

Cash and cards vs smartphone? - Outcomes of a comparative study on retail payment behaviour in China and Germany

Jan Lukas Korella, Deutsche Bundesbank

Abstract

The upcoming of internet and e-commerce in the late 1990ies and early 2000s brought new challenges to the payment markets. While in the following, China's online as well as offline payment market became dominated by large non-bank platforms like Alipay and WeChat, the German market remained "bank-dominated" with a leading role of credit transfers, direct debits and – for point-of-sale payments – the bank-owned girocard debit card scheme along with cash. In a survey among a sample of Chinese retailers in three metropolitan areas, which is unique in this field, we confirm the dominance of non-bank payment service providers and find combined market shares of Alipay and WeChat between 55 and 65 % in various payment scenarios both at the POS and online in China.

Contents

1	INTRODUCTION	2
2	DATA SOURCES AND PROCEEDINGS	2
3	EMPIRICAL FINDINGS/SURVEY RESULTS ON PAYMENT BEHAVIOUR	5
3.1	MOBILE PAYMENT SOLUTIONS DOMINATING AT THE POINT OF SALE IN CHINA.....	5
3.2	CARDS, CASH AND DIRECT DEBIT IN GERMANY	7
3.3	DIFFERENCES IN PAYMENT BEHAVIOUR IN SITUATIONS OF DAILY LIFE	9
3.3.1	BRICK-AND-MORTAR RETAIL	9
3.3.2	E-COMMERCE.....	10
3.3.3	PETROLEUM SALES.....	11
3.3.4	CAFES AND (FAST-FOOD) RESTAURANTS.....	13
3.3.5	RECURRING PAYMENTS.....	14
3.3.6	P2P PAYMENTS	14
3.4	REGIONAL DIFFERENCES IN CHINA	15
4	CONCLUSIONS BASED ON THE EMPIRICAL ANALYSIS.....	16
5	OUTLOOK	19
6	REFERENCES	23

1 Introduction

Everyone who visits Chinese megacities like Shanghai and Beijing nowadays and calls a taxi, gets a beer at a bar or pays for a parking ticket will come across the blue and green logos of “Alipay” and “WeChat” offering inter alia mobile payment solutions. In situations like these in which German customers would open their wallets to get some cash, one will see Chinese urban dwellers most likely pulling out their smartphone to settle the payment via mobile applications. When looking at current discussions in media and research, there seems to be little doubt that digitisation and innovative means of payment will have, and partly already had, a disruptive impact on the payment market in both China and Germany. This paper comprises the main findings of a research project carried out by the Deutsche Bundesbank in cooperation with Zhejiang University Hangzhou, Goethe-University Frankfurt / Sino-German-Center, supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The aim was to underpin current discussions with empirical findings and to gain insights into the current status of the availability and adoption of payment methods in China and Germany.¹ Within the project, an in-depth comparative analysis of payment habits in China and in Germany was conducted in order to identify potential differences, provide explanations and, where possible, define policy implications. In particular, the research questions to be answered on an empirical basis in this report are:

- (1) How do Chinese and German customers pay in their daily lives and which country-specific differences are there in payment method usage?
- (2) What are the explaining factors for these payment habits?
- (3) Which implications can be drawn for a market outlook?

Research question (1) will be answered in section 3, which presents our empirical findings and survey results.² It is preceded by a description of data sources and empirical proceedings (see section 2). Research question (2) is covered in section 4, while the market outlook (3) is presented in the final section 5 of this paper.

2 Data sources and proceedings

Due to relatively good data availability, the German part of the empirical analysis mainly relies on secondary sources, in particular data from an annual study conducted by the EHI Retail Institute described below. On the Chinese side, no comparable data sources, i.e. a survey among retailers that covers a broad mix of sectors, were available. Thus, over the course of the project, a survey was set up in order to gather primary data. In particular, a field research on payment behaviour in retail stores in Beijing, Shanghai and Hangzhou was conducted in April and May 2017 and a total

¹ The project was carried out in the context of China’s and Germany’s G20 presidencies. In particular, China’s presidency theme “Towards the Innovative, Invigorated, Interconnected and Inclusive World Economy” of 2015/2016 was supported by the German G20 presidency in 2017. At a meeting of the Sino-German-Center - which was established in 2015 in order to strengthen the Chinese-German financial dialogue - and the Deutsche Bundesbank and with the input of GIZ, the idea of a Chinese-German collaborative project arose. Bearing in mind the G20 2016/2017 focus on “Digital Finance”, a research project in the field of payment systems, methods and patterns in China and Germany was agreed on.

² Further empirical results as well as an extensive analysis and comparison of the Chinese and German payment market can be found in a comprehensive research report to be published at the end of 2017.

of 160 merchants were interviewed in person. Beijing and Shanghai are the two major first-tier cities in China with populations of around 21 million and 24 million respectively, while Hangzhou, the capital city of the Zhejiang province where the Alibaba Group is located, has a population of around 9.2 million. Apart from this, these three cities are also considered to be highly economically developed among the Chinese cities. Due to limited resources, in this study we focused only on retail payments in more well developed areas. However, we are aware of a potential sample bias, as the digital divide between urban areas and rural areas, as well as large cities and small cities is still quite significant in China. To address the research questions, a questionnaire comprising the following parts was designed:

- (i) basic company information (sector, retail channels (online, POS or multichannel), number of employees, yearly turnover, average number of daily customers),
- (ii) payment options offered and criteria why payment methods were preferred by merchants,
- (iii) usage of payment methods by customers, and
- (iv) estimation of what payment methods would be most prominent five years from today.

In particular, the following point-of-sale (POS) payment methods were covered in the survey:

Table 1: List of payment methods covered in the Chinese sample

Payment Method	Description
Cash	Payment using banknotes and coins
Debit Card	Payment using a debit card issued by a bank
Credit Card	Payment using a credit card issued by a bank
Alipay	Third-party online and mobile payment method offered by Alibaba Group
WeChat Pay	Third-party mobile payment method offered by Tencent
Union Quick	Card-based payment method offered by China UnionPay based on the NFC technology
Prepaid Card	Payment with prepaid cards issued by various companies
Others	Other payment methods

In order to ensure comparability, the analysis of the German market was mainly based on data from merchants - in particular an annual survey carried out by EHI Retail Institute (cf. EHI 2017a). The Deutsche Bundesbank's triennial payment behaviour study applying a different methodology by surveying the consumer side of the payment market was used as an additional source whenever helpful (cf. sections 3.3.4 and 3.3.6).

The EHI data differentiate between the following payment methods in Germany.

Table 2: List of payment methods covered in the German EHI Retail Institute sample

Payment Method	Description
Cash	Payment using banknotes and coins
Debit Card	Payment using a debit card issued by banks.
Credit Card	Payment using a credit card issued by banks.
(Electronic) direct debit (ELV)	ELV builds on the availability of the customer's bank data on the bank card's magnetic stripe. These data are read at the POS terminal and used to generate a direct debit, i.e. a payment initiated by the payee, which the customer mandates by a signature. The ELV is not a card payment in the narrow sense; however the debit card is used to trigger the payment.
Retailer card	Payment using cards with a payment function issued by a number of major retailers
Others	Other payment methods, for example purchase on account/financing

Due to lack of equivalent data, the empirical analysis had to rely on different data sources for the Chinese and the German side. In order to show differences as well as similarities of the Chinese and the German survey, the following table 3 presents key figures of both data bases.

Table 3: Comparison of the Chinese and German survey data bases

	Chinese sample	German EHI survey
Number of stores covered	160 (i.e. small sample)	approx. 80,000 (60% of German retail market)
Regions covered	3 Metropolitan regions in China (Beijing, Shanghai, Hangzhou)	Extensive coverage of Germany (metropolitan as well as rural regions)
Sectors covered	Personal Care, Convenience stores, Clothing/Sports, Shoewear, Supermall, Department Store, Gardening, Electronics, Furniture, Baby Care, Fast Food, Coffee/Drinks Stores, Bakery/Snacks, Local Food Markets, Gas Stations, (and others)	Personal Care /Chemist, food chains/ supermarkets, department stores, clothing, sports, Shoewear, warehouse/gardening, furniture, perfumery, electronics (and others)
Total turnover of sample	4.3 billion Yuan (€ 584.9 million) *	€ 237.5 billion
Average annual turnover per store	28.6 million Yuan (€ 3.9 million) *	€ 2.97 million
Average number of daily customers per store	357	approx. 669

* n=149 (11 respondents did not disclose revenue figures/estimates)

