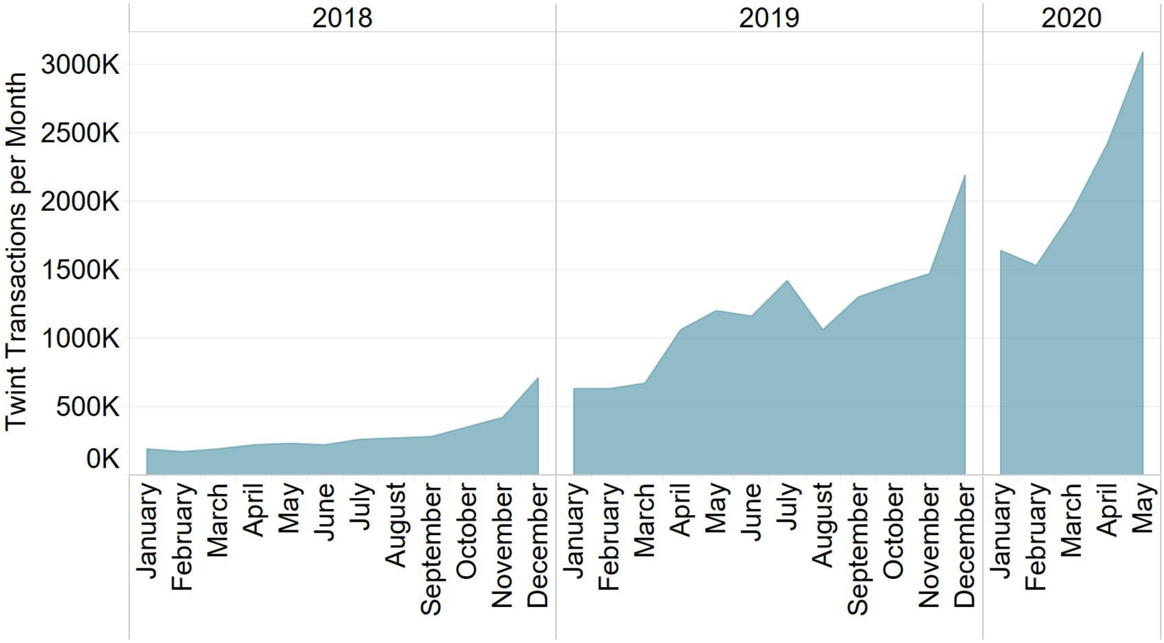
	2017	2018	2019	2020
Debit Amount in CHF	-1,367,423	-3,885,480	-18,849,5661	-2,425,369
Quantity of Debits	12,075	34,602	189,780	25837

Figure 12 – Quantity and Amount of International Credit Transactions



	2017	2018	2019	2020
Credit Amount in CHF	3,085	9,695	64,872	15,539
Quantity of Credits	23	69	567	97

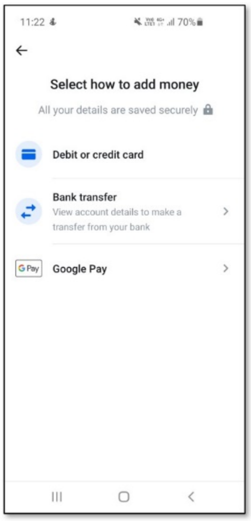
Figure 13 – Twint Transactions per Month



	2018	2019	2020
January	194,224	630,922	1,639,109
February	172,994	627,639	1,531,859
March	186,528	667,322	1,918,063
April	222,966	1,058,854	2,419,518
May	232,335	1,203,547	3,089,953
June	225,068	1,158,222	-
July	263,418	1,418,594	-
August	272,162	1,063,277	-
September	279,394	1,305,342	-
October	352,635	1,392,741	-
November	416,053	1,475,325	-
December	707,326	2,196,039	-

Appendix II – Revolut Screenshots

Following screenshots show how users of Revolut can transfer money to their account when they are a resident of a country currently not officially serviced by Revolut. The country in question in this example is Switzerland.

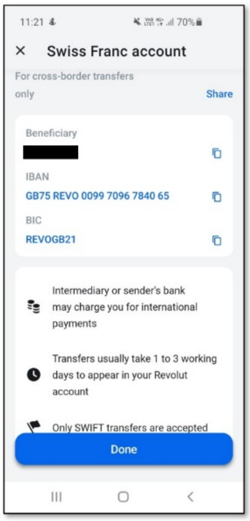


Select how to add money

All your details are saved securely

Bank transfer
View account details to make a transfer from your bank

Different transfer methods
to your account at Revolut



Swiss Franc account

For cross-border transfers only

Beneficiary
[redacted]

IBAN
GB75 REVO 0099 7096 7840 65

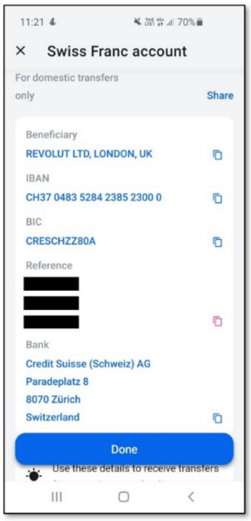
BIC
REVOGB21

Intermediary or sender's bank may charge you for international payments

Transfers usually take 1 to 3 working days to appear in your Revolut account

Only SWIFT transfers are accepted

International bank transfer
details for Revolut



Swiss Franc account

For domestic transfers only

Beneficiary
REVOLUT LTD, LONDON, UK

IBAN
CH37 0483 5284 2385 2300 0

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Über die Informationswissenschaft der Fachhochschule Graubünden

Die Informationswissenschaft ist in der Schweiz noch ein relativ junger Lehr- und Forschungsbereich. International weist diese Disziplin aber vor allem im anglo-amerikanischen Bereich eine jahrzehntelange Tradition auf. Die klassischen Bezeichnungen dort sind Information Science, Library Science oder Information Studies. Die Grundfragestellung der Informationswissenschaft liegt in der Betrachtung der Rolle und des Umgangs mit Information in allen ihren Ausprägungen und Medien sowohl in Wirtschaft und Gesellschaft. Die Informationswissenschaft wird in Chur integriert betrachtet.

Diese Sicht umfasst nicht nur die Teildisziplinen Bibliothekswissenschaft, Archivwissenschaft und Dokumentationswissenschaft. Auch neue Entwicklungen im Bereich Medienwirtschaft, Informations- und Wissensmanagement und Big Data werden gezielt aufgegriffen und im Lehr- und Forschungsprogramm berücksichtigt.

Der Studiengang Informationswissenschaft wird seit 1998 als Vollzeitstudiengang in Chur angeboten und seit 2002 als Teilzeit-Studiengang in Zürich. Seit 2010 rundet der Master of Science in Business Administration das Lehrangebot ab.

Der Arbeitsbereich Informationswissenschaft vereinigt Cluster von Forschungs-, Entwicklungs- und Dienstleistungspotenzialen in unterschiedlichen Kompetenzzentren:

- Information Management & Competitive Intelligence
- Collaborative Knowledge Management
- Information and Data Management
- Records Management
- Library Consulting
- Information Laboratory
- Digital Education

Diese Kompetenzzentren werden im Swiss Institute for Information Research zusammengefasst.

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