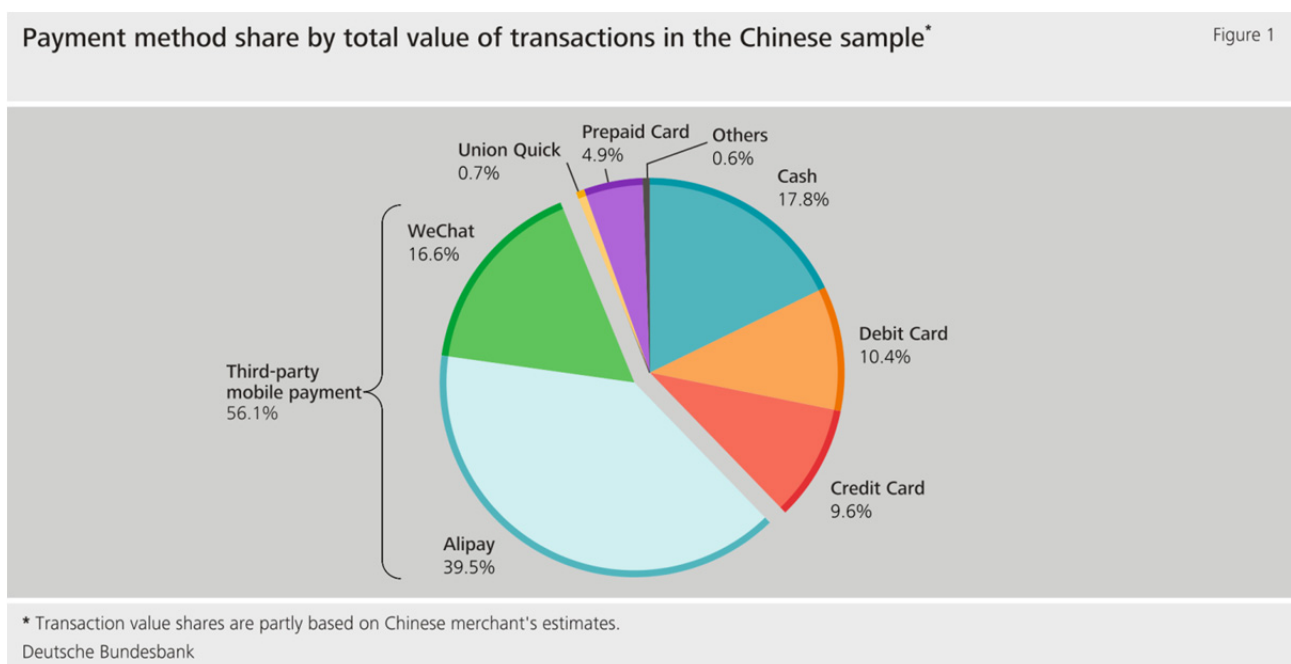
Both on the Chinese and the German side other sector-specific surveys as well as interviews with sector experts served as additional sources to provide descriptions of recent developments on both the Chinese and German payment markets as well as analyses of payment behaviour in specific situations of customers' daily lives.

3 Empirical findings/survey results on payment behaviour

In the following, the most important findings of our empirical survey in China are compared with results from Germany, especially the EHI Retail Institute study, as well as other surveys and expert estimates.

3.1 Mobile payment solutions dominating at the point of sale in China

The survey results show that the customers of the surveyed Chinese merchants prefer mobile payment solutions at the POS. In the sample, an estimated 39.5% of the total value of transactions is paid with Alipay, while cash is the second most prominent payment method with a share of 17.8%. The second leading non-bank payment provider WeChat accounts for 16.6%, while debit and credit cards have shares of 10.4% and 9.6% respectively.



The high adoption of mobile payment solutions is confirmed by other surveys among consumers: A survey by FT Confidential Research among 1,000 consumers in 2016 showed that a combined 98.3% of respondents had used mobile payment solutions in the previous three months. Alipay was the most frequently used payment platform with almost 80% of respondents living in first-tier cities and was thus more regularly used than credit cards (about 60%), debit cards (about 30%) or cash (79%) (EY 2016). Similarly, according to research by China Tech Insights 92% of Chinese mobile internet users choose mobile payment apps such as WeChat Pay as their primary offline payment method today, while “smartphone built-in payment tools” such as Apple Pay are currently used by approximately 12%. The penetration rate of mobile payments amounts to as much as 94.1% in first-tier cities (NFC World 2017).

Box 1: About Alipay and WeChat

According to the data provided, third-party/non-bank payment providers play a large role in the Chinese payment market. Leading players are Alipay, a payment service provider that is part of the Alibaba conglomerate and Tenpay, a payment service provider under the Tencent holding that offers the mobile payment solution “WeChat Pay”. The Alipay wallet enables users to make e-commerce and face-to-face purchases and is run by Alipay.com Co., Ltd. the leading third-party payment company in China. In 2004, Alipay was founded by the Alibaba Group in order to provide internet based escrow payment services for the online shopping website of Alibaba. In 2009, the mobile application of Alipay was launched. By 2016, Alipay was processing already 175 million transactions per day, of which a majority of 60% were completed through a mobile phone. In 2014, Alipay was restructured as Ant Financial Services Group and separated from Alibaba to comply with governmental regulations. However, there is still a profit-sharing agreement between Ant Financial and Alibaba (Alibaba 2016).

WeChat Pay is the integrated digital wallet housed within the WeChat application, a social platform run by Tencent that in 2016 had a user rate of 806 million (EY 2016). WeChat combines functionalities known from Facebook and WhatsApp. For instance, WeChat allows users to chat with contacts and has a feature called “Moments” to share pictures and videos, similar to Facebook’s “timeline.” In 2005, Tencent developed a digital payment app called Tenpay, launched only nine months after the release of Alipay. The Tenpay app allowed users to pay for Tencent’s products and services and is also interoperable with several e-commerce platforms, with the exception of Alibaba-owned Taobao and Tmall e-commerce platforms though. In 2013, Tencent integrated the Tenpay app functionality into WeChat, in the following known as “WeChat Pay” (Kapron and Meertens 2017). With the WeChat Pay wallet customers can pay in various situations, both remote and at the POS.

Both the Alipay and the WeChat Pay wallet provide different options of funding. For instance, with Alipay customers can choose within the purchase process whether the transaction amount will be deducted from the Alipay account on a prepaid basis, a linked debit or credit card or from an account that offers an interest rate free credit for 41 days. While most customers connect their third-party account with their bank account and/or a payment card, it is also possible to use it without a bank account as for example Alipay accounts can also be topped up via a prepaid phone card. However, Alipay and WeChat are not interoperable and it is not possible to send money directly between accounts at the two different providers.

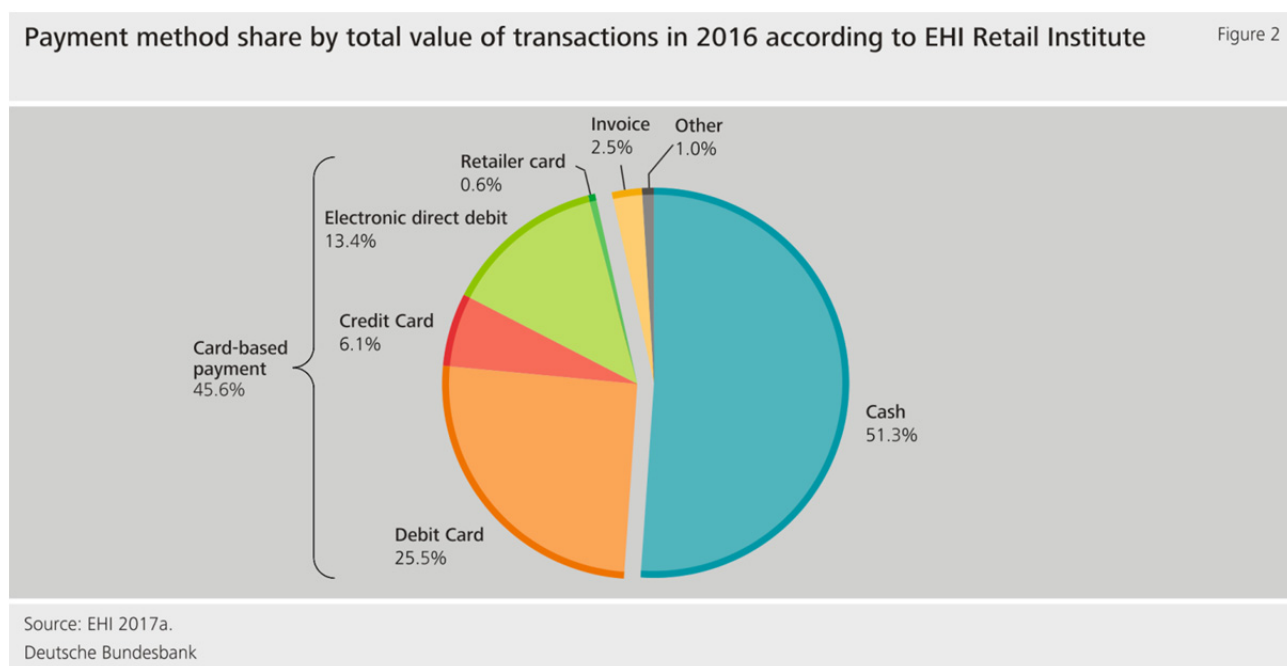
Recently, Chinese payment providers enforced their **expansion to the German market**. Alipay for example entered the German market in three steps, starting with e-commerce, followed by tax refund at airports and payments at the POS. Starting in 2013, as more and more Chinese consumers were shopping on German websites for high quality German products, several websites started to accept Alipay as an online payment method, with some of them even launching a separate website in Chinese. In a next step, Alipay seized the opportunity to expand its business into offline markets. Having in mind the over 1.3 million Chinese tourists travelling to Germany per year (World Tourism Organization 2016), Alipay started a tax refund service at Munich Airport in cooperation with local payment service providers, enabling Chinese tourists to receive their tax refund to their Alipay account. Moreover, Alipay collaborates with Wirecard in order to enable retailers to accept Alipay both online and at the POS: Since April 2017, Alipay’s barcode payment solution is in use in Rossmann stores in Germany (SOURCE 2017b, 3). In addition, Alipay is accepted in selected Zwilling and WMF stores. While Alipay was going ahead, Wirecard since 2017 is also making WeChat Pay available to merchants in Europe. Starting November 2017, Tencent together with Wirecard will provide WeChat Pay as a mobile payment solution in Germany (Wirecard 2017).

However, the digital divide between urban areas and rural areas in China is still quite significant. For instance, nearly 50% of the country's 1.36 billion population lives in rural areas, but less than 30% of rural residents are online and only 10% have bought things online (EY 2016). Thus, in rural areas, the picture is most likely different than our survey indicates and, for example, the share of cash is expected to be higher.

Additionally, Bank for International Settlements (BIS) figures show that bank account based payments, i.e. credit transfers are not widespread in China with 4.6 credit transfers per capita in 2015 (compared to 73.5 in Germany), whereas cards were used 21.1 times per year (see BIS 2016).

3.2 Cards, cash and direct debit in Germany

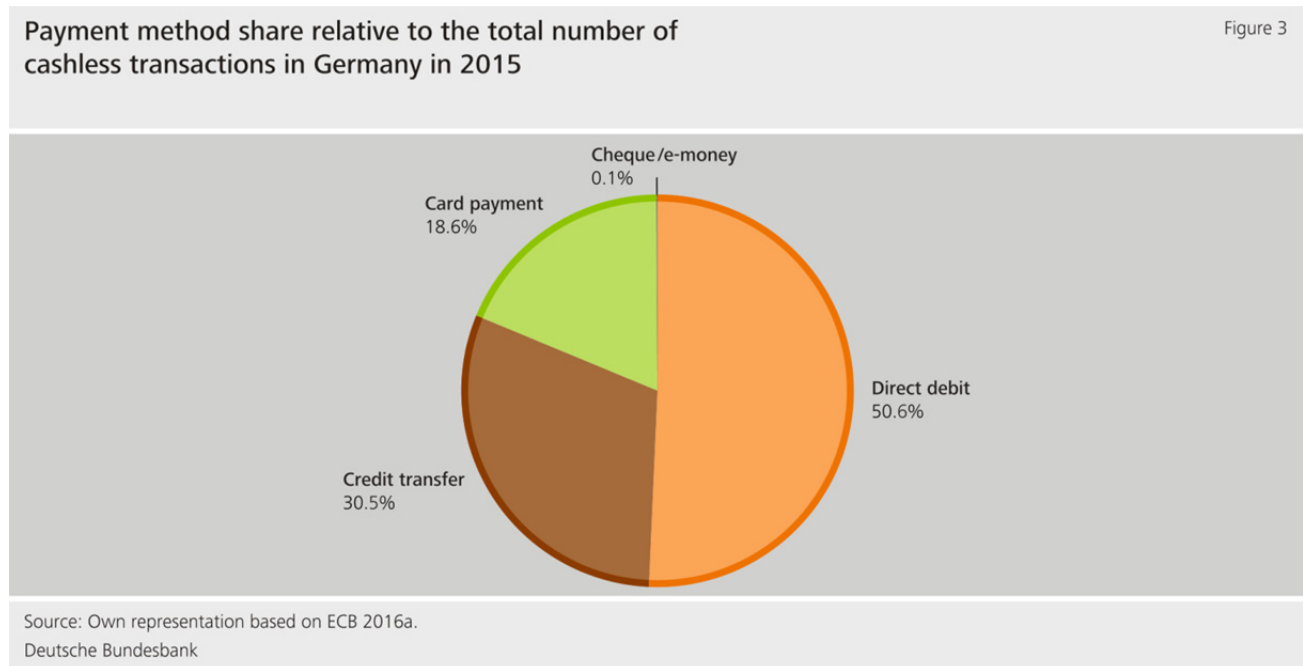
By contrast, the German market for payments at the POS is dominated by cash and cards. Recent EHI Retail Institute data show a 51% share of cash relative to total payment transaction value in retail, while cards and card-initiated methods, i.e. electronic direct debit, account for another 45.6 % of value (EHI 2017a). Since Germans prefer to pay higher sums by (credit or debit) card whereas small sums are more likely to be paid in cash, the share of cash relative to the number of payment transactions is even higher, at 78% (see EHI 2017a and Deutsche Bundesbank 2015).



However, despite Germany's reputation as "cash friendly" the total payment market in Germany is more digitalised than figures from the POS might suggest. First and foremost, the direct debit³ system is of high importance and accounts for over 50% of all cashless payment transactions in Germany according to Central Bank statistics (see figure 3). This is mainly due to the fact that direct debit has a high acceptance in the German population and is based on a well-established payment process. For example, direct debits are very popular for recurring payments, like the monthly elec-

³ Unlike credit transfers, direct debits are initiated by the payee, who thereby ensures that his/her claim on the payer is asserted on time. However, this presupposes that the payer preauthorises the payee to collect the payment (collection authorisation) or, by agreement with the payee, authorises his/her bank to debit his/her account in accordance with direct debit requests issued by that particular payee (debit authorisation) (BIS 2012, 174).

tricity bills or rent payments. By contrast, cards are prominent at the POS in Germany - accounting for 58% of cashless payments in German retail (see figure 2) - but account for only 18.6% of the total cashless payments market (see figure 3).



Mobile payments are not present in the EHI data, since first solutions entered the market only recently (see Box 2 for details).

Box 2: Current status of mobile payment solutions in Germany

In Germany first mobile payment solutions entered the market only recently. One example is “girocard mobile”, a payment solution via Smartphone that relies on the NFC-technology at the POS and which is in the field testing phase as of July 2017. Payments will be settled via the linked “girocard” debit card.







Another example is a Deutsche Bank solution for payments via smartphone and their “Deutsche Bank Mobile” app at the POS terminal that started in April 2017 (SOURCE 2017b). While customers need an NFC-ready smartphone, connection to the Internet or telecommunication network is not necessary, since the App always has ten number codes, so-called Tokens, saved in order to authorise up to ten payments even without network connection.

However, when analysing the German market, it is important to keep in mind that current mobile payment applications rely on existing payment systems. Examples are an NFC payment with a mobile device and a following deduction of the amount from a linked credit card or a direct debit that is triggered by scanning a QR code by the smartphone. Thus, existing mobile payments are access channels relying on the established instruments of payments (credit transfer, direct debit, card payments) in the background.

3.3 Differences in payment behaviour in situations of daily life

In order to enable a broader comparison of payment behaviour, our study analysed specific situations of payments in the daily lives of customers. Thus, table 4 provides an overview of the most commonly used payment methods in various situations based on both our survey data as well as secondary sources. In the following sections 3.3.1 to 3.3.6, the empirical findings for the situations listed in table 4 are presented in detail.

Table 4: Overview matrix of most commonly used payment methods in various situations in China and Germany ⁴

	China	Germany
Brick-and-mortar retail 	Alipay Cash WeChat Pay	Cash Debit card Electronic direct debit
E-Commerce 	Alipay WeChat Pay	Invoice (i.e. credit transfer) Direct debit PayPal
Gas station 	Prepaid card Cash Alipay / Credit card	Cash Debit card Fleet card
Café / Fast food restaurant 	Alipay WeChat Pay Cash	Cash Debit card Credit card
Rent payment 	Cash Alipay	Credit transfer Direct debit
P2P 	Cash WeChat Pay Alipay	Cash Credit transfer Paypal / mobile apps

Source: Own compilation.

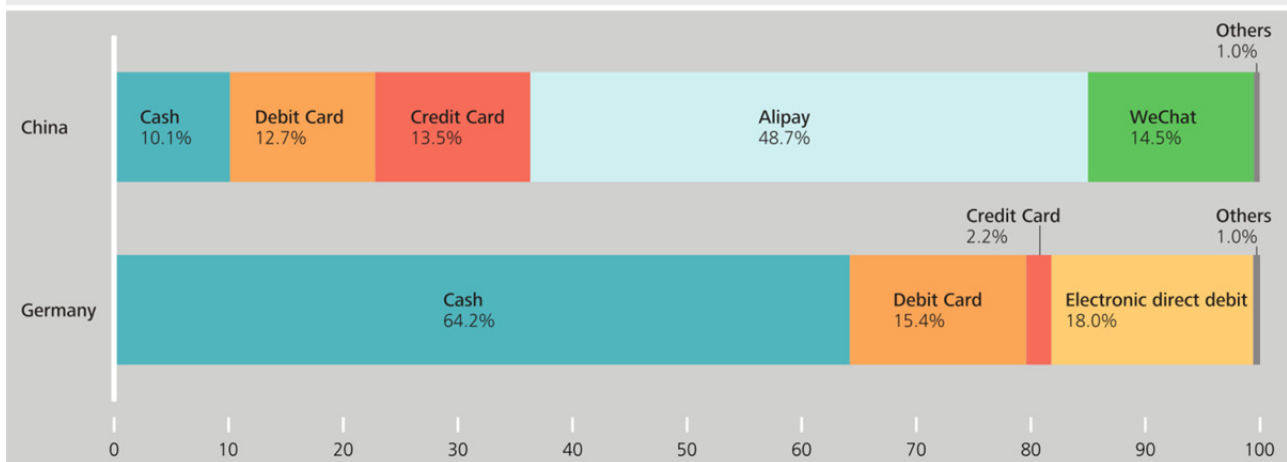
3.3.1 Brick-and-mortar retail

Customers in brick-and-mortar / over-the-counter (OTC) retail in Germany typically prefer cash, debit card or electronic direct debit payment, while – according to our sample - people in Chinese retail stores mainly pay with mobile payment solutions. As an example, the following graph compares the payment method usage in clothing and sporting goods stores in the German EHI survey with our sample for the Chinese market.

⁴ The table is based on the sources of this report and is not intended to be an exhaustive and/or representative market analysis.

Comparison of payment method usage in the clothing and sporting goods sector in China and Germany

Figure 4

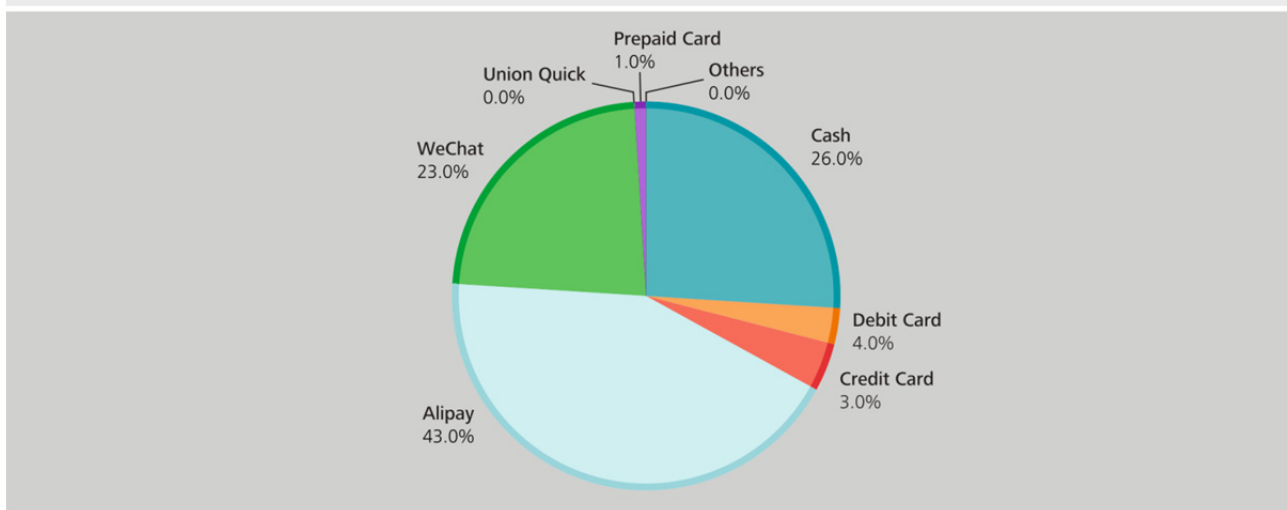


Source: Own representation based on survey results and EHI (2017a).
Deutsche Bundesbank

A comparison of other OTC retail segments showed similar results. Convenience stores in China for instance showed a high adoption of Alipay and WeChat Pay. However, the share of cash was higher than the sample average (cf. figures 1 and 5).

Payment method usage in Convenience stores in the Chinese sample

Figure 5



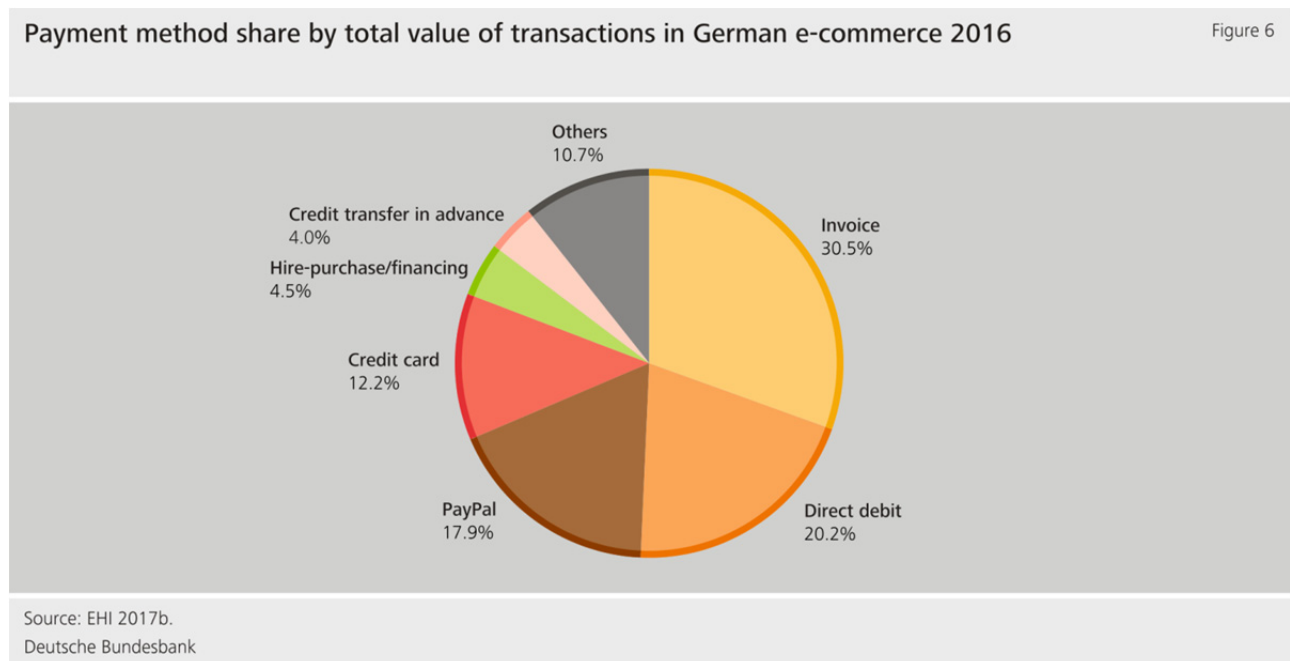
Deutsche Bundesbank

3.3.2 E-commerce

A large share of shopping in both China and Germany is not done in brick-and-mortar shops but online. In particular, roughly 18% of total retail revenue in China and 8% of retail revenue in Germany can be attributed to e-commerce (Kleiner Perkins 2017). Thus, the following section will shed some light on payment behaviour in this important sector.

In contrast to brick-and-mortar retail, merchants in German e-commerce offer a different mix of payment methods and customers use different payment methods. According to the “Online-Payment” study of the EHI Retail Institute among the leading 1,000 German online shops, the most

frequently used payment method online in 2016 in Germany was invoice, followed by direct debit, PayPal and credit card (EHI 2017b).



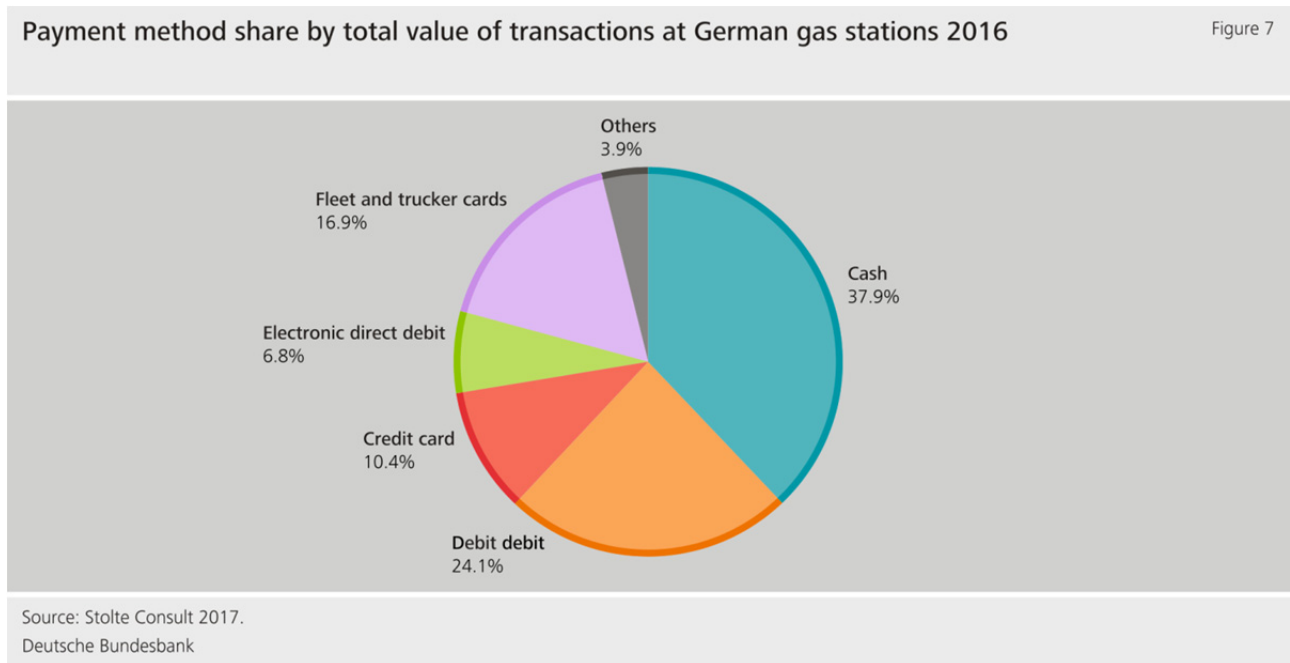
On the other hand, PayPal is used by Chinese customers mostly only for shopping at international websites like eBay and by non-Chinese nationals living in China. Moreover, the Chinese e-commerce market is dominated by domestic players – first and foremost China’s biggest online shopping website “Taobao” owned by Alibaba - while Amazon, for example, has a market share of less than 1% in China (Handelsblatt 2017a). At Taobao, 75% of payments in 2016 were settled through Alipay, underpinning Alipays overall strong market position (Alibaba 2016). Along the same lines, analyses by Kapronasia Analysis show a market share of Alipay of 43% in online payments for 2016 (Kapron and Meertens 2017), while according to Analysys, Alipay is the leading online payment solution with a market share of 34.7% (SEO Shifu 2017). However, these data do not provide information on where the payments were carried out, whether for example on an online shopping website or in-app. According to data of eMarketer however, 55.5% of all ecommerce sales in 2016 were carried out via a mobile device and the share is expected to reach 68% by 2020 (eMarketer 2016).

3.3.3 Petroleum sales

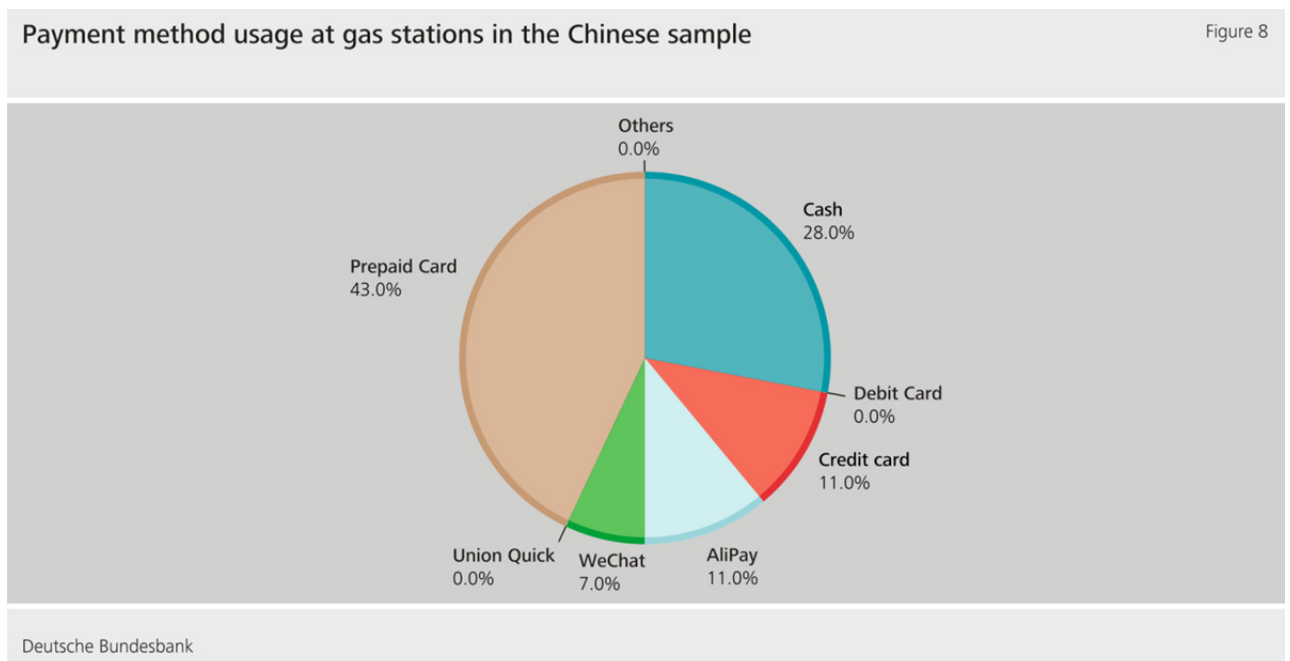
When comparing payments for petroleum sales, i.e. payment behaviour at gas stations, a special feature in Germany is the high importance of fleet cards (“Flottenkarten”). Those cards are issued by either gas station operators like Shell or by third parties (see for example DKV 2017). Fleet cards are cards with a payment function, whereby the payment function is available only for specific purposes, i.e. buying gas or paying for repairs. These cards are popular in the business context and are used by truck drivers or field staff driving company cars, for example.

According to a survey by Stolte Consult, 16.9 % of total transaction value at German gas stations is paid by fleet and trucker cards (see figure 7). The overall share of card-based payments, includ-

ing electronic direct debit, fleet and trucker cards, lies at 62 %, which is distinctly more than in the retail sector.



Within the Chinese sample, five respondents from gas stations were interviewed regarding their customers payment behaviour. Interestingly, Alipay and Wechat are not dominating at gas stations. Instead, in our sample prepaid cards were most heavily used (see figure 8).⁵



Prepaid cards in China are very popular for business purposes. In particular, companies provide employees who use a company car with a respective payment card with which they can fill up their tank at all cooperating gas stations. This payment method is thus to some extent comparable to the German “fleet cards”.

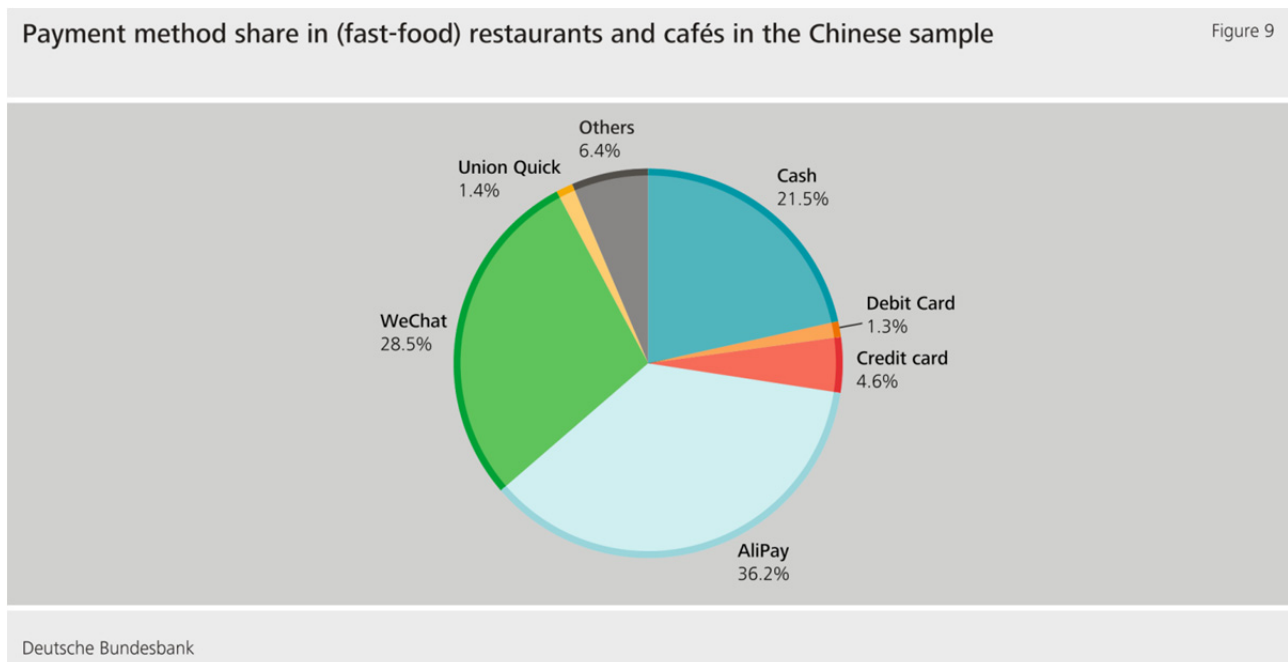
⁵ The 0% share of debit cards at gas stations has to be interpreted with care. The share might be biased due to the very small sample of five gas stations.

3.3.4 Cafes and (fast-food) restaurants

A large portion of daily payment situations occur in the gastronomy sector. Thus, the survey on the Chinese side covered some local and international food and coffee places and provides insights into how payments are carried out in the Chinese gastronomy sector. In Germany, by contrast, the analysis relies on secondary data from surveys as well as expert opinions.

For instance, Mastercard and orderbird find in a joint survey among 2,000 sector representatives that 73% of German restaurants offer cashless payment, while in 27% of restaurants cash is the only accepted payment method (Mastercard 2017). According to evidence from a consumer survey within the Bundesbank's payment behaviour study "cafes/bars/snack bars/fast-food restaurants" have the highest proportion of cash payments compared to other places of payment: 93.5 % of total transaction value was paid by cash and only 4.3 % by debit and credit card (Deutsche Bundesbank 2015). This is possibly due to the fact that cashless payments might not always be available in cafes, bars and smaller fast food places due to infrastructure constraints. Another factor might be the smaller average payment amounts in this sector, which would favour cash, since German consumers prefer cash payment for amounts up to € 20 (Deutsche Bundesbank 2015).

By contrast, in Chinese (fast-food) restaurants and cafés, many customers rely on mobile payment solutions. According to an online survey of Tencent Research Institute, Renmin University and Ipsos almost all dining establishments accept mobile payments (see Tencent Research Institute 2017). Accordingly, within our survey, the fast-food restaurants and cafés in China had a share of 36.2 % of Alipay, followed by WeChat with a share of 28.5 % (see figure 9). In comparison to our overall sample, both debit and credit cards have distinctly lower usage rates (1.3 % and 4.6 % versus 10.4 % and 9.6 % respectively). In comparison to Germany, the relatively low share of cash at fast-food restaurants and cafés in China is noticeable.



The combined share of mobile payment applications Alipay and WeChat Pay of 64.8% is in line with the results of the Tencent Research Institute survey among consumers. They find a 64%

share of mobile payments in restaurants, 66% in cafes and 74% in fast-food chains (Tencent Research Institute 2017).

3.3.5 Recurring payments

Moreover, our analysis covered recurring payments, for which we focused on the example of rent payments. In Germany, housing companies and landlords will most often offer payment via credit transfer (possibly using a standing order) and via a direct debit mandate according to representatives from the German federal house owners association “Haus & Grund” as well as from leading German housing companies. Regarding the share of credit transfers and direct debits, estimates vary between 54 % of tenants using credit transfer and 46 % choosing direct debit to pay their rent, to a share of 2/3 for direct debit. However, two experts from the federal association “Haus & Grund” estimate an 80 to 90 % share of credit transfers.

By contrast, rent in China is often paid not on a monthly but on a quarterly basis. Since no extensive data were available from housing companies or similar actors and in addition most housing rent in China is paid on a person-to-person basis, i.e. from one tenant to its respective landlord, we relied on expert estimates for this part of our comparison. Experts indicated that a large portion of rent is settled in cash, especially in rural areas. Bank transfers and Alipay, which also offers a rent payment function, were mentioned as other rent payment methods. While in China as a whole, cash is estimated to still be the most popular payment method, the younger population especially in large cities is increasingly switching to paying their rent via mobile applications like Alipay and WeChat.

3.3.6 P2P payments

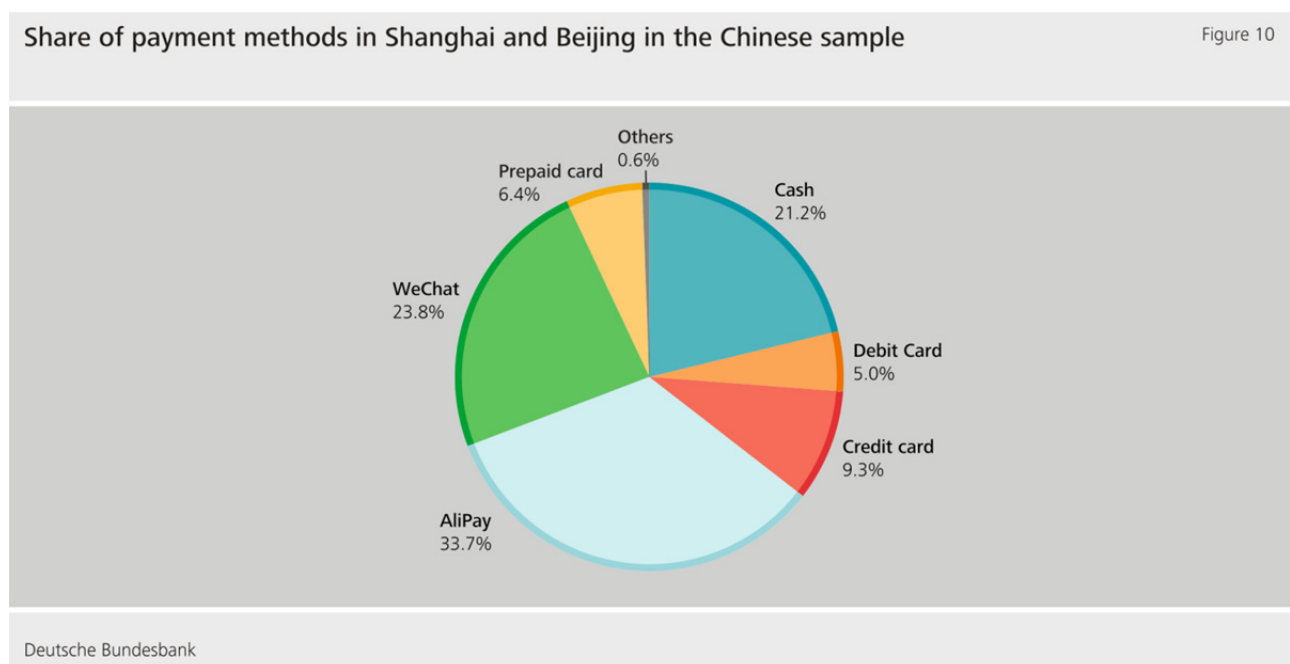
In Germany, surveys indicate that most payments from one private individual to another are settled in cash. For example, according to the Bundesbank’s payment behaviour survey among consumers, 87.1 % of payment turnover from one private individual to another was settled in cash, 7 % via credit transfer and 5.9 % via other cashless payment methods (Deutsche Bundesbank 2015). However, since underlying data are from 2014, various innovative peer-to-peer or person-to-person (P2P) mobile and online payment solutions that entered the market in recent years, are not covered in the survey. For instance, PayPal offers a P2P payment function in Germany based on the PayPal e-mail addresses. Another mobile P2P payment function that is also linked to an online shopping payment provider was recently introduced to the German market by paydirekt (SOURCE 2017a). Moreover, both the German savings banks and the German cooperative banks offer their own P2P payment applications. However, as of 2017 these applications only play a niche role compared to the total size of the German payments market (see section 3.2). For example, as of March 2017 the savings banks network application “Kwitt” had a total number of transactions of approximately 0.5 million in the first three months after its launch (Handelsblatt 2017b).

In China, both market dominating payment providers Alipay and WeChat offer functionalities for money transfers directly from one person’s Alipay/WeChat account to another. Alipay offers a “go-

ing-dutch” function originally invented to split the bill in a restaurant or similar situations. Dutch people are said to split their bill based on each person’s consumption, while in other countries one peer might pay for the whole table. However, the most popular player in P2P payments in China is WeChat. Due to its history as a messenger application it was a small step for Chinese consumers to also use WeChat to send money to their peers. Since 2014, WeChat offers a P2P payment functionality called “red envelopes”. The name refers to the tradition of handing over family members, relatives and close friends red envelopes which contain money around the time of Chinese New Year. In 2016, WeChat delivered 8.08 billion digital red envelopes, which amount to 10.6 envelopes per user. Alipay also launched its own red envelope exchange service called Lucky Money (Fung Global Retail & Tech 2017). Considering the strong position of WeChat in P2P payments, its share on the overall payments market most likely is stronger than our data suggest given that P2P payments were not part of our sample. Aside from that, many person-to-person payments in China are still settled in cash. Due to lack of data availability, no indication can be given on the share of cash on total P2P payments volume though.

3.4 Regional differences in China

An influencing factor we came across in our analysis of payment behaviour data were significant differences in the adoption of mobile payment solutions, especially Alipay, between different cities. In particular, Alipay was significantly more common in Hangzhou than in Beijing and Shanghai. The likely cause for this overrepresentation of Alipay is that the Alibaba Group is headquartered in Hangzhou and thus special efforts in attracting merchants as well as consumers were made in its “home city”. The following graph shows the overall payment method share in our sample when leaving out data from Hangzhou based merchants.



Compared with the full sample, Alipay’s share is significantly lower (33.7% versus 39.5%) while WeChat’s share is higher (23.8% compared to 16.6%) when restricting the sample to Beijing and Shanghai. Thus, the competition for market share between Alipay and WeChat is likely to be closer

than the overall sample suggests. This evidence is also in line with other secondary sources indicating that Alipay and WeChat have comparably strong positions in the Chinese payment market.

4 Conclusions based on the empirical analysis

Our data show a high importance of mobile device based solutions in the Chinese payments market. However, the empirical part of this study focused on three metropolitan areas and research indicates that in some way there are still “two worlds” in Chinese payments. In retail stores, especially in metropolitan regions, there is a high share of mobile payments, while other payment processes, notably in rural areas, are often still settled in cash.

In Germany mobile payment solutions have only recently entered the market and as of now do not play an important role. Meanwhile, our analysis shows that the importance of cash at the POS in Germany is declining, but remains very high in comparison to the respective sectors in metropolitan China. However, large parts of payments in Germany are already digitalised, in particular due to the high importance of the direct debit offered by traditional banks.

The explanatory factors for the high adoption of mobile payment solutions offered by non-banks in China on the one hand and the remaining dominance of traditional payment instruments in Germany on the other hand, are given in the following.

“Leapfrogging” from cash to third-party mobile payments in China

Experts and secondary sources indicate that in the past the Chinese payments landscape both in metropolitan and rural areas was heavily relying on cash and a large share of population did not have access to reliable and efficient cashless payment services (see Kapron and Meertens 2017 and Euromoney 2017). For instance, even in 2011 36% of Chinese population above the age of 15 did not have a bank account – compared to 2% in Germany (World Bank 2015). Our research thus supports the hypothesis of “leapfrogging”. This means, Chinese consumers partly missed out earlier stages of banking evolution, from fixed-line telephone banking to credit cards and directly jumped/leapfrogged to using their smartphone for banking and payments, first and foremost the omnipresent Alipay and WeChat applications. This leads to the question which factors facilitated the emergence of mobile payment solutions in China.

Drivers of the emergence of Alipay and WeChat in China

The high rate of mobile payment transactions in general and the market success of Alipay and WeChat in particular relies on advantages for consumers and merchants as well as success factors related to basic technical infrastructure. Most importantly, Alipay and WeChat Pay were able to reach a “critical mass” of users relatively easily both on the consumer and merchant side. On the consumer side Alipay benefitted from growing together with e-commerce (i.e. Alibaba) and customers were willing to adopt Alipay in their online shopping process. WeChat on the other side was already present at consumer’s phones so that the barriers for users to also use WeChat’s payment functionality were relatively low. Moreover, third party non-bank payment providers in many cases

were more customer-oriented than other players according to sector experts. Lastly, there is empirical evidence that Chinese consumers are more willing to trust companies with their personal data than consumers from other countries, which helped Alipay, WeChat and others to develop their business (EY 2016). On the merchant's side, both Alipay and WeChat benefitted from having a large potential user base to start with – Alipay due to its linking with Alibaba and WeChat Pay due to its integration into the WeChat social platform. This made it attractive for merchants to also adopt these payment solutions. Moreover, experts describe both Alipay and WeChat as fast and convenient for merchants. This is in line with our survey results: When asking merchants for the most important criteria to offer a payment method, convenience was ranked first, followed by costs, safety and speed.⁶ Lastly, to offer the respective payment services at the POS, merchants only need some kind of mobile device and a mobile internet connection. Thus merchants benefit from low thresholds with regards to initial investments and the technology needed.

In addition, the non-bank payment service providers like Alipay and WeChat benefitted from the fact that banks at first missed out to provide convenient, fast and low-cost payment services for the POS as well as in e-commerce. Third-parties successfully filled that demand gap both at the POS and in e-commerce (World Economic Forum 2017).

Regarding basic technical infrastructure, mobile payment solutions entering the market benefitted from the ubiquity of mobile Internet. According to the National Bureau of Statistics 70% of the Chinese population were “mobile Internet subscribers” already in 2015, with this number likely to have risen even more in the past two years (National Bureau of Statistics of China 2016). Similarly, suitable hardware, i.e. smartphones and other devices with mobile internet access, became available at prices that are affordable already for a large part of population (Fung Global Retail&Tech 2017). Nowadays, already 74% of Chinese customers have a smartphone, proving the prerequisite for an adoption of mobile payments solutions on a large scale (CD Networks 2017).

Dominance of bank-run payment systems in Germany

The largest part of payments in Germany is made via cash, debit card, credit transfer and direct debit (see section 3.2). For all four payment instruments German banks provide essential infrastructure. First of all, German banks implemented a dense cash-distribution network with a high availability of ATMs (see BIS 2016) and thus met the consumer demand and preference for cash payments; a factor that contributed to the banks importance in the German payments market.

Another main characteristic of the German market is that almost all people hold a bank account and have access via their banks to a well-established and efficient cashless payment infrastructure (BIS 2012). For instance, the high share of debit card payments at the POS owes to the bank-run “girocard” system.⁷ Girocard dominates its domestic market with approximately 110 million cards

⁶ In a similar survey among German merchants safety was ranked as most important criteria, followed by costs and speed (see EHI 2017a).

⁷ For debit cards, the German banking industry community (Deutsche Kreditwirtschaft, DK) in 2007 introduced the brand name “girocard”, which is the superordinate and neutral umbrella brand for the German debit card scheme. It allows for the secure and simple use of debit cards using a PIN. The intention of the new branding was not only to simplify recognition of the scheme but also to facilitate the international acceptance of German debit cards in the SEPA region. To enable customers to make cross-border transactions, girocards in Germany are most often co-branded with one of the international debit card schemes Maestro or V-Pay (BIS 2012, 175).

issued and approximately 800,000 POS acceptance points. While German banks for many years extracted substantial profits from the girocard system, customers benefitted from relatively high safety standards and the protection of data against misuse from retailers. Moreover, German customers tend to stick to well-known payment solutions (see for example Cards Karten Cartes 2017). Thus, there was no urge for both the customers and the banks to “change a running system”. An additional factor owing to the strong role of banks is that (bank) account-to-account payment systems, i.e. credit transfer and direct debit, are well-established and widely used for example for recurring payments (see section 3.3.5).

Low adoption of mobile payment solutions in Germany

However, while banks relied on well-established, popular and profitable cashless payment schemes, they might have been less willing to invest into the establishment of new payment solutions. Due to their investments into cash infrastructure, banks also might have been committed to some extent to cash.

The low adoption of mobile payments in Germany owes to a number of additional factors: First, there was a lack of demand from consumers for mobile solutions - seeing the established mix of cash, cards and A2A payments as sufficient (Deutsche Bundesbank 2015, 55). Cash in particular still enjoys a high level of acceptance and is regarded as, for example, easier to handle, more secure and anonymous by German consumers (Deutsche Bundesbank 2015). In addition, many customers are sceptical towards mobile payment solutions: According to a survey of PWC on mobile payment adoption from 2017, 72 % of respondents see the danger that mobile payment data might be hacked or misused and almost half of respondents (47 %) do not trust mobile payment technology in general (PWC 2017). Data security and system safety issues also play a very important role for regulators in Germany and the EU. On the one hand, this ensures secure payment systems but on the other hand might pose barriers for new market entrants. Moreover, with Germany being part of the EU and its common market, regulators are continuously working to improve the common payment market. However, many different stakeholders as well as various national interests have to be taken into consideration which makes the implementation and standardization of EU-wide payment systems a big challenge.

While first German solutions (cf. Box 2) are based on the NFC technology, not all customers are equipped with (NFC-ready) mobile devices yet. In fact, the share of population owning a smartphone is lower than in China (65% compared to 74%, see CD Networks 2017). Even more than the hardware, the software seems to hinder the adoption of mobile payment solutions. As of 2017, the market for mobile payment solutions for customers is very fragmented and there is no market leader with a broadly accepted payment solution visible yet. However, from the consumer perspective a “widespread offering and acceptance” is seen as an important success factor for mobile payment solutions⁸, leading to a classical Chicken and Egg problem.

⁸ Most important success factors for mobile payments in Germany from the consumer perspective according to the PWC (2017) survey among over 1,000 consumers: 1. Security/data protection 2. easy and fast use 3. Low fees 4. Widespread offering and acceptance.

On the merchants' side, as of 2017, only 4 % of retailers see mobile payments in a dominating role 5 years from now (EHI 2017a). Considering the fierce competition in the retail sector, German retailers are likely to be less willing to invest into payment solutions with unclear prospects of success.

However, an adoption of mobile payment solutions at the POS in Germany is conceivable. Within the past years, similar to China, the ubiquity of fast mobile Internet and the fact that smartphones became a constant companion for many people provided essential prerequisites for the establishment of mobile payment solutions. In addition, the infrastructure of NFC-ready terminals at the POS, which allows for secure NFC technology based payments via mobile devices, is already well advanced. However, the most decisive factor for future changes in the retail payments landscape and the potential adoption of mobile device based payment applications in Germany is most likely the customers will to use or not to use the offered solutions. Lastly, the emergence of mobile devices might provide various opportunities for the established payment system landscape in Germany, since mobile payment solutions for end-users can be combined with cost effective, established payment instruments: One could think of an innovative mobile device based payment at the POS combined with a well-established, cost effective SEPA direct debit in order to settle the payment.

5 Outlook

In Germany, banks were in a relatively comfortable position by providing established and profitable services in the area of payments (cf. section 4). However, new challengers - newly founded "FinTech" firms as well as the so-called "GAFA / BigTechs"⁹ – are entering the payment market and might try to disintermediate the established payment value chain between payers, banks and payees. In addition, the 2014 interchange-fee regulation made card payments less profitable for the associated actors and holding ground in the payment market even more challenging (see for example Oliver Wyman 2016). Building on our study of the status quo, two contrary scenarios for the future in German payment markets - instant payments guaranteeing a strong role of banks in the payment market versus a potential world in which non-bank platforms become leading players - are provided.

For China, our analysis showed a strong position of mobile payment solutions. In the outlook a potential development towards a cashless society and tendencies towards an alignment of the Chinese and German payment market are presented in brief.

Instant Payments as a possible driver in Germany

Instant payments could lead to significant changes for both banks and merchants. Due to the SCT^{Inst} scheme developed by the EPC, retail payments can be settled in near real time 24/7 from 2017 on. Instant Payments offer possibilities for German banks to defend their influence in the re-

⁹ GAFA is an acronym for Google, Amazon, Facebook and Apple – four leading technology giants from the US.

tail payments “value chain”. Thus, instant payments could strengthen consumer – bank relations and put banks (back) in a position as prime customer contact point in the area of payments. In the following, intermediaries like PayPal that install themselves and their services between banks and customers as well as merchants could lose significance. A driver of this development could be that German customers have relatively high trust in their banks – an aspect of high importance for the safety-conscious German consumer in the sensitive area of payments (SRC 2016). On the other hand, Instant Payments might offer new business opportunities for third-parties, for example by offering added value for the retailer side. This might be facilitated by the revised Payment services Directive (PSD2) which will give third-parties a regulated access to customers’ bank account information.¹⁰

Following this, things could drastically change for merchants as well. For merchants, Instant Payments could be like cash, but without its disadvantages. According to a position paper of the German federal retailer association HDE, an Instant Payments scheme with end user solutions for POS and e-commerce would bring added value for retailers. Similar to cash, sale revenues would be settled and available nearly in real-time and not with delays of one to several days (standard credit transfers or card payment) (HDE 2017). In contrast to cash, payments could be settled with less logistical and safety efforts. In case it came to a disappearance of some intermediaries, retailers could save additional fees. According to the retailer association, an important driver of a success of Instant Payment in retail would be the standardization of interfaces between banks and retailers (HDE 2017).

Platforms / internet giants as leading payment market players in Germany

Another possible scenario could entail a leading role of non-bank internet platforms and technology giants like Alibaba, Tencent (WeChat Pay), Samsung and others from Asia and Apple, Facebook and others from the USA in the German payments market. More and more of these giants tend to create comprehensive digital ecosystems with integrated payment systems using mobile apps. In a next step, online payment systems could be used offline at the POS (see SRC 2016, HWWI and Berenberg 2017 and others). In a platform dominated payment ecosystem, banks face the challenge of getting access to the respective e-wallets and risk to lose direct contact to customers in large parts of the payment market. This could reduce the role of banks to infrastructure operators (see for example SRC 2016). Just as the banks, the merchants would have to adapt to the new players. Bringing with them a large number of users, these players would have a powerful argument to place their payment solutions at the POS. Merchants might not want to miss out on a large potential new customer base and thus feel obliged to cooperate with new payment market players (see PWC 2017 and SRC 2016).

¹⁰ In October 2015, the European Parliament adopted the revised Payment services Directive (Directive 2015/2366), the so-called PSD2. One main scope of the PSD2 is to enable third parties to access bank account information. With the PSD2, a new category of overseen companies, the so-called third-party payment service providers (TPP) has been introduced. The PSD2 defines two types of TPPs - account information service providers and payment initiation service providers - which will both get regulated access to customer data.

In this course, a significant role of Alipay as part of the Alibaba ecosystem is imaginable. Actually, a possible next step of Alipay and WeChat could be to market their services not only to Chinese tourists but also to German customers both online and at the POS.

The future of cash in China

The development towards a world of payments without cash is already advanced in China. According to sector experts, in some cities it might be possible already today to live without cash and during recent cashless payment marketing campaigns of Alipay and Tencent in summer 2017, some shops even rejected cash payments. However, in our opinion, cash will continue to play a significant role in payments in the upcoming years. First and foremost, the Chinese Central Bank works towards a future in which cash payments still play a role and recently emphasized that the Renminbi has to be accepted countrywide due to its status as legal tender. Furthermore, cash still has certain advantages especially for rural regions, like its independence from technical infrastructure. This will most likely ensure a certain level of cash usage along with higher usage rates in rural regions than in metropolitan areas.

Tighter oversight for non-bank payment services in China

While in the early years, China has taken a pragmatic “wait and see” regulatory approach towards the upcoming third-party mobile payment service providers (Kapron and Meertens 2017), they are increasingly getting into the focus of authorities’ attention. For instance, the PBOC is currently setting up a centralized clearing platform to more closely oversee the growing market of third-party payments. The platform is run by the “China Nets Union Clearing Corporation”, which is jointly owned by market players and the PBOC.¹¹ The new platform covers transactions from and to third-party payment firms and banks, while the current UnionPay clearing service was for bank-to-bank transactions only. Under the current direct connection model payment service providers are directly connected with a number of banks, bypassing the central bank’s clearing system and making it difficult for the PBOC to track and monitor capital flows and leaving loopholes for example for money laundering (South China Morning Post 2017). Moreover, due to the new centralized platform, Alipay and co. lose their exclusive access to valuable customer payment data. PBOC announced that banks and non-bank payment service providers will be linked to the clearing platform until October 2017 and be ready to route payments from June 30, 2018 on.

Payment markets in China and Germany getting more similar

All in all, it is probable that the payment markets in China and Germany might get more similar in the future. For instance, mobile payment solutions might play a larger role in Germany, having in mind for example recently started mobile payment applications (see Box 2). Additionally, the PSD2 might facilitate the entrance of new non-bank actors into the German payments market.

On the other hand, the payment market in China will most likely become more regulated. For instance, the PBOC initiative of a centralized clearing platform for third-party-payments comes to

¹¹ Alipay and Tencent’s payment service subsidiary Tenpay each own around 10%, 36 other non-bank payment providers own another 45%, while the remaining 35% are owned by six entities associated to the PBOC (Forbes 2017).

mind. Lastly, while the market for cashless POS payments is currently bank-dominated in Germany and non-bank dominated in China, Chinese banks might be able to regain a part of the market in the future. For instance, Chinese regulators recently permitted traditional banks to also use QR code scanning to process mobile payments (Forbes 2017).

6 References

Alibaba Group Holding Limited (2016): Annual Report 2016. Available online:

http://www.alibabagroup.com/en/ir/pdf/agm160524_ar.pdf

BIS (2016): Statistics on payments 2011 – 2015, CPMI – Red Book statistical up-date - December 2016.

BIS (2012): Payment, clearing and settlement systems in Germany.

Cards Karten cartes (2017): Zeitschrift für Zahlungsverkehr und Kartendienstleistungen, No 2, 10 May 2017. Fritz Knapp Verlag: Frankfurt a.M.

CDNetworks (2017): “Webnutzung im Vergleich: China vs. Deutschland“

<https://www.cdnetworks.com/de/infomaterial/infographics/webnutzung-im-vergleich-china-vs-deutschland>

Deutsche Bundesbank (2015): Payment behaviour in Germany in 2014 - Third study of the utilisation of cash and cashless payment instruments. Deutsche Bundesbank: Frankfurt a. M.

DKV (2017): DKV Euroservice website: <https://www.dkv-euroservice.com/dkv-card/tankkarte-de/?gclid=CO6c-oWx9NMCFUaeGwod7YoMNw>

ECB (2016a): European Central Bank Payments statistics 2016. Available online: <http://sdw.ecb.europa.eu/reports.do?node=1000004051>

EHI (2017a): Kartengestützte Zahlungssysteme im Einzelhandel 2017. EHI Retail Institute: Cologne.

EHI (2017b): Online-Payment 2017. EHI Retail Institute: Cologne.

eMarketer (2016): “China Eclipses the US to Become the World's Largest Retail Market - Mobile now accounts for more than half of all ecommerce sales in China”. Article available online: <https://www.emarketer.com/Article/China-Eclipses-US-Become-Worlds-Largest-Retail-Market/1014364>

Euromoney (2017): “Inside ANT Financial’s nest”, May 2017 issue, article written by Chris Wright.

EY (2016): The Rise of FinTech in China - Redefining Financial Services. A collaborative report by DBS and EY. Available online: [http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of-fintech-in-china/\\$FILE/ey-the-rise-of-fintech-in-china.pdf](http://www.ey.com/Publication/vwLUAssets/ey-the-rise-of-fintech-in-china/$FILE/ey-the-rise-of-fintech-in-china.pdf)

EY (2015): "E-commerce strategy and must-haves in China" [http://www.ey.com/Publication/vwLUAssets/ey-ecommerce-strategy-and-must-haves-in-China/\\$FILE/ey-ecommerce-strategy-and-must-haves-in-China.pdf](http://www.ey.com/Publication/vwLUAssets/ey-ecommerce-strategy-and-must-haves-in-China/$FILE/ey-ecommerce-strategy-and-must-haves-in-China.pdf)

Forbes (2017): "How China's Central Bank Is Clamping Down On The Mobile Payment Industry", Article by Jinshan Hong, available online: <https://www.forbes.com/sites/jinshanhong/2017/08/18/how-chinas-central-bank-is-clamping-down-on-the-mobile-payment-industry/#38c9f64a50be>

Fung Global Retail & Tech (2017): "DEEP DIVE: Mobile Payments In China". Report available online: <https://www.funglobalretailtech.com/research/deep-dive-mobile-payments-china/>

Handelsblatt (2017a): „Angreifer aus Fernost - Die mächtigsten Konkurrenten der US-Technologiefirmen sitzen in China. Alibaba, Tencent und Baidu sind auf dem riesigen Heimatmarkt reich geworden. Jetzt greifen sie global an.“. Handelsblatt No 134.

Handelsblatt (2017b): "Start-up macht Sparkassen-App Konkurrenz". Article from 10 March 2017. Available online: <http://www.handelsblatt.com/finanzen/banken-versicherungen/fintech-lendstar-start-up-macht-sparkassen-app-konkurrenz/19496642.html>

HDE (2017): „Instant Payment – HDE-Position zur Schaffung einer modernen europäischen Zahlungsinfrastruktur“, 20 July 2017. Available online: <https://einzelhandel.de/index.php/zahlungssysteme/item/127736-hde-position-zu-instant-payment>

HWWI and Berenberg (2017): Die Zukunft des Geldes – das Geld der Zukunft. Joint study of Berenberg and Hamburgisches Weltwirtschaftsinstitut (HWWI).

Kapron, Z.; Meertens, M. (2017): "Social Networks, e-Commerce Platforms, and the Growth of Digital Payment Ecosystems in China: What It Means for Other Countries." Better Than Cash Alliance Research Series, April 2017. Available online: <https://www.betterthancash.org/tools-research/case-studies/social-networks-ecommerce-platforms-and-the-growth-of-digital-payment-ecosystems-in-china>

Kleiner Perkins (2017): "Internet Trends 2017". Presentation available online: <http://dq756f9pzlyr3.cloudfront.net/file/Internet+Trends+2017+Report.pdf>

National Bureau of Statistics of China (2016): China Statistical Yearbook 2016. <http://www.stats.gov.cn/tjsj/ndsj/2016/indexeh.htm>.

NFC World (2017): "WeChat Pay and offline mobile payments see "incredibly high" uptake in China", results from research of China Tech Insights, article from April 26, 2017. Available online: <https://www.nfcworld.com/2017/04/26/351800/wechat-pay-offline-mobile-payments-see-incredibly-high-uptake-china/>

Oliver Wyman (2016): Zahlungsverkehr in Europa http://www.oliverwyman.de/content/dam/oliver-wyman/europe/germany/de/insights/publications/2016/dec/Oliver_Wyman_Zahlungsverkehr_in_Europa_08122016.pdf

PWC (2017): "Mobile Payment Report 2017 – What customers really want". Available online: <http://www.pwc.de/de/digitale-transformation/studie-mobile-payment-report-2017.pdf>

SEO Shifu (2017): "An Overview of Popular Online Payment Methods in China" <https://chineseseoshifu.com/blog/online-payment-methods-china.html>

SOURCE (2017a): „paydirekt startet mit Handy-zu-Handy-Zahlfunktion“. SOURCE Informationsdienst, No. 7, 17 July 2017.

SOURCE (2017b): Zahlen, Fakten, Hintergründe für Karten-Experten. SOURCE Informationsdienst, No. 4, 18 April 2017.

South China Morning Post (2017): "China sets up clearing house for online payment services like Alipay and Tenpay". Article from August 7, 2017.

SRC Security Research & Consulting (2016): „Bezahlen 2025 – Eine Szenarioanalyse zur Zukunft des Bezahlens in Deutschland 2025“. Joint study in cooperation with Z_punkt and Fraunhofer INT.

Stolte Consult (2017): Jahrerhebung 2016 – POS und Zahlssysteme auf Tankstellen in Deutschland.

Tencent Research Institute (2017): "2017 Mobile Payment Usage in China Report". Report co-launched by Tencent Research Institute, The Chongyang Institute for Financial Studies at Renmin

University of China and Ipsos research. Available online:

https://www.ipsos.com/sites/default/files/ct/publication/documents/2017-08/Mobile_payments_in_China-2017.pdf

Wirecard (2017): Wirecard half-year report 2017. Available online:

<http://ir.wirecard.de/download/companies/wirecard/Quarterly%20Reports/DE0007472060-Q2-2017-EQ-D-00.pdf>

World Bank (2015): Global Findex: Financial Inclusion data 2014. Database available online:

<http://datatopics.worldbank.org/financialinclusion/country/china>

World Economic Forum (2017): Beyond Fintech: A Pragmatic Assessment Of Disruptive Potential In Financial Services. Report available online: <https://www.weforum.org/reports/beyond-fintech-a-pragmatic-assessment-of-disruptive-potential-in-financial-services>

World Tourism Organization (2016): Yearbook of Tourism Statistics Dataset. Available online:

<http://www.e-unwto.org/doi/pdf/10.5555/unwtotfb0280071220112015201609